PEPIN COUNTY MULTI-HAZARDS MITIGATION PLAN 2017-2022

This plan serves to update the original Pepin County Multi-Hazard Mitigation Plan (2012-2016) that was developed by the Mississippi River Regional Planning Commission. Pepin County is updating the plan through the Pre-Disaster Mitigation Program with grant funding made available through Wisconsin Emergency Management and the Federal Emergency Management Agency. This plan was created through a collaborate effort of the Pepin County Land Management Department, Law Enforcement Committee, and participating communities.
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FEMA Approval Letter

To be included when available
WEM Approval Letter

To be included when available
Section 1. Planning Process

A. Plan Purpose

The Pepin County Multi-Hazard Mitigation Plan has been prepared because of the county’s successful application to the Pre-Disaster Mitigation (PDM) Grant Program funds. These funds are distributed by the Federal Emergency Management Agency (FEMA) through Wisconsin Emergency Management (WEM).

The primary purpose of this plan is to evaluate exposure to hazards and identify mitigation goals, projects, and actions the county, other local governments, and other organizations can undertake to continue to reduce risks to life, health, and property within Pepin County.

The development of the original Pepin County Multi-Hazards Mitigation Plan was the result of the passage of the Disaster Mitigation Act of 2000. This Act (Public Law 106-390) signed into law on October 30, 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act and provides the legal basis for the requirement of local mitigation plans. The requirements and procedures for local mitigation plans are found in the Code of Federal Regulations at Title 44, Chapter 1, Part 201. The amendment to the Stafford Act emphasizes identifying hazards before they occur and taking actions to prevent, or at least to reduce, potential losses. Hazard mitigation reduces the potential of future public and private expenditures and speeds up response and recovery from disasters.

This plan is developed to be consistent with the Code of Federal Regulations and encompasses all natural hazards that pose a significant risk to Pepin County and all the municipalities within its borders. The Pepin County Multi-Hazard Mitigation Plan was updated in a manner that conforms to all hazards mitigation planning requirements that are established by the federal government. Pepin County has chosen to include some non-natural hazards within the plan scope. Per FEMA guidance, manmade or human-caused hazards may be included in the plan, but these are not required and will not be reviewed to meet the requirements for natural hazards.

Development of this plan will help the county, its communities, and residents to identify its areas of risk, assess the magnitude of risk and develop strategies for reducing hazard risks. Through this process, Pepin County can address issues related to the protection of life, property, and critical services while reducing the costs associated with natural disaster relief and rescue efforts.

Completion and approval of this plan will make the county and participating jurisdictions eligible to apply for future FEMA hazard mitigation project grant funding. Pepin County may be more reliant on mitigation to reduce potential damages, especially if natural disasters increase in frequency and severity. As a small county, our resources are limited which means we may need assistance from other counties and the state to recover from large disasters incidents. Due to limited budgets at the County, City, Village, and Town levels; this plan will be instrumental in identifying potential needs within the county and should help the communities to identify projects that could benefit from funding through both public and private grant opportunities.
Over the past five years, Pepin County, in a collaborative effort with its various departments, towns, village, and city governments, and private businesses has made progress on the following mitigation goals and actions:

- Enforcement of NR116 Floodplain Regulations
- Initiated process to buy out a repetitive loss property within the county.
- Purchased back-up generators for Pepin County government building locations
- Progress on paving roadways vulnerable to washouts
- Lined sewers along Madison Street in the City of Durand
- Storm drainage improvements on Madison and Washington Streets in the City of Durand
- Purchased portable generator for use at City of Durand facilities

B. Planning Process

Pepin County contracted with the Mississippi River Regional Planning Commission to create the original hazard mitigation plan that was adopted by the county and approved by FEMA in June 2012. In 2015, when applying for the Pre-Disaster Mitigation Grant to update the plan, Pepin County decided to have the work done in house to ensure that the plan reflects the capabilities of local communities, businesses, and response agencies to prepare for, mitigate, and respond and recover from disasters.

Development of the Pepin County Multi-Hazard Mitigation Plan was based on the planning requirements and guidance provided by the Federal Emergency Management Agency (FEMA) and the Wisconsin Department of Military Affairs, Wisconsin Emergency Management. As such, the plan meets the requirements of the Disaster Mitigation Act of 2000. The plan is inclusive of all of Pepin County and is considered a multi-jurisdictional plan under federal guidelines.

To guide the plan’s development and update process, the Pepin County Law Enforcement Committee was designated as the steering committee, as identified in the original plan. The committee has five representatives of the Pepin County Board of Supervisors including: Steven Anderson, Gerald M. Bauer, Jeffrey Fregine, James Kraft, and Bruce Peterson. Additionally, over 20 individuals were identified as key stakeholders and were encouraged to attend committee meetings to participate in the decision-making process; these individuals were notified at the beginning of the planning process that the Hazard Mitigation Plan to attend Law Enforcement Committee meetings if interested in participating in the process. Outreach was made to gather information from subject area experts, especially in regards to non-natural disasters and emergencies that have occurred within the County in the past.

The planning process officially started in the middle of April 2016. All time spent developing the plan was documented as Pepin County received a Pre-Disaster Mitigation grant to update the Pepin County Multi-Hazard Mitigation Plan. FEMA and Wisconsin Emergency Management awarded funds to Pepin County, with the expectation that the plan be updated in a manner that meets state and federal guidelines. Pepin County provided a 25% match to complete the grant, which includes volunteer time of county board members and residents as well as the time and effort of GIS staff for developing maps used in the plan.
C. Community Involvement

The County has utilized numerous press releases, a survey, a series of public awareness seminars, and the Pepin County Law Enforcement Committee meetings as the primary methods of community involvement in the update of the Pepin County Hazard Mitigation Plan. The Emergency Management Director identified a group of stakeholders who are reminded of the meetings and seminars prior to the events being held to ensure that those with insight on hazard issues were invited to be part of the conversation.

The press releases serve to inform the public of the update process and how they can be involved. The first newspaper article invited residents to fill out a hazard risk assessment survey and to contribute their experiences of past disasters in Pepin County. The second press release served to remind residents of the public awareness seminars that were being held in the county and that they could participate in the update of the hazard mitigation plan through discussions being held as part of Law Enforcement Committee meetings.

The surveys were distributed to every elected official in the county, which includes all members of the City of Durand Council, the Village Boards in Pepin and Stockholm, the town boards of each of the eight towns in Pepin County, and all the County Board Supervisors. The survey was also distributed to community stakeholders and available to the public upon request. A copy of this survey is in Appendix A.

The public awareness seminars were designed to be educational sessions that the public can attend; a total of five seminars were held as part of the plan update process. These seminars were advertised in the local newspaper, cable channel, and posters throughout the county. The purpose of the public awareness seminars is to serve as a mechanism to educate residents about local hazards and raise awareness for ways the county can attempt to mitigate certain hazards. Pepin County believes that increased awareness is our primary stepping stone towards resiliency, as informed individuals will take steps to reduce the impacts of hazards on their own property.

- July 6, 2016 – Severe Summer Weather: focusing on tornadoes, thunderstorms, lightning, hail, and high wind events. This seminar was held the day after a real-life event which presented many of the discussed hazards to the residents of Pepin County. Therefore, the participants could review actions that would have reduced damages and increased the efficiency of response and recovery actions. We also covered different ways that residents can receive weather alerts so that they know when to take protective actions.
- August 3, 2016 – Heat Related Hazards: includes extreme heat, drought, agricultural hazards, and forest and wildland fires.
- September 7, 2016 – Flooding: encompasses all potential sources of flooding and how residents can prepare for flooding and protect their property.
- October 5, 2016 – Land Based & Manmade Hazards: highlights an assortment of hazards including fog, earthquakes, landslides, subsidence, large scale health outbreaks, chemical spills/accidents, and train derailments. This session will also cover any other topic that has been identified by the update of the countywide risk assessment.
- November 2, 2016 – Winter Hazards: concentrates on extreme cold, blizzards, heavy snow storms and ice storms that are common in Wisconsin.
The Pepin County Hazard Mitigation Plan identifies the Law Enforcement Committee as having oversight of the update process. The update of the plan was discussed at the following Law Enforcement Committee meetings and covered a variety of topics. The County Board had elections in April and reorganized committee members, so we delayed the update process until after the new committees were established.

- March 7, 2016 – Approved budget modification for Pre-Disaster Mitigation Grant; this meeting marks the acceptance of the grant by Pepin County. The grant acceptance paperwork was signed the following week by the Administrative Coordinator.
- June 13, 2016 – Hazard Mitigation Plan Update – distributed existing Hazard Mitigation Plan to oversight committee and reviewed their role as the steering committee for updating the plan.
- July 27, 2016 – Evaluated hazard rankings and assessments and updated the list of critical facilities within the county.
- September 12, 2016 – Reviewed progress of the updates to the Hazard Mitigation Plan and answered committee questions.
- November 7, 2016 – Reviewed hazard profiles and potential hazard mitigation ideas for winter storms, extreme cold, flooding, water contamination, extreme heat, and thunderstorms.
- January 9, 2017 – Reviewed hazard profiles for the remaining hazards and identified additional hazard mitigation ideas. After all the hazard profiles were complete, the committee discussed updates to the county-wide hazard mitigation goals and action items as well as identified emergency management projects that should be pursued if grant funding is available.
- February 13, 2017 – Finalized Pepin County Hazard Mitigation Strategies and proposed changes to the Plan Maintenance and Adoption section of the plan related to future review of plan.
- March 3, 2017 – Special request to attend Board of Health Committee Meeting to discuss the Public Health hazard included within the Hazard Mitigation Plan.
- March 13, 2017 – Final oversight committee review of Hazard Mitigation Plan draft and approval to submit to State of Wisconsin for review
- Public Informational Session prior to adoption – Plan to be distributed to all neighboring counties, school districts, local libraries, and the Mississippi River Regional Planning Commission with invitation to participate and provide input to be incorporated as part of the final review process.

The following individuals offered their professional experiences, opinions, and advice on hazards or other subject matter included within the plan:

- Chase Cummings and Travis Drier – Pepin County Land Conservation Department
- Joel Wener, Greg Balow, and Jeff Krisik – Pepin County Sheriff’s Office
- Maria Nelson and Jacki Drier – Pepin County Land Management Department
- Heidi Stewart and Lisa Traun – Pepin County Health Department
- John Hanz – Pepin County Highway Commissioner
- Jesse Van Alstine – Village of Pepin Police Chief
- Durand, Pepin, and Lund Fire Departments
- Lisa Olson-McDonald – Regional Emergency Management Director
- Katie Sommers – State Hazard Mitigation Officer
D. Multi-Jurisdictional Planning Approach

The Pepin County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan and encompasses all incorporated and unincorporated municipalities within Pepin County. All participating jurisdictions in Pepin County were actively involved in the planning process through the following means:

- The Law Enforcement Committee includes representation from different areas in the county.
- The Hazard Mitigation Plan update planning process was discussed at the Pepin County All Towns Association meeting in June 2016.
- A risk assessment survey was sent to all municipal elected officials and representatives within the county to identify hazards and evaluate each community’s assessment of hazards of concern. A total of 74 surveys were distributed to county board members, town board members, village boards, and the city council. A total of 25 surveys were filled out and returned; 14 responses were from unincorporated towns, 2 represented the Village of Pepin, 3 from the Village of Stockholm, and 6 surveys were completed by representatives from the City of Durand. Members of the public were also encouraged to request a survey if they wanted to participate. All copies of the surveys are available for viewing at the Pepin County Land Management Department.
- Communicated with towns, villages, and city to gather input and update hazard mitigation goals, projects, and action items. This information was distributed to town clerks and chairs, village presidents and clerk, and the mayor and administrator in the City of Durand. Unique hazard-related issues or strategies were identified for each incorporated community. See Appendix B for the letters that were distributed along with each community’s goals from the original Hazard Mitigation Plan. Most towns communicated their responses in person or via telephone, while the City and Villages communicated via email. All responses and updates have been documented.
- Additional follow-up contacts were made with local jurisdictions as needed. Draft strategies were sent to each town, village, and city for further comment, accompanied by an invitation to attend the final review meeting prior to it being sent to the state for review.
- Prior to adoption, a public hearing will be held to allow any members of the public to express concerns or provide comments on the plan. The Pepin County Multi-Hazard Mitigation Plan will be posted on the Pepin County website, www.pepin.co.wi.us and will be distributed to all neighboring counties, school districts, local libraries, and the Mississippi River Regional Planning Commission with invitation to participate and provide input to be incorporated as part of the final review process.

Plan Contact Information

For further information, pertaining to this plan contact:

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pepza@co.pepin.wi.us
## List of Individuals Involved in Hazard Mitigation Plan Update Process

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Section 2. Community Profile – Pepin County

The community profile section of the plan provides background data for a better understanding of the geographic, socioeconomic, and other important aspects of Pepin County that could impact the occurrence of hazards or recovery and response to natural disaster and emergencies. Included in this section is a description of natural and demographic characteristics, general development trends, and an inventory of critical facilities.

A. Geographic Location

Pepin County is in western Wisconsin along the Mississippi River and is one of the smallest counties in the State of Wisconsin. The county is 249 square miles, of this total water encompasses about 7.8% which reduces the total area of the county to approximately 232 square miles. Pepin County is bordered by the Mississippi River to the west, Pierce and Dunn Counties to the north, Eau Claire County to the east, and Buffalo County to the south.

Pepin County has 11 municipal governments within its jurisdictional boundaries including the Towns of Albany, Durand, Frankfort, Lima, Pepin, Stockholm, Waterville, and Waubeek, the Villages of Pepin and Stockholm, and the City of Durand which were all included within this plan.
B. Natural Features and Environment

Pepin County is part of Wisconsin’s Western Upland geographical province and is part of the Driftless Area. In general, the western half of the county is characterized by a plateau, capped with limestone, in which streams have cut deep steep-sided valleys which are collectively commonly referred to as “coulees and ridges”. Within portion of the county that is characterized by highly eroded non-glaciated topography, the steep sided valleys are heavily forested with hardwoods while agricultural activities are confined to valley floors and ridge tops. The central portion of the county to the eastern edge consists of smooth to undulating uplands and areas of sandy and gravelly outwash underlain by eroded, weak, Cambrian sandstone. Much of the landscape is used to support agricultural production.

Watersheds

A watershed is an area of land that drains or “sheds” its water to a lake, river, stream, or wetland. Watersheds vary in size and may cover several hundred square miles to only a few square miles that surround a lake. It is important to understand the concept of watersheds as the natural and man-made activities in one area can impact the hazard potential in other areas of the watershed. For example, stormwater runoff and flash flooding from a heavy rainfall upstream in a watershed will eventually reach the downstream part of the watershed.

Pepin County is located almost entirely in the Lower Chippewa River Basin with a very small portion in the southeast part of the county in the Black-Buffalo-Trempealeau Basin. There are six major watersheds and sixteen sub-watersheds in the county. Those six major watershed are based on Wisconsin Department of Natural Resources delineation include the Bear Creek, Eau Galle River, Lower Buffalo River, Lowes and Rock Creeks, Plum Creek, and Rush River. Specific information about each individual watershed is available in the Pepin County Comprehensive Plan.
Lakes, Rivers, and Streams

The Wisconsin Department of Natural Resources identifies 12 named and 26 unnamed lakes within Pepin County. Lake Pepin, the largest lake in the county and second largest lake in the state, is part of the Mississippi River and forms a natural border between Wisconsin and Minnesota. The largest named lakes are displayed to the right. Many of these lakes, such as The Bay, Fortyacre Lake, Chimney Lake, and most of the unnamed lakes are part of the backwaters of the Chippewa and Mississippi Rivers. As noted above, the two most prominent rivers in Pepin County are the Mississippi and the Chippewa Rivers. There are number of rivers, streams, and creeks that flow through Pepin County; the most well-known include: Arkansaw Creek, Bear Creek, Bogus Creek, Cranberry Creek, Duscham Creek, Eau Galle River, Elk Creek, Fall Creek, Little Arkansaw Creek, Lost Creek, Nine Mile Slough, Plum Creek, and Porcupine Creek. The water features present within Pepin County create the threat of hazards such as flooding to many portions of the county.

<table>
<thead>
<tr>
<th>Lake Name</th>
<th>Size (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Pepin</td>
<td>24,550</td>
</tr>
<tr>
<td>Silver Birch Lake</td>
<td>145</td>
</tr>
<tr>
<td>Fortyacre Lake</td>
<td>139</td>
</tr>
<tr>
<td>The Bay</td>
<td>102</td>
</tr>
<tr>
<td>Dead Lake</td>
<td>77</td>
</tr>
<tr>
<td>Thompson Lake</td>
<td>60</td>
</tr>
<tr>
<td>Wilcox Lake</td>
<td>55</td>
</tr>
<tr>
<td>Chimney Lake</td>
<td>33</td>
</tr>
<tr>
<td>Goose Pond</td>
<td>32</td>
</tr>
<tr>
<td>Browning Lake</td>
<td>23</td>
</tr>
</tbody>
</table>

Lakes, Rivers, Streams, Tributaries and Dam Locations within Pepin County
Wetlands

In the United States Code (16 U.S.C., Section 3801(a)(18)), the term wetland is defined "as land that (A) has a predominance of hydric soils, (B) is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions and (C) under normal circumstances supports a prevalence of such vegetation."

A wetland is a land area that is saturated with water, either permanently or seasonally, such that it takes on the characteristics of a distinct ecosystem. The primary factor that distinguishes wetlands from other land forms or water bodies is the characteristic vegetation of aquatic plants adapted to hydric soils. Every wetland is unique and may vary widely due to local and regional differences in topography, hydrology, vegetation, and other factors such as human involvement. Wetlands are important to the environment, most notably providing critical habitat for wildlife, water storage to prevent flooding, protection of water quality, and shoreline stability.

Pepin County has approximately 7,235 acres of wetlands that are dispersed throughout the county, this accounts for 4.9% of the total surface area. Most wetland areas are associated with the location of rivers, streams, and creeks. In general, the eastern portion of the county has a greater abundance of wetlands.

Wetland Areas in Pepin County
Pepin County Shoreland Protection Ordinance. The State of Wisconsin has delegated to counties the responsibility of protecting shoreland and wetland areas in unincorporated areas as a means of protecting water quality. Shoreland zones are designated as any land within 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 river or stream, or the landward side of the floodplain whichever distance is greater. Wetland areas are mapped by the Wisconsin DNR and can be found at: http://dnrmaps.wi.gov/SL/Viewer.html?Viewer=SWDV&runWorkflow=Wetland. These regulations are unique in that they regulate uses that may be detrimental to shoreland areas and preserve the shore cover and natural beauty by restricting the removal of natural shoreland cover, regulate development and building sites, and controlling excavation, filling, and other earth moving activities.

Floodplains

A floodplain is an area of land adjacent to a stream or river that experiences flooding during periods of high discharge. Throughout time, floods have altered the floodplain landscape as forces of water have eroded or built up areas with deposits of sediment. Floods are part of the Earth’s natural hydrologic cycle and result when an area receives more precipitation than the environment can handle. Floodplain terminology provided below to help understand a few concepts that may be discussed throughout this plan. Additional information is included within the flooding hazard profile.

The floodplain is that land that has been or may be covered by floodwater during the regional flood. The floodplain includes the floodway and flood fringe areas.

The 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. The floodway is the most dangerous part of the floodplain -- it is associated with moving water.

The flood fringe is the portion of the floodplain outside of the floodway that is covered by flood water during the regional flood. The term flood fringe is generally associated with standing water rather than flowing water. Development is allowed in the flood fringe subject to local floodplain ordinance requirements.

Per FEMA, the regional flood is the same as the 100-year flood, the 1 percent chance flood, or the base flood

In Wisconsin, the regional flood elevation is the elevation determined to be representative of large floods known to have occurred in Wisconsin or which may be expected to occur on a lake, river, or stream at a frequency of 1 percent during any given year.

The base flood elevation is the elevation determined by FEMA to which flood water is expected to rise during the base flood.

Wisconsin identifies the flood protection elevation as being 2 feet above the regional flood elevation.
Pepin County Floodplain Zoning Ordinances. 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 standards of the National Flood Insurance Program. The Villages of Pepin and Stockholm and the City of Durand have also been delegated the responsibility to administer floodplain zoning within their respective incorporated boundaries.

The contents of the Floodplain Zoning Ordinance are determined by the minimum state (Chapter NR116, Wisconsin Administrative Code) and federal standards (44 Code of Federal Regulation 59-72). In Wisconsin, new residential construction is prohibited in the floodway as it is deemed to be a high hazard zone. Improvements to existing floodway residential structures is limited to 50% of the equalized assessed value, therefore the Zoning Administrator needs to keep records of all improvements to their structure. Flood fringe properties need to have dry land access and prove that the proposed development is located at least 2 feet above the regional flood elevation. All forms of development within the floodplain require a permit.
National Flood Program Community Status

<table>
<thead>
<tr>
<th>Community</th>
<th>In Good Standing</th>
<th>Initial FHBM Identified</th>
<th>Initial FIRM Identified</th>
<th>Effective Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>V. Pepin</td>
<td>Yes</td>
<td>05/26/1972</td>
<td>05/26/1972</td>
<td>08/19/2010</td>
</tr>
<tr>
<td>V. Stockholm</td>
<td>Yes</td>
<td>12/12/1972</td>
<td>03/28/1975</td>
<td>08/19/2010</td>
</tr>
<tr>
<td>C. Durand</td>
<td>Yes</td>
<td>10/12/1973</td>
<td>06/01/1977</td>
<td>08/19/2010</td>
</tr>
<tr>
<td>Pepin County</td>
<td>Yes</td>
<td>12/16/1972</td>
<td>12/16/1972</td>
<td>08/19/2010</td>
</tr>
</tbody>
</table>

Enforcement and day-to-day administration of the local 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 based on the standards outlined in the Floodplain Ordinance. Local staff at the county, villages, and city are responsible for issuing or denying building permits, inspecting development, and maintaining records of floodplain activities. The County is expected to report to the DNR any local decisions on variances, appeals, amendments, and violations pertaining to floodplain zoning. Enforcement of violations are carried out by the Zoning Administrator and reported to the District Attorney for prosecution.

There are four primary floodplain management strategies for reducing the human economic losses from flooding as well as minimizing the losses of natural and beneficial floodplain resources. In most cases, a combination of these tools is needed to reduce risks and protect natural resources and functions. Therefore, it is important to consider all the options and account for both hazard and natural values before developing or implementing any action that will change the floodplain.

- **Strategy #1 Modify human susceptibility to flood damage**
  - Reduce disruption by avoiding hazardous, uneconomic, or unwise use of floodplains.
- **Strategy #2 Modify the impact of flooding**
  - Assist individuals and communities to prepare for, respond to, and recover from a flood.
- **Strategy #3 Modify flooding itself**
  - Develop projects that control floodwater
- **Strategy #4 Preserve and restore natural resources**
  - Renew the vitality and purpose of floodplains by reestablishing and maintaining floodplain environments in their natural state.
General Climate

The climate of Pepin County is classified as mid-latitude continental. This type of climate is characterized by warm, humid summers and cold, snowy winters. The weather in Pepin County is predicted out of the National Weather Service’s Twin Cities/Chanhassen Weather Forecast Office. There is one weather recording station in Durand, at the City of Durand Wastewater Treatment Plant and that provides information to the National Oceanic & Atmospheric Administration.

The City of Durand utilizes a standard rain gauge to collect the precipitation data and a snowboard to collect snow depth; the standard rain gauge is then utilized to convert snowfall into water equivalent units. Temperatures are recorded using a Nimbus Maximum/Minimum digital thermometer.

Normal weather conditions can be derived from records collected by the National Oceanic and Atmospheric Administration for Durand between 1981 and 2010 which help describe normal weather conditions within Pepin County. Average annual precipitation over the last 30 years is about 34 inches, most precipitation is rainfall in the summer, spring, and fall. The liquid equivalent of snowfall accounts for just over 3 inches of precipitation, although most communities within Pepin County can expect an about 3 feet of snow on an annual basis. Snow generally begins to fall in November and continues into spring. December through March generally see the greatest amounts of snow fall. Based on other regional sources, the record low temperature was -46 on February 5, 1895, while the record high temperature was 110 degrees on July 14, 1936.

<table>
<thead>
<tr>
<th>Month</th>
<th>Daily Maximum Temp (F)</th>
<th>Daily Minimum Temp (F)</th>
<th>Mean Temp.</th>
<th>Average Precipitation (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>25.5</td>
<td>4.3</td>
<td>14.9</td>
<td>1.09</td>
</tr>
<tr>
<td>February</td>
<td>29.2</td>
<td>8.4</td>
<td>18.8</td>
<td>0.92</td>
</tr>
<tr>
<td>March</td>
<td>41.4</td>
<td>20.3</td>
<td>30.9</td>
<td>1.87</td>
</tr>
<tr>
<td>April</td>
<td>56.9</td>
<td>34.2</td>
<td>45.6</td>
<td>3.22</td>
</tr>
<tr>
<td>May</td>
<td>69.0</td>
<td>46.0</td>
<td>57.5</td>
<td>3.84</td>
</tr>
<tr>
<td>June</td>
<td>78.1</td>
<td>56.5</td>
<td>67.3</td>
<td>4.68</td>
</tr>
<tr>
<td>July</td>
<td>82.8</td>
<td>61.2</td>
<td>72.0</td>
<td>4.06</td>
</tr>
<tr>
<td>August</td>
<td>80.4</td>
<td>58.8</td>
<td>69.6</td>
<td>4.70</td>
</tr>
<tr>
<td>September</td>
<td>72.6</td>
<td>49.2</td>
<td>60.9</td>
<td>3.85</td>
</tr>
<tr>
<td>October</td>
<td>58.7</td>
<td>37.8</td>
<td>48.3</td>
<td>2.42</td>
</tr>
<tr>
<td>November</td>
<td>42.3</td>
<td>25.1</td>
<td>33.7</td>
<td>1.90</td>
</tr>
<tr>
<td>December</td>
<td>29.1</td>
<td>9.8</td>
<td>19.5</td>
<td>1.15</td>
</tr>
</tbody>
</table>
C. Demographic, Economic, and Land Use Profile

Population

Per the last U.S. Census, Pepin County has a total of 7,469. The population in Pepin County has been stable for the last century. The 2010 U.S. Census data is displayed in the population pyramid to the right. This snapshot in time provides us with a basis understanding of the typical community structure. Youth, ages 0-19, appear to have fairly stable numbers. The sharp decrease in the chart at age 20 depicts out-migration of youth as they seek post-secondary education or employment opportunities. The bulk of Pepin County's population in 2010 are “baby boomers”; with the most populated age co-hort being 50-54 years of age. The generations born before 1946 slow a gradual decline in population as individuals age.

The projected population of Pepin County shows a significant change over time. The Wisconsin Department of Administration, Demographic Services Center has predicted that Pepin County reached its peak projected population in 2015 and is predicted to see a 7.8% decline in population by 2040. The State’s demographic models predict that by 2040, Pepin County will lose approximately 584 people primarily due to the impact of natural decrease. The Department of Administration’s projections also indicate that the majority of baby boomers are aging in place; therefore Pepin County may need to adapt to accommodate great numbers of special populations over time.

However, since this specific plan is designed to guide actions over the next five years, it is important to note that the 2020 Population Projection indicates a gradual decline in the number of children, fewer young adults returning to the county, and the baby boomers continuing to grow older in their homes. The projected
population, as depicted in the population pyramid to the right shows the predicted changes to the population over the timeframe of this plan.

**Housing**

While some hazards have an equal chance of occurring regardless of where people live, there are a few hazards that can be avoided based on the location of where we place housing. To get the biggest benefit from our mitigation dollars, it may be useful to know where the population of Pepin County lives. According to the U.S. Census Bureau there were a total of 3,579 housing units in Pepin County at the time of the 2010 Census. The table below depicts the population and number of housing units in each municipality throughout the county. The incorporated villages, city, and census designated places have the highest concentration of people, as one would typically expect. The Towns of Durand and Waubeek have the highest density of the rural townships, which can probably be attributed to the proximity to Durand and number of subdivisions within each town’s borders.

### Distribution of Housing Units in Pepin County

<table>
<thead>
<tr>
<th>Geographic Boundary</th>
<th>Population</th>
<th>Housing Units</th>
<th>Land Area (sq. miles)</th>
<th>Density: Pop/sq. mile</th>
<th>Density: Housing units/sq. mile</th>
<th>Average people per housing unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town of Albany</td>
<td>676</td>
<td>257</td>
<td>36.01</td>
<td>18.8</td>
<td>7.1</td>
<td>2.6</td>
</tr>
<tr>
<td>Town of Durand</td>
<td>742</td>
<td>284</td>
<td>18.37</td>
<td>40.4</td>
<td>15.5</td>
<td>2.6</td>
</tr>
<tr>
<td>Town of Frankfort</td>
<td>343</td>
<td>190</td>
<td>30.07</td>
<td>11.4</td>
<td>6.3</td>
<td>1.8</td>
</tr>
<tr>
<td>Town of Lima</td>
<td>702</td>
<td>266</td>
<td>35.92</td>
<td>19.5</td>
<td>7.4</td>
<td>2.6</td>
</tr>
<tr>
<td>Town of Pepin</td>
<td>721</td>
<td>443</td>
<td>45.32</td>
<td>15.9</td>
<td>9.8</td>
<td>1.6</td>
</tr>
<tr>
<td>Town of Stockholm</td>
<td>197</td>
<td>122</td>
<td>15.31</td>
<td>12.9</td>
<td>8.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Town of Waterville*</td>
<td>654</td>
<td>286</td>
<td>34.93</td>
<td>18.7</td>
<td>8.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Town of Waubeek</td>
<td>423</td>
<td>154</td>
<td>11.99</td>
<td>35.3</td>
<td>12.8</td>
<td>2.7</td>
</tr>
<tr>
<td>Arkansaw CDP</td>
<td>177</td>
<td>93</td>
<td>0.71</td>
<td>248.5</td>
<td>130.5</td>
<td>1.9</td>
</tr>
<tr>
<td>City of Durand</td>
<td>1,931</td>
<td>906</td>
<td>1.75</td>
<td>1,105.6</td>
<td>518.7</td>
<td>2.1</td>
</tr>
<tr>
<td>Village of Pepin</td>
<td>837</td>
<td>490</td>
<td>0.70</td>
<td>1,190.9</td>
<td>697.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Village of Stockholm</td>
<td>66</td>
<td>88</td>
<td>0.90</td>
<td>73.3</td>
<td>97.8</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Pepin County</strong></td>
<td><strong>7,469</strong></td>
<td><strong>3,579</strong></td>
<td><strong>231.98</strong></td>
<td><strong>32.2</strong></td>
<td><strong>15.4</strong></td>
<td><strong>2.1</strong></td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, 2010 Census: Population, Housing Units, Area, and Density

*Town of Waterville data does not include Arkansaw, which is a census-designated place.

Diving deeper into the U.S. Census Housing data provides a greater understanding of the types of homes people live in. Approximately 25% of the homes in Pepin County were built in 1939 or earlier, it appears that there were housing booms from 1970 to 1979 and 2000-2009; each decade accounts for 15% of the current housing stock. The Pepin County Comprehensive Plan suggests that the Village of Stockholm, Town of Pepin, and Town of Frankfort have the oldest housing stock, as more than 40% of housing units were built prior to 1949.

Eighty percent of homes in Pepin County are one unit detached housing structures. There are approximately 100 duplexes, over 350 multi-unit apartments, and 200 mobile homes within Pepin County. Eighty-four percent of housing units are occupied, while 16% are vacant; almost 60% of the
vacant housing units are utilized on a seasonal, recreational, or occasional use basis. Almost all the vacant housing units within the communities in the western half of the county are seasonal homes.

The value of housing within Pepin County’s housing stock vary significantly, as can be seen in the table to the left. Although a handful of people have expensive residences located within Pepin County, the median home value is only $133,000. The values of homes vary across the county when compared at the municipal level. The Town of Stockholm has the most expensive homes with a median value of $229,500. The values of homes appear to be lower than the median in urbanized areas of the county, which have larger numbers of small homes.

The Pepin County Comprehensive Plan indicates that the county sees an annual increase of approximately 8 new housing units per year, approximately 60% of these new housing units are built in unincorporated areas of the county. However, the data in the Comprehensive Plan was derived from the Wisconsin Demographic Services that may have been collected during a time of recession, therefore the county staff would not be surprised if these numbers increase as the economy improves. Based on current municipal boundaries, there may be land based constraints to development within Village and City limits compared to rural areas of the county.

Land Use

The most developed portions of the county include the City of Durand, Village of Pepin, unincorporated community of Arkansaw, and Village of Stockholm. Among these densely populated areas of the county, Durand and Pepin provide both public water and sewer, Arkansaw has a municipal sewer, while Stockholm residents have private sources. A few large groups of residential units, or subdivisions can be found in portions of the county, most notable in the Towns of Durand and Waubeek, Deer Island in the Town of Pepin, and some areas on the bluffs above Lake Pepin. Additionally, there is a business park in the Town of Waubeek with numerous commercial and industrial enterprises which is located at the crossroads of Highways 10 and 25. Otherwise, unincorporated portions of the county primarily consist of farmland and forests with single family homes scattered across the landscape.

Based on assessment records, most of the land in Pepin County (64%) is utilized for agriculture, followed by forest uses (24%) and when combined with undeveloped properties in the county accounts for approximately 95% of the land base. Only three percent of the land base is occupied by homes and less than a percent is used by commercial and industrial uses. The Pepin County Comprehensive Plan land use projections suggests that in the next 15-20 years between 500 and 1000 acres of agricultural land may be converted to residential or commercial/manufacturing uses. The plan also recognizes that with change, some conflicts between uses may occur as annexations take place, agricultural land is converted to housing developments, or if undesirable land uses occur due to the lack of zoning in Pepin County.
Economic Overview

The economy of Pepin County has been relatively stable for several decades. Most major employers within the county have a history of longevity which helps to provide job opportunities for local residents. The largest employers within Pepin County include Chippewa Valley Hospital, local school districts, county government, Bauer Built Inc., and Countryside Cooperative. Approximately 18% of the residents are self-employed which includes numerous farmers, construction related trades, small business owners, and those providing individualized services to residents (home health care, childcare, etc.). Tourism is also an important component that supports many local businesses.

Employment by Sector

<table>
<thead>
<tr>
<th>NAICS Description</th>
<th>Number of Employees</th>
<th>Median earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, forestry, fishing, and hunting</td>
<td>418</td>
<td>$26,161</td>
</tr>
<tr>
<td>Utilities</td>
<td>25</td>
<td>$56,250</td>
</tr>
<tr>
<td>Construction</td>
<td>304</td>
<td>$42,727</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>542</td>
<td>$33,000</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>88</td>
<td>$41,250</td>
</tr>
<tr>
<td>Retail trade</td>
<td>437</td>
<td>$24,539</td>
</tr>
<tr>
<td>Transportation and warehousing</td>
<td>198</td>
<td>$36,250</td>
</tr>
<tr>
<td>Information</td>
<td>54</td>
<td>$31,111</td>
</tr>
<tr>
<td>Finance and insurance</td>
<td>153</td>
<td>$31,250</td>
</tr>
<tr>
<td>Real estate and rental and leasing</td>
<td>21</td>
<td>$31,250</td>
</tr>
<tr>
<td>Professional, scientific, and technical services</td>
<td>82</td>
<td>$41,250</td>
</tr>
<tr>
<td>Administrative and support services</td>
<td>84</td>
<td>$20,185</td>
</tr>
<tr>
<td>Educational services</td>
<td>280</td>
<td>$37,604</td>
</tr>
<tr>
<td>Health care and social assistance</td>
<td>473</td>
<td>$25,847</td>
</tr>
<tr>
<td>Arts, entertainment, and recreation</td>
<td>39</td>
<td>$26,875</td>
</tr>
<tr>
<td>Accommodation and food services</td>
<td>162</td>
<td>$9,250</td>
</tr>
<tr>
<td>Other services</td>
<td>141</td>
<td>$23,068</td>
</tr>
<tr>
<td>Public Administration</td>
<td>147</td>
<td>$37,417</td>
</tr>
<tr>
<td><strong>Total for all sectors</strong></td>
<td><strong>3,648</strong></td>
<td><strong>$30,615</strong></td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, 2010-2014 American Community Survey 5-year Estimates

The U.S. Census Bureau estimates that 3,588 residents are actively involved in the work force. While most residents work within Pepin County (53.8%), 36.4% travel to another county to work and 9.8% commute to another state. Approximately 8% of residents work from home. Most individuals who commute to work don’t have to travel very far as 30.9% have a less than 10-minute commute, on average people travel for 24.4 minutes to get to their place of employment. The employment by sector indicates that there are 3,648 jobs in Pepin County, which is indicative of the fact that people from other places also commute to work for businesses in Pepin County.
D. Critical Facilities & Emergency Services

For the purposes of updating the Pepin County Hazard Mitigation Plan, a critical facility is defined as:

“A facility in either the public or private sector that provides essential products or services to the general public, is otherwise necessary to preserve the welfare and quality of life in Pepin County, or fulfills an important public safety, emergency response, and/or disaster recovery functions.”

Pepin County has categorized and identified the following as being a critical facility:

### Government Facilities

<table>
<thead>
<tr>
<th>Facility</th>
<th>Community</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albany Town Hall</td>
<td>Town of Albany</td>
<td>W1155 CTH R</td>
<td>None</td>
</tr>
<tr>
<td>Durand Town Hall</td>
<td>Town of Durand</td>
<td>N5986 Brunner Rd</td>
<td>None</td>
</tr>
<tr>
<td>Frankfort Town Hall</td>
<td>Town of Frankfort</td>
<td>W7804 CTH SS</td>
<td>715-285-5292</td>
</tr>
<tr>
<td>Lima Town Hall</td>
<td>Town of Lima</td>
<td>W4195 Forster Rd</td>
<td>715-672-4108</td>
</tr>
<tr>
<td>Pepin Village Hall</td>
<td>Village of Pepin</td>
<td>508 2nd St</td>
<td>715-442-2461</td>
</tr>
<tr>
<td>Stockholm Village Hall</td>
<td>Village of Stockholm</td>
<td>N2040 Spring St</td>
<td>None</td>
</tr>
<tr>
<td>Durand City Hall</td>
<td>City of Durand</td>
<td>104 E Main St</td>
<td>715-672-8770</td>
</tr>
<tr>
<td>Pepin County Government Center</td>
<td>City of Durand</td>
<td>740 7th Ave West</td>
<td>715-672-8704</td>
</tr>
</tbody>
</table>

### Hospitals, Clinics, and Residential Care Facilities

<table>
<thead>
<tr>
<th>Facility</th>
<th>Community</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chippewa Valley Hospital</td>
<td>City of Durand</td>
<td>1220 3rd Ave West</td>
<td>715-672-4211</td>
</tr>
<tr>
<td>Durand Clinic North</td>
<td>City of Durand</td>
<td>905 7th Ave West</td>
<td>715-672-5981</td>
</tr>
<tr>
<td>Durand Clinic South</td>
<td>City of Durand</td>
<td>1250 3rd Ave West</td>
<td>715-672-5233</td>
</tr>
<tr>
<td>Stockholm Health Care Clinic</td>
<td>Village of Stockholm</td>
<td>W12070 Hwy 35</td>
<td>715-821-8532</td>
</tr>
<tr>
<td>Pepin Manor</td>
<td>Village of Pepin</td>
<td>1110 2nd St</td>
<td>715-442-4811</td>
</tr>
<tr>
<td>Assisted Living of Durand</td>
<td>City of Durand</td>
<td>1103 E Laneville Ave</td>
<td>715-672-3936</td>
</tr>
<tr>
<td>Flo’s Adult Family Home</td>
<td>City of Durand</td>
<td>915 E Washington</td>
<td>715-672-8191</td>
</tr>
<tr>
<td>Homeplace of Durand</td>
<td>City of Durand</td>
<td>315 Country Lane</td>
<td>715-672-4823</td>
</tr>
<tr>
<td>Hurlburt’s Haven LLC</td>
<td>City of Durand</td>
<td>1227 E Prospect</td>
<td>715-672-4049</td>
</tr>
<tr>
<td>Nicole’s Adult Family Home</td>
<td>City of Durand</td>
<td>620 4th Ave E</td>
<td>715-672-3287</td>
</tr>
</tbody>
</table>
### Police and Fire

<table>
<thead>
<tr>
<th>Facility</th>
<th>Community</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durand Fire Department</td>
<td>City of Durand</td>
<td>205 E Montgomery St</td>
<td>715-672-5944</td>
</tr>
<tr>
<td>Durand Police Department</td>
<td>City of Durand</td>
<td>740 7th Ave W</td>
<td>715-672-5948</td>
</tr>
<tr>
<td>Lund Fire Department</td>
<td>Pierce County*</td>
<td>W1498 CTH CC</td>
<td>715-448-3204</td>
</tr>
<tr>
<td>Pepin Fire Department</td>
<td>Village of Pepin</td>
<td>202 8th St</td>
<td>715-442-2461</td>
</tr>
<tr>
<td>Pepin Police Department</td>
<td>Village of Pepin</td>
<td>508 2nd St</td>
<td>715-442-2461</td>
</tr>
<tr>
<td>Pepin County Sheriff's Office</td>
<td>City of Durand</td>
<td>740 7th Ave W</td>
<td>715-672-5944</td>
</tr>
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### Schools and Community Facilities

<table>
<thead>
<tr>
<th>Facility</th>
<th>Community</th>
<th>Address</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansaw Community Center</td>
<td>Arkansaw</td>
<td>N6223 CTH N</td>
<td>715-285-5795</td>
</tr>
<tr>
<td>Assumption Catholic School</td>
<td>City of Durand</td>
<td>901 W Prospect St</td>
<td>715-672-5617</td>
</tr>
<tr>
<td>Lima Holy Rosary School</td>
<td>Town of Lima</td>
<td>N6217 CTH V</td>
<td>715-672-4276</td>
</tr>
<tr>
<td>Caddie-Woodlawn Elementary</td>
<td>City of Durand</td>
<td>650 Auth St</td>
<td>715-672-8977</td>
</tr>
<tr>
<td>Durand Jr./Sr. High School</td>
<td>City of Durand</td>
<td>604 7th Ave E</td>
<td>715-672-8917</td>
</tr>
<tr>
<td>Pepin Public Schools</td>
<td>Village of Pepin</td>
<td>510 Pine St</td>
<td>715-442-2391</td>
</tr>
<tr>
<td>Pepin County Senior Services</td>
<td>City of Durand</td>
<td>606 W Madison St</td>
<td>715-672-8936</td>
</tr>
</tbody>
</table>

### Wells

<table>
<thead>
<tr>
<th>Community</th>
<th>Well ID</th>
<th>Well Depth</th>
<th>Design Yield (GPD)</th>
<th>Capacity (GPM)</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durand</td>
<td>Durand #3</td>
<td>327 feet</td>
<td>576,000</td>
<td>500</td>
<td>100,000</td>
</tr>
<tr>
<td>Durand</td>
<td>Durand #4</td>
<td>128 feet</td>
<td>1,440,000</td>
<td>1200</td>
<td>424,000</td>
</tr>
<tr>
<td>Pepin</td>
<td>Pepin #1</td>
<td>166 feet</td>
<td>223,200</td>
<td>155</td>
<td>N/A</td>
</tr>
<tr>
<td>Pepin</td>
<td>Pepin #2</td>
<td>125 feet</td>
<td>528,480</td>
<td>367</td>
<td>80,000</td>
</tr>
</tbody>
</table>

Contact information for wells: Durand Public Works 715-495-0816 | Pepin Public Works 715-495-6221
### Wastewater Treatment Plants

<table>
<thead>
<tr>
<th>Facility</th>
<th>Address</th>
<th>Contact</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansaw Wastewater Treatment Plant</td>
<td>W7256 CTH O</td>
<td>Steve Stellar</td>
<td>715-495-3581</td>
</tr>
<tr>
<td>Durand Wastewater Treatment Plant</td>
<td>1500 W Wells</td>
<td>Matt Gilles</td>
<td>715-495-0816</td>
</tr>
<tr>
<td>Pepin Wastewater Treatment Plant</td>
<td>100 1st St</td>
<td>Mike Schultz</td>
<td>715-495-6221</td>
</tr>
</tbody>
</table>

### Pepin County PL 566 Dams

<table>
<thead>
<tr>
<th>Facility</th>
<th>Location</th>
<th>Waterway</th>
<th>Hazard Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bogus Creek 1</td>
<td>Town of Pepin</td>
<td>TR Bogus Creek</td>
<td>Low</td>
</tr>
<tr>
<td>Bogus Creek 2</td>
<td>Town of Pepin</td>
<td>TR Bogus Creek</td>
<td>Significant</td>
</tr>
<tr>
<td>Lost Creek 3</td>
<td>Town of Pepin</td>
<td>TR Lost Creek</td>
<td>Low</td>
</tr>
<tr>
<td>Lost Creek 4</td>
<td>Town of Pepin</td>
<td>TR Lost Creek</td>
<td>Low</td>
</tr>
<tr>
<td>Lost Creek 5</td>
<td>Town of Pepin</td>
<td>Lost Creek</td>
<td>Low</td>
</tr>
<tr>
<td>Plum Creek 12</td>
<td>Town of Frankfort</td>
<td>TR Little Plum Creek</td>
<td>Low</td>
</tr>
</tbody>
</table>

All PL 566 Dams listed above are maintained by Pepin County Land Conservation which can be reached at 715-672-8665 Extension 5. Additional privately owned dams located in Pepin County may be found by searching the WI DNR database: [http://dnr.wi.gov/damsafety/damSearch.aspx](http://dnr.wi.gov/damsafety/damSearch.aspx).
E. Hazardous Material Storage and Use

Hazardous materials can present special risks to humans and the environment at the time of disaster, as well as necessitate special precautions and resources for post-disaster clean-up. As of March 2017, there were 4 EHS Planning facilities and 20 Tier II Reporting facilities located within Pepin County. This number has remained relatively stable since the original Hazard Mitigation Plan was adopted in 2012.

A Tier II facility, by law (SARA Title III), is required to prepare or have available a Material Safety Data Sheet (MSDS) for a hazardous chemical present at the facility and must submit annual reports to Wisconsin Emergency Management (WEM), Pepin County Local Emergency Planning Committee (LEPC) and the local fire departments. EHS (Extremely Hazardous Substances) facilities store and/or use one of over 300 chemicals with extremely toxic properties, and must also maintain the MSDS and prepare annual reports. EHS Planning facilities have extremely hazardous substances in such quantity (thresholds vary by chemical type) that an emergency plan must be prepared by the owner/operator and submitted to WEM and the LEPC.

Most the Tier II facilities are in or around Durand, although there a couple in the Pepin area and one in the Town of Albany. Three of the EHS facilities are located within the City of Durand, while the fourth is located in the Town of Waubeek. Most of the facilities with chemicals in Pepin County are used to support the needs of the community and include sources of fuel to heat homes, providing water and sewer to residents, maintaining roadways, agricultural chemicals to support farming operations, and back-up fuel sources to run generators. Therefore, most of these facilities are considered resources during a natural disaster; most sites have a limited hazard vulnerability other than sites in the floodplain. Hazardous materials may also travel through Pepin County on the rail lines and highways.

### Facilities with Hazard Materials

<table>
<thead>
<tr>
<th>Facility</th>
<th>Location(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bauer Built Oil</td>
<td>City of Durand</td>
</tr>
<tr>
<td>Bauer’s Gas and Appliance (2)</td>
<td>City of Durand, Town of Waubeek</td>
</tr>
<tr>
<td>Black’s Valley Ag Supply</td>
<td>City of Durand</td>
</tr>
<tr>
<td>Chippewa Valley Hospital</td>
<td>City of Durand</td>
</tr>
<tr>
<td>Countryside Cooperative (4)</td>
<td>City of Durand, Town of Lima, Town of Pepin</td>
</tr>
<tr>
<td>Durand Wastewater Treatment Plant</td>
<td>City of Durand</td>
</tr>
<tr>
<td>Durand Wellhouse #3</td>
<td>City of Durand</td>
</tr>
<tr>
<td>Nelson Communication Cooperative</td>
<td>City of Durand</td>
</tr>
<tr>
<td>Pepin Area Schools</td>
<td>Village of Pepin</td>
</tr>
<tr>
<td>Pepin Highway Department (2)</td>
<td>City of Durand, Village of Pepin</td>
</tr>
<tr>
<td>Pittman Oil</td>
<td>City of Durand</td>
</tr>
<tr>
<td>Schauls Gas (2)</td>
<td>City of Durand</td>
</tr>
<tr>
<td>Town of Albany Garage</td>
<td>Town of Albany</td>
</tr>
<tr>
<td>Tractor Central</td>
<td>Town of Waubeek</td>
</tr>
</tbody>
</table>
Pepin County Tier II Reporting Facilities

Village of Pepin

City of Durand
- Countryside Cooperative - LP Plant
- Durand Wellhouse #3 & Tarrant Park Pool
- Pepin Co. Highway Dept.
- Countryside Cooperative - Main Facility
- Nelson Telephone Cooperative
- Pittman Oil Inc. - Station
- Black's Valley Ag.
- Bauer Built Oil Inc. Bulk Plant
- Schauns Gas
- Bauer's Gas & Appliance Sales Plant 1
- Durand Wastewater Treatment Plant
- Chippewa Valley Hospital

Village of Pepin
- Countryside Cooperative - Pepin Bulk Facility
- Pepin Co. Highway Dept.
- Pepin Area Schools

County
- Town of Albany Shop
- Countryside Cooperative - Bulk Plant
- Tractor Central LLC.
- Bauer's Gas & Appliance Sales
- Schauns Gas
F. Transportation Systems

Pepin County’s transportation network is unique due to the natural features that impact the placement of roadways. There is a total of 463 miles of road in the county including 49 miles of state roads, 155 miles of county roads, and 259 miles of local roads. Highways and county roads are generally the primary routes identified as being heavily utilized to enable motorists to travel across the county. As of 2015, there were 2,999 automobiles, 636 cycles, 1,054 trailers, and 5,096 trucks registered in Pepin County.

One federal highway, US Highway 10, traverses the county from east to west crossing through the City of Durand and the Chippewa River. Highway 10 is a route that connects many central Wisconsin communities to the Twin Cities in Minnesota; within Pepin County it is a two-lane highway and only provides one lane in each direction except for a passing lane up Bien Hill in the Town of Waterville.

There are a few state highways within Pepin County. Highway 35, otherwise known as the “Great River Road” runs along the Mississippi River through the communities of Pepin and Stockholm. This highway carries traffic between La Crosse and Hudson and is frequently travelled by tourists as it is designated a National Scenic Byway. State Highway 85 begins in Durand as a branch off US Highway 10, it is the primary route carrying traffic to Eau Claire. State Highway 25 carries traffic between the City of Menomonie and Buffalo County, running primarily along the Chippewa River. Highway 25 crosses the Chippewa River on the US Highway 10 bridge in the City of Durand.

Pepin County maintains a total of 36 named county roads/highways that collectively cover 155 miles. Approximately 92 miles of county roads are classified as collector roads that provide a transportation network between population centers and developed areas within the county. The other 63 miles of county roads are classified as minor collectors which are considered local roads. If damaged by a natural disaster, minor collectors may be eligible damage assistance through the WI-DOT Damage Assistance Aid program and WEM’s Wisconsin Disaster Fund for repairs and construction work, while collector roads are only eligible for debris clearance and emergency protective measure expenses.

Town roads are considered local roads and are intended to provide a limited level of mobility by providing direct access to collectors and arterials. The main purpose of these roadways is to provide access to adjacent land, residences, and businesses throughout the county. Each township receives a set amount of money per mile to maintain roads, which includes snow removal, repairs, and clearing right of ways, and culvert or bridge replacements. Within Pepin County, some town roads are paved while others are gravel. Due to the natural features of Pepin County, many town roads are dead ends that serve multiple properties. Additionally, a few roads within the county are privately owned and maintained by groups of residents. Town roads may be eligible for both the Damage Assistance Aid and Wisconsin Disaster Fund if impacted by certain types of natural disasters.

Additionally, Pepin County has a bike trail that runs from the City of Durand to the border of Dunn County along the east side of the Chippewa River. There are also snowmobile trails that are maintained each winter that cover approximately 120 miles across private and public land. At this time, there are no ATV routes or trails established within the County, however they are being discussed and may exist in the future.
The Burlington Northern Santa Fe rail line runs through Pepin County for approximately 16 miles; it is parallel to the Mississippi River and Highway 35. The rail corridor is used primarily to transport commodities; it does not provide passenger service. There are several railroad crossings across town roads, village streets, and private drives which could be potentially dangerous. The railroad travels through areas that are considered to be in the floodplain or wetlands, which could increase the vulnerability of shipments made by rail if the tracks were to be compromised.

Barge traffic is common along the Mississippi River channel, however there are no commercial ports or harbors located in Pepin County. The nearest public terminal is located at Red Wing, Minnesota. There is a recreational marina in Pepin, which is owned by the Village but operated by a private party. Both the Mississippi River and Chippewa river are navigable for the purposes of commerce and recreation. Lakes within the county are often utilized for recreational purposes, while some rivers and streams can be traveled via kayak or canoe.
G. Cultural Resources

Cultural resources play a vital role in defining the character of Pepin County and supporting the local economy, especially as it relates to tourism and recreation. While Pepin County is probably most known as being the birthplace of author Laura Ingalls Wilder, our unique landscape continues to attract an increasing number of visitors to the area.

The State of Wisconsin has designated three State Wildlife Areas and two State Natural Areas within Pepin County. These areas are open to the public throughout the year and provide several recreational opportunities for residents and visitors.

- **Tiffany Wildlife Area** – Over 4,000 acres of state land that includes wooded coulees and steep bluffs as well as floodplain forests and open marsh. This area offers opportunities for hunting, fishing, trapping, wilderness camping, boating, and hiking.
- **Lower Chippewa River State Natural Area** – A number of scattered properties that feature prairies and savannas in the Chippewa River basin in Buffalo, Dunn, Eau Claire, and Pepin counties.
- **Pepin County Extensive Wildlife Habitat Area** – Just under 300 acres of state land along the Mississippi River; the land was originally purchased to develop a state park which was never formalized.
- **Five-Mile Bluff Prairie** – A 10-acre site located within the Tiffany Wildlife Area, which includes excellent examples of a dry prairie environment.
- **Nine-Mile Island State Natural Area** – Includes over 4,000 acres combined in Pepin and Dunn Counties, with approximately 700 acres in the Town of Waubeek. The island features two high quality native plant communities – oak barrens and floodplain forest and contains many rare species.
- **Maiden Rock Bluff Natural Area** – This site is one of the most noteworthy limestone cliff faces in the State of Wisconsin and provides nesting sites for peregrine falcons. The natural area provides hiking and skiing trails in a restored prairie.

The National Register of Historic Places identifies two historic places within Pepin County. Both buildings are located within the City of Durand and include the following:

- **The Durand Free Library** located at 315 2nd Avenue West in Durand, which is listed for its Architecture/Engineering. It is currently utilized as a law firm office.
- **The Former Pepin County Courthouse and Jail** located at 315 West Madison Street in Durand, which is listed for its Architecture/Engineering/event. This building is the last remaining wood frame courthouse in the State of Wisconsin is now utilized as a museum.

There are six historical markers within Pepin County:

- **Pepin County Courthouse** – Washington Square, 315 W Madison Street, Durand
- **Maiden Rock** – On Highway 35, approximately 1-mile north of Stockholm
- **Little House Wayside** – County Road CC, 7 miles north of Pepin
- **Laura Ingalls Wilder** – On Highway 35 in the Pepin Village Park
- **Phil Scheckel Anchor** - On Highway 35 in the Pepin Village Park
- **Site of Fort Antoine** – On Highway 35, about 3 miles northwest of Pepin
Cultural Resources in Pepin County
Section 3. Pepin County Risk Assessment

To more effectively evaluate potential hazard mitigation alternatives and develop feasible strategies to address the risks associated with identified hazards the county must:

- Identify the hazards which are thought to pose the greatest risk to the residents of the county;
- Profile the extent and severity of past hazard events that have affected the county; and
- Assess the vulnerability of the community to the risk of future hazard events

Each of the hazards are assessed on the historical occurrence of the hazard, the perceived vulnerability of the county to the hazard, and the probability of the hazard occurring again. A survey was distributed to all the elected officials within the jurisdictions of Pepin County to evaluate how different communities determine which hazards pose the highest risk to their municipality and to the county as a whole. A final risk assessment designation of high, moderate, or low is assigned to each hazard based on the total score from ratings within each of the following assessment factors.

**Historical Occurrence Rating Criteria**

Historical occurrence refers to the number of times a particular hazard occurred in the past. Since 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 are adversely affected by a given hazard. The vulnerability of a population, buildings, structures, transportation routes, and businesses will vary from by community.

- Less than 10% of the population or property adversely affected = Negligible rating, 1-3 points
- 10% to 25% of the 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**

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

- Less than 1% probability in the next 100 years = Unlikely rating, 1-3 points
- From 1% to 10% probability in the next year = Possible rating, 3-5 points
- Over 10% to nearly 100% probability in the next year = 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, all elected officials at town, village, and city levels of government. Everyone was asked to assign a risk rating to hazards within the county based on their opinion of each hazard’s threat to health and public safety. The survey also allowed individuals to suggest additional hazards to be included in the updated Hazard Mitigation Plan.

- A majority of local officials were of the opinion that the hazard poses a low threat to health and public safety = Low rating, 1-3 points
- A majority of local officials were of the opinion that the hazard poses a medium threat to health and public safety = Medium rating, 3-6 points
- A majority of local officials were of the opinion that the hazard poses a high threat to health and public safety = High rating, 6-9 points

Risk Assessment Designation:

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

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

The Pepin County Law Enforcement Committee established point values for the first three criteria metrics during the July 2016 committee meeting. During this meeting, the committee members also decided to group similar hazards, rename hazards to have more inclusive definitions, add additional hazards to be included within the plan, and hazards to remove from the plan due to extremely low chances of occurring. By making these changes, Pepin County can simplify our plan and focus on the needs of our communities while reducing repetition of mitigation actions throughout the plan. The hazards determined to be included with the Pepin County Hazard Mitigation Plan are described in the following section of the plan and are arranged by the total risk assessment scores.

Hazard definitions are derived from the National Oceanic and Atmospheric Administration’s National Weather Service Glossary, or other credible sources when available. Incorporating recognized definitions into the plan helps to establish credibility of the Hazard Mitigation Plan, as describing the hazard in question helps decision makers to assign risk.
A. Winter Storms

The winter storm hazard category consolidates three of the hazards listed in the original Pepin County Hazard Mitigation Plan, which previously included heavy snow storm, ice storm, and blizzards. As a county in Wisconsin, winter storms have been known to occur October through May, although most winter storms are seen during mid-winter months. Winter storms can vary in size and strength and include a variety of weather phenomena such as heavy snow storms, blizzards, freezing rain, sleet, ice storms, and blowing and drifting conditions.

The National Weather Service provides the following definitions for these terms associated with winter storms:

**Blizzard:** The occurrence of sustained wind or frequent gusts of 35 miles per hour or greater accompanied by considerable falling or blowing snow which reduces visibility less than a quarter of a mile when conditions are expected to prevail for a period of three hours or longer.

**Blowing Snow:** A wind driven snow that reduces visibility. Blowing snow can be falling snow or snow that has already accumulated but is picked up and blown by strong winds. Blowing snow is usually accompanied by drifting snow.

**Drifting Snow:** An uneven distribution of snowfall/snow depth caused by strong surface winds. Drifting snow can occur during or after a snowfall. Drifting snow is usually associated with blowing snow.

**Freezing Rain:** Rain that falls as a liquid but freezes into glaze upon contact with the ground or other surfaces.

**Heavy Snow:** The accumulation of four or more inches of snow in a 12-hour period, or more than six or more inches of snow in a 24-hour period.

**Ice Storm:** A situation in which damaging accumulations of ice are expected during freezing rain situations, generally ice accumulations of ¼ inch or greater are considered to be significant.

**Sleet:** Pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Heavy sleet is a relatively rare even defined of accumulation of ice pellets covering the ground to a depth of ½ inch or more.

**Winter Storm:** A general term for the potential for heavy snow or significant ice accumulations.

Community Hazard History

Generally, much of the snowfall in Wisconsin occurs in small amounts of one to three inches per storm event. The most recent 30-year average snowfall map from the National Weather Service indicates that Pepin County typically receives between 30 and 40 inches of snow per winter season. The NOAA NCDC Storm Events Database has recorded 54 winter storm events in Pepin County since it began including winter hazards in 1996. The number of winter storms that occur in each year varies significantly, but based on the existing data Pepin County is averaging about three large winter storm events annually. Throughout this timeframe, no injuries or deaths have been reported in Pepin County associated with winter storms. Significant and/or unusual winter storms throughout the county’s history include:
February 21-23, 1922 Ice Storm - Light rain and freezing rain began falling across the Upper Mississippi River Valley during the afternoon of February 21, 1922; most areas received 1-3” of ice, while others saw a mix of sleet and heavy snow. Throughout Wisconsin, the heavy ice accumulation brought down 15,000 to 20,000 communication poles which interrupted power and phone service for up to two weeks.

November 11, 1940 “Armistice Day Blizzard” – An unusual winter storm to say the least; during the morning, there was unseasonably high temperatures around 60°. As the day continued, conditions quickly deteriorated as temperatures dropped quickly, winds picked up and rain, followed by sleet and then snow began to fall. Snow fall totals of about a foot and a half were recorded in the area. Along the Mississippi River, several hundred duck hunters (not prepared for cold weather) were caught off guard and resulted in some deaths. Prior to this storm forecasts came from Chicago, however after this storm event regional forecasting offices were established to provide 24-hour coverage and more accurate local forecasts.

September 24-26, 1942 – An early start to the winter storm season still stands as the earliest measurable snow on record. Pepin County was estimated to have received 2 inches of snow during this storm.

March 22-23, 1966 – Over a foot of snow fell; this storm was accompanied by strong winds, as well as thunder and lightning. Huge drifts blocked highways and closed schools and businesses for 48 hours. Telephone and power lines were down in many areas due to the heavy snow and wind.

December 1968 – January 1969 – Late December had three storms on the 19th, 25th, and 28th which each produced about a foot of snow, with the addition of the January 8-9th blizzards there was significant snow cover and some roofs began to collapse due to the weight of the snow. High winds and drifting snow kept roads closed for several days over the Christmas holidays.

March 1985 – Heavy snowfall reported with totals of over a foot over the 3rd and 4th and the 31st, these storms are among the largest snowfalls in the greater Twin Cities area and helped contribute to a very snowy calendar year.

November 30 – December 2, 1985 – A snowstorm was reported to the NCDC records indicating that about 20 inches of snow fell over this timeframe, this is one of the largest recorded snowfalls for this area.

Halloween Blizzard 1991 – A period of heavy snowfall and ice accumulation that fell from October 31 to November 3, 1991. In Pepin County, the storm began with ice deposits which were covered by approximately 8 inches of snowfall making traveling dangerous.

December 10-11, 2010 – This is the only winter storm on the NCDC Storm Database for which Pepin County has reported property damage. Several barns in rural portions of the county experienced roof damage or collapsed under the heavy weight of snowfall. One dairy farmer lost 60 short-bred heifers and other livestock were injured due to the collapsed roof. Snowfall amounts across the county average around 16 inches.

May 2-3, 2013 – Record setting snow fell throughout much of Wisconsin including Pepin County. Durand received 10.5 inches of snow, which caused considerable damage to tree branches and powerlines.
Vulnerability Assessment

Winter storms pose a relatively equal level of risk to all areas of Pepin County as most winter weather is regional in nature. It is possible that a winter storm may impact portions of the county more severely than others, for example communities along Lake Pepin may experience lake effect snow fall which could increase winter precipitation amounts slightly. However, estimating the potential future losses for winter storms is difficult as damages are typically minor and widespread. Costs associated with snow removal efforts and minor automobile accidents have not been collected and compared for past winter storm events.

Winter storms can present a serious health and safety threat to area residents and can result in significant damage to property and infrastructure. The most common impacts include downed power lines, unsafe driving conditions that may increase the occurrence of automobile accidents, dangerous pavement conditions leading to slipping and falling, increased costs to the highway and public works departments associated with salting and plowing public roadways, and in rare events accumulated snow or ice can lead to the structural collapse of buildings. Additional concerns during winter storm events include the ability of emergency response agencies to provide services to residents of Pepin County. Economic impacts can result from the closure of businesses due to the lack of mobility or power loss, but these impacts are generally very short-term in nature.

Out of all the critical facilities in Pepin County, public roads and highways have the highest vulnerability from winter storms and may put those traveling at risk. Winter storm events typically reduce visibility significantly and cause slick driving surfaces; accumulations of drifting snow may also result in roads being impassable or unsafe. The conditions of roadways often dictate whether other facilities in the county are open. School districts will commonly shut down if they feel it is not safe to transport students based on the road conditions. Most businesses and government offices remain open, but may have limited staff and customers during winter storm events due to limited mobility based on road conditions.

Winter storms also have potential to impact travel by railroad, air, and waterways. The BNSF Railroad follows the southern border of Pepin County along Lake Pepin; during winter storm events visibility, may be reduced. Ice storms have the greatest potential for disrupting rail transportation as wire based communication lines may break and significantly impact the safety of the rail corridor. Both the Mississippi River and the Chippewa River are closed for most the winter season (December through mid-March) which limits travel along waterways. All airports in the county are privately owned by individuals, winter storms would severely limit their ability to get their aircraft off the ground due to reduced visibility and unsafe runway conditions.
**Winter Storms Risk Assessment Designation**

Winter Storms Historical Occurrence Rating: High – 7 points  
Winter Storms Vulnerability Rating: Catastrophic – 9 points  
Winter Storms Probability Rating: Highly Likely – 9 points  
Winter Storms Local Official Survey Rating: Medium – 5 points  
Winter Storms Risk Assessment Designation: **High Threat - 30 points**

**Winter Storms 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 other methods for protection of electrical and other utility lines to prevent disruption of utility services  
- Advocate for building and zoning codes that include provisions for snow loads, roof slope, snow removal, and storage on residential, agricultural, and accessory structures.  
- Maintain roads to provide adequate road and debris clearing capabilities  
- Utilize and optimize the location of snow fences and tree lines to limit blowing and drifting snow over critical roadways  
- Encourage maintenance of structures to prevent roof and wall damage from “ice dams”
B. Extreme Cold

Extreme cold is a phrase used to describe winters that are accompanied by extremely cold temperatures. Extremely cold temperatures with strong winds can result in wind chills that cause bodily injuries such as frostbite, hypothermia, and death. Extreme cold weather events most commonly occur November through March.

The National Weather Service uses the following terms to describe extreme cold conditions:

**Wind Chill:** An apparent temperature describing the combined effect of wind and low air temperatures on exposed skin; measurement is based on the rate of heat loss from exposed skin caused by wind and cold.

**Wind Chill Factor:** Increased wind speeds accelerate heat loss from exposed skin; as a general rule, the threshold for potentially dangerous wind chill conditions is about -20 degrees Fahrenheit.

**Wind Chill Warning:** The National Weather Service issues this warning when the wind chill is life threatening.

The National Weather Service uses the below wind chill chart to help the public understand the threats of extremely cold weather. The information in the chart is derived from computer modeling to show the estimated time one can spend outdoors before frostbite is expected to set in based on the temperature and wind speeds.

![Wind Chill Chart](image-url)
Community Hazard History

Quantifying the extent of extreme cold weather can be measured in a couple ways. The average temperature throughout meteorological winters (December through February) can be used to compare extreme winter months. Although Pepin County does not have this data collected, the National Weather Service keeps track of this information for nearby Eau Claire, Wisconsin. As can be seen to the right, extreme cold winters have been recorded for over a century. The ten coldest winters are too small of a sample to reveal trends over time, however one can notice that on occasion extreme cold spells occurred in back to back winters; as can be noticed for the winters between 1916-1918 and 1976-1978.

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<tr>
<td>7</td>
<td>1898-1899</td>
<td>9.4</td>
</tr>
<tr>
<td>8</td>
<td>1958-1959</td>
<td>10.0</td>
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<tr>
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<td>1977-1978</td>
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</tr>
</tbody>
</table>

Since cold spells can extend beyond the meteorological winter; one can also measure extreme cold as a number of days with the minimum temperature below zero. While this metric shows winters that are persistently cold, by comparing the charts for Eau Claire, Wisconsin one will notice that the number of days below zero doesn’t necessarily mean that it was the coldest winter. For example, the winter of 1977-1978 had 60 days with the minimum temperature below zero, however it still had an average temperature of 10.2 degrees earning it the last spot in the ten coldest winters on record.

Additional days of extreme cold were derived from NOAA’s historical storm data records. These records generally account for days with very cold temperatures that were not part of a larger winter season trend within the State of Wisconsin. Most of these events can be traced to causing significant interference with normal household, business, and government functions and a few of them resulted in loss of life due to exposure to the extreme cold.

- **January 1982** – a few short cold spells contributed to new record low temperatures. Wind chills in some portions of the state dropped to 100 degrees below zero.
- **December 17-20, 1983** – a prolonged arctic cold spell invaded the state plunging temperatures well below zero. During this timeframe, La Crosse set record low temperatures for four consecutive days. Throughout the state, this cold weather frozen water lines in homes and businesses, caused schools to be closed, and resulted in vehicle issues.
- **December 22-26, 1983** – a second blast of cold air impacted the state, some churches cancelled Christmas services so that people did not have to be exposed to the elements.
- **January 17-23, 1984** – an arctic air mass settled over the state resulting in subzero temperatures as well as wind chill factors in the 35 to 58 below zero range. Throughout the state, several low temperature records were tied or broken.
• **January 18-21, 1985** – a frigid air mass caused temperatures to dive to negative 20 degrees or colder throughout the state. Winds accompanying the air mass sent wind chill readings into the 40 to 85 below range. This cold spell attributed to water main breaks, power outages, frozen water pipes and school closings.

• **December 12-29, 1985** – An extended cold period impacted the State of Wisconsin, during this time temperatures were frequently below zero with bitter wind chills of 20 to 60 below zero.

• **December 16-24, 1989** – Very cold temperatures as low as 33 below zero and brisk winds dipping wind chills readings to 80 below zero impacted the entire state.

**Vulnerability Assessment**

Winters with extremely cold weather can put residents at risk to frostbite, hypothermia, and death due to exposure to cold temperatures if they spend time outside. Frostbite occurs when the body cuts off circulation to one’s extremities (feet, hands, nose, etc.) to protect the vital inner organs. Therefore, it is really important to cover every part of your body when going outside in severely cold weather. Hypothermia sets in when one’s body temperature drops below 96° F; this condition may affect an individual’s ability to think clearly or move well. Victims of hypothermia are most common among elderly people with inadequate food, clothing, or heating; babies sleeping in cold bedrooms, children left unattended; people under the influence of alcohol; mentally ill individuals; and people who remain outdoors for long periods such as the homeless, hikers, hunters, etc.

However, risks aren’t limited to those spending time outdoors; homes can become too cold due to a power failure or because heating systems aren’t able to keep up with the weather. Therefore, it is important to check up on vulnerable populations during extremely cold weather. Municipal public works departments may see an increase in water lines breaking from freezing. Additionally, some people may begin to use space heaters, wood stoves, and fireplaces to stay warm which increases the risk of household fires and carbon monoxide poisoning. Many of the historic cold spells listed above were accompanied by either power outages or energy consumption records which could create hardships for some individuals.

Extremely cold weather can be very detrimental to the agricultural community; as livestock are vulnerable to exposure from cold temperatures and wind chills which may reduce production, alfalfa crops can experience substantial losses if there isn’t snow present to act as an insulator, and frozen water pipes, fuel lines, etc. can also disrupt agricultural production. Other businesses and industries within Pepin County may see decreases in productivity due to extreme cold weather and increased cases of frostbite, especially those employed in the forestry, mining, utilities, and construction activities. The extreme cold may also cause equipment failure at a variety of industries within sectors of the local economy.

Transportation can also be affected by extreme cold; vehicles may not start or operate properly due to frigid temperatures. Fuel lines and cooling systems can freeze, door latches may not close properly, and mechanical components may fail. Since road conditions may be compromised due to other winter weather, extreme cold temperatures place an additional level of risk if drivers are stranded in a ditch or the side of the road. Exposure to extreme cold, whether in or out of the vehicle, can occur quickly. Additionally, extreme cold places stress on road systems including contraction of bridge joints, contribute to rock face collapse, and pavement cracking.
Alternative forms of transportation can also be impacted by extreme cold temperatures and wind chills. Railroads may experience contraction of welded continuous rails. Additionally, railroad companies may impose speed limits to reduce the risk of derailment, which may result in longer waiting times at rail crossings due to slower movement of train cars. Those working on the maintenance of the rail system could be exposed to the elements and be at a greater risk for frostbite and hypothermia. Navigation along waterways in Pepin County are limited (closed for the season) during the time frame which we would normally expect extreme cold temperatures, however those using snowmobiles to traverse the ice may be at risk if they become stranded in an inaccessible area. Much like vehicles, aircraft experience difficulty operating during periods of extremely cold weather, so we would expect a decline in the use of privately owned aircraft.

**Extreme Cold Risk Assessment Designation**

Extreme Cold Historical Occurrence Rating: Moderately High – 7 points  
Extreme Cold Vulnerability Rating: Catastrophic – 9 points  
Extreme Cold Probability Rating: Likely – 7 points  
Extreme Cold Local Official Survey Rating: Medium – 5 points  
Extreme Cold Risk Assessment Designation: **High Threat - 28 points**

**Extreme Cold Mitigation Ideas**

- Institutions and non-profits can organize outreach to vulnerable populations during periods of extreme temperature and provide them with guidance and/or resources  
- Establish heating centers or shelters for vulnerable populations  
- Utility companies can create special arrangements for individuals needing assistance to heat their homes.  
- Encourage residents to travel with winter emergency kits, charge batteries, utilize fuel line antifreeze, and to keep their gas tanks as full as possible to ensure operation of vehicle.
C. Flooding

Rivers form geographic boundaries in portions of Pepin County, so naturally it floods on occasion. The Pepin County Hazard Assessment Survey separates flooding into five different categories including flash, riverine, lake, stormwater, and dam failure flooding. Most communities provided the same response to each category in the survey, so the steering committee decided that combining the types into a single category would reduce the amount of repetition in the plan and emphasize that flooding is dangerous regardless of the source.

Flooding occurs when a river, stream, lake, or other body of water overflows its banks on to normally dry land or when there is an excessive pooling of surface water. The amount of water in the floodplain is a function of the size and topography of the contributing watershed, the regional and local climate, geological characteristics, and land use attributes.

Flooding events can be slow to develop or happen very quickly. Typically, flooding is caused by prolonged periods of rainfall from river systems covering larger areas. These systems may saturate the ground and overload the rivers and streams. Localized weather systems, such as thunderstorms, may cause intense rainfall over smaller areas, leading to flooding in smaller rivers and streams. These events may also lead to flooding in larger waterways, as smaller rivers and streams feed into these larger systems. Annual spring floods, due to the melting of snowpack, may also affect both large and small rivers and areas.

Due to its geographic location, Pepin County is subject to both localized and regional flood impacts. The City of Durand is the last community along the Chippewa River before it empties into the Mississippi River. The Chippewa River is formed by the confluence of two rivers that travel south from northern Wisconsin originating in Chippewa Lake in Bayfield County and a wetland in Iron County. The Chippewa River is managed by several dams under the operation of Xcel Energy and other institutions before free flowing downstream through Pepin County. The western portion of the county has the Mississippi River as the southern border; this river system collects precipitation, runoff, and snow melt from an even larger geographic area which includes most of Minnesota and northern Wisconsin. Numerous smaller rivers, streams, and creeks flowing through Pepin County are also prone to flooding, each river system with a flood history will be discussed further in this section.

The National Weather Service uses the following terms associated with flooding:

**Flash Flood:** A rapid and extreme flow of high water into a normally dry area, or a rapid level rise in a stream or creek above a predetermined flood level, beginning within six hours of a causative event (e.g. intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters.

**Flood:** Any high flow, overflow, or inundation by water which causes or threatens damage.

**Flood Categories:** Terms defined for each forecast point which describe or categorize the severity of flood impacts in the corresponding river/stream reach. Each flood category is bounded by an upper and lower stage. The severity of flooding at a given stage is not necessarily the same at all locations along a
river reach due to varying channel/bank characteristics. The flood categories used by the National Weather Service are:

- **Minor Flooding:** minimal or no property damage, but possibly some public threat.
- **Moderate Flooding:** some inundation of structures and roads near stream. Some evacuations of people and/or transfer of property to higher elevations.
- **Major Flooding:** extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.
- **Record Flooding:** flooding which equals or exceeds the highest stage or discharge at a given site during the period of record keeping.

**Flood Crest:** Maximum height of a flood wave as it passes a certain location.

**Flood Loss Reduction Measures:** In hydrologic terms, the strategy for reducing flood losses. There are four basic strategies which include prevention, property protection, emergency services, and structural projects. Each strategy incorporates different measures that are appropriate for different conditions.

**Floodplain:** In hydrologic terms, the portion of a river valley that has been inundated by the river during historic floods.

**Flood Prevention:** In hydrologic terms, measures that are taken in order to keep flood problems from getting worse. Planning, land acquisition, river channel maintenance, wetlands protection, and other regulations all help modify development on floodplains and watersheds to reduce their susceptibility to flood damage. Preventative measures are usually administered by the building, zoning, planning, and/or code enforcement offices of the local government.

**Flood Problems:** In hydrologic terms, problems and damages that occur during a flood as a result of human development and actions. Flood problems are a result from:

1) Inappropriate development in the floodplain (e.g., building too low, too close to the channel, or blocking flood flows).
2) Development in the watershed that increases flood flows and creates a larger floodplain, or;
3) A combination of the previous two.

**Floodway:** In hydrologic terms,

1) A part of the floodplain reserved for emergency diversion of waters during floods. A part of the floodplain which, to facilitate the passage of floodwater, is kept clear of encumbrances.
2) The channel of a river or stream and those parts of the floodplains adjoining the channel, which are reasonably required to carry and discharge the floodwater of any river or stream.
Community Hazard History

The State of Wisconsin Hazard Mitigation Plan recognizes that the Mississippi River and its tributaries (such as the Chippewa River) are prone to flooding on occasion. Since 1971, over half of Wisconsin’s Presidential Disaster Declarations have involved flooding as the principle cause of damage. Although records of flooding have primarily only been tracked for the last 50 to 60 years, searching through historical records indicates that flooding has been an issue in Pepin County for more than 100 years. The early settlers to the area that is now Pepin County left evidence of challenges with flooding that have been recorded throughout time. The first to arrive came to work on logging and sawmill operations along the Chippewa River in the 1840s. In the mid-1850s, two villages were established along the Chippewa River; the first one, “Chippewa” was established at the mouth of Bear Creek, while the second one is the present-day City of Durand. The Village of Chippewa quickly was abandoned as the thirty buildings in the community including a hotel, post office, several stores, and residences were subject to frequent flooding.

Early records associated with Arkansaw indicate that the flood of 1878 carried away three dams, all bridges, the grist mill, a school and many barns and residences. A replacement dam was built in 1885 to support a furniture factory and later it was modified to generate electricity for the community; but this dam was destroyed in 1907 and the power lines were sold to the operator of a dam in nearby Eau Galle. Each time the bridges were washed out they were replaced with ones of a better design, the first two were wooden, followed by two iron bridges; over time these bridges have been destroyed by flood waters.

Additionally, the United States Congressional Serial Set from 1887-1888 reveals early flood history along the Chippewa River. The report from Archibald Johnson, Assistant Engineer, USCOE was in response to an assignment to examine the causes of the extraordinary overflows of the Chippewa River and the means that can be adopted to prevent their recurrence. During his visit to the Chippewa Valley, he obtained information from local sources about floods that occurred between 1838 and 1884; below is a summary of his findings:

- **1838** – From Eau Claire to the Mississippi the bottom-lands from bluff to bluff were covered from 10 to 15 feet deep.
- **June 1847** – A rain storm on June 5th caused the Chippewa River to rise 12 feet overnight and destroyed all the structures placed in the river during the previous winter.
- **July 1855** - A violent storm to the north of Eau Claire brought forth a surge of logs and driftwood which were scattered all over the bottoms and amongst the sloughs of the Lower Chippewa River.
- **May 1857** – As a result of heavy rains, the Chippewa River at Durand exceeded its banks for 62 days without any damage of consequence, according to Miles Prindle the founder of Durand.
- **April 1866** – An ice “freshet” brought down jams of ice, logs, and driftwood in such force as to carry away booms, piers, and all other obstructions that interfered with the swollen, uncontrollable flood. The entire Chippewa bottom was overflowed and covered with logs and driftwood.
- **June 1880** – Heavy rain caused a rise of 14 feet above low water in Durand, although greater amounts were reported upstream above a dam in Eau Claire. This storm system also impacted the Wisconsin, St. Croix, and Mississippi Rivers. Along the Chippewa River, it is noted that there
was much damage to residences, places of business, and crops and was estimated to incur damages of $1,000,000 to $1,500,000. The image to the right shows the flood waters in the streets after the 1880 flood.

- **September 1884** – This is the highest flood of record within the Congressional Report as it was reported as being 15 feet 8 inches above low water or 20 inches above the flood of 1880. This flood was caused by a storm system that allegedly produced 10 to 19 inches of rain in a 36-hour period, with tornadoes being reported in other areas of the region. The floods inundated many buildings to a depth of 10 to 12 feet and some valleys were reported to have up to a foot of sand deposited in farm fields. An estimated total of $2,000,000 in damage throughout the Chippewa Valley was reported as a result of the 1884 flood.

In his summary, Mr. Johnson reported that it would be difficult to control all flooding with dams along the Chippewa River and that doing so would be at odds with the lumbering interests of the region. Since the Chippewa River tends to be more rapid based on the topography of watershed, flooding is not likely to be limited by the construction of dams and that farming lands in the valley will continue to be prone to flooding. Additionally, he notes that individuals building cheap dams for private interests should be responsible for damages due to the failure of their structures. Mr. Johnson also comments “now that the people of the valley have a high-water mark that they can rely on, railways, bridges, and valuable buildings will be built so they cannot be destroyed by a flood similar to that of 1884.” In his concluding thoughts, he states “I am unable to see that the extraordinary floods of the Chippewa River can be prevented”.

The Chippewa River has continued to flood and impacts the City of Durand. The National Weather Service has had a measurement gauge to track flood heights on the Chippewa River at Durand since July 1928; the device has upgraded at least once during this timeframe. Minor flood stage has been established at 13 feet, the basements of businesses may start to flood at this flood height. Moderate flooding (16.5 feet) is characterized by the Highway 10 north approach to the bridge starting to be submerged in water and major flooding occurs at 17.5 feet and impacts many of the businesses in downtown Durand along the river.

Per recent records, the Chippewa River has only reached the stage categorized as major flood twice since the gauges have been installed. An article from the Eau Claire Leader Telegram describes the 1967 flood as “the greatest Chippewa River flood in 82 years”. An unusually warm spring day caused more than 36 inches of snow to melt overnight in northern Wisconsin.

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which caused havoc as it traveled downstream. Many of the downtown businesses rushed to move their merchandise and equipment above anticipated flood levels, while auto dealers cleared their sales lots. Schlosser Motor Company, which lost about a dozen cars to the flood, became the center for volunteers as residents attempted to sandbag the business district. Before the crest passed, water was more than a foot deep in Main Street between 6th and 7th Avenue West. Residents outside of the City of Durand were also impacted by the flood; approximately ten families had to evacuate their homes.

Unlike the 1967 flood, the September 1941 flood had been preceded by the issuance of a flood warning. The warning predicted the river to crest at 15.5 feet after 15 inches of rain fell in 36 hours near Hayward. The 1993 flood, impacting most of the State of Wisconsin, was caused by compounding factors including saturated conditions lingering over the fall and winter of 1992 combined with unusually high precipitation throughout the spring and summer of 1993. In addition to spring flooding, the Chippewa River is also known to flood after extreme precipitation events which explains why we commonly see September included in the historic crest data.

NOAA’s historical storm data reveals another flooding event in Pepin County which was attributed to flash flooding rather than the Chippewa River cresting. Records from September 1975 indicate that on September 10-11th the area was hit by torrential rains, high winds and hail which resulted in 7.5 inches of rain falling within 4 hours in the City of Durand. Durand was noted as having three feet of water standing in the streets which contributed to flooded basements and residences. Two individuals were injured when the car they were driving fell into a 15 feet deep washout north of Durand. Significant damage was reported to Highways 10 and 85; the railroad tracks that then were in operation in Durand were undermined by the flood; and several cars washed out of an auto lot into the Chippewa River. The Highway Department had to replace culverts and repair many washouts throughout the county.

The Arkansaw Creek, which only drains 2.61 square miles, had a USGS gauge from 1959 until 1993 which measured peak streamflow and recorded the height of flood waters. The most significant flood event recorded at this location was in September 1992 when the waters crested at 14.82 feet. Following the floods in the 1970’s the county acquired a couple of properties along the creek to create the Arkansaw Creek Park since the county was eligible for federal disaster relief. The Arkansaw Creek flood again in August 2009 and taking out the iron bridge placed over the creek in the 1978 spanning 75 feet long and 18 to 20 feet above the water. Without the gauge in place, it is hard to determine the crest of the flood, however individuals report that the flood waters reached the bottom of the County Road O bridge in the center of town.

The mighty Mississippi River also floods; except for the 1993 flood, historical records suggest that it is more prone to spring flooding compared to the other river systems in Pepin County. The Mississippi River gauge is located on Lake Pepin on the Minnesota side and is used to measure the magnitude. Minor flood stage has been established at 16 feet, moderate flooding at 18 feet, and major flooding at 20 feet. All the flood impact indicators listed by the National Weather Service correspond to Lake City, Minnesota. Local benchmarks have been established with nails in trees, paint on road signs, and other marks to show the flood of record in developed areas within the floodplain.

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The flood of record along the Mississippi River crested April 19th, 1965 setting a record of 22.18 feet. The river was at flood stage for a total of 21 days at Lake City, MN. There were several factors contributing to the flood including: a deeper than usual frost in the early months of winter, heavy snow events in late winter combined with cold weather that prevented gradual melting of snow, and heavy April showers while the ground was still frozen. Most major flood events in the Upper Mississippi Valley can be attributed to winters and springs with above average precipitation. Temperature can also contribute to flooding as warmer weather can speed up melting of snow packs and colder weather can prevent infiltration into the soil if the ground is still frozen. Significant portions of the land area of both Minnesota and Wisconsin contribute to flooding along the Mississippi River in Pepin County, therefore it is important to consider the weather patterns in central Minnesota and northern Wisconsin when monitoring the flood outlook.

In addition to the Mississippi River, Chippewa River, and Arkansaw Creek which have an established flood history, Pepin County has several smaller rivers, streams, and creeks that could potentially flood and cause damage to property. Floodplains have been mapped throughout the county and include property in all eight unincorporated municipalities, both villages, and the City of Durand within Pepin County since the 1970’s. The floodplain maps were updated by FEMA in 2010 and are utilized to regulate and restrict development within the floodplain. More information about floodplain regulations and a map of floodplain areas within Pepin County is included in the community profile portion of this plan.

### Dams

To reduce flooding, sedimentation, and erosion damage and to encourage conservation of land and water, there are numerous privately owned dams located throughout the county. Any dam with a structural height of over 6 feet and an impoundment area of 50 acre-feet, or with a structural height of 25 feet or more and impounds more than 15 acre-feet. Due to their size and potential to impact downstream areas in the event of a failure, large dams have mandatory inspection and design requirements. These dams are assigned hazard ratings based on the potential for the loss of life or property should the dam fail. The Department of Natural Resources is responsible for regulating all dams in the State of Wisconsin, including 65 dams in Pepin County.

Design and normal operation of the PL 566 dams is based on a rainy-day failure that occurs from periods of excessive precipitation leading to an unusually high runoff. The high runoff increases the reservoir of the dam and may cause the dam to overtop and contribute to flooding downstream. Normal storm events can also lead to rainy day failures if water outlets are plugged with debris or otherwise made inoperable. Dam failures can be caused by excessive rainfall or melted snow, poor construction or maintenance, flood damage, earthquake activity, weakening from burrowing animals or vegetation, surface erosion, vandalism, or a combination of these factors.

The county is responsible for six dams built under the Watershed Protection and Flood Prevention Act of 1954. These PL 566 dams hold little or no water in their reservoirs under normal conditions. These dams can hold a significant amount of water during flood events, therefore it important that they are inspected

<table>
<thead>
<tr>
<th>Rank</th>
<th>Date</th>
<th>Crest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>April 19, 1965</td>
<td>22.18 feet</td>
</tr>
<tr>
<td>2</td>
<td>April 17, 1969</td>
<td>20.20 feet</td>
</tr>
<tr>
<td>3</td>
<td>April 16, 2001</td>
<td>20.13 feet</td>
</tr>
<tr>
<td>4</td>
<td>April 18, 1952</td>
<td>19.17 feet</td>
</tr>
<tr>
<td>5</td>
<td>April 16, 1951</td>
<td>19.06 feet</td>
</tr>
<tr>
<td>6</td>
<td>April 11, 1997</td>
<td>18.95 feet</td>
</tr>
<tr>
<td>7</td>
<td>May 1, 1975</td>
<td>17.60 feet</td>
</tr>
<tr>
<td>8</td>
<td>June 28, 1993</td>
<td>17.45 feet</td>
</tr>
<tr>
<td>9</td>
<td>April 6, 1967</td>
<td>17.40 feet</td>
</tr>
<tr>
<td>10</td>
<td>April 6, 1986</td>
<td>17.17 feet</td>
</tr>
</tbody>
</table>
and maintained so they don’t present a hazard to downstream properties within the hydraulic dam shadow. Cedar Corporation prepared a dam failure analysis for these PL 566 dams in 2004 which have been utilized to develop emergency action plans for the following dams: Bogus Creek Structure #1, Bogus Creek Structure #2, Lost Creek Structure #3, Lost Creek Structure #4, Lost Creek Structure #5, and Little Plum Creek Structure #12. Bogus Creek Structure #2 has a high hazard ranking as there is at least one structure with sleeping quarters located within the hydraulic shadow.

Additionally, Xcel Energy operates four hydroelectric dams on the Chippewa River north of Pepin County. Each of the dams with locations at Cornell, Jim Falls, Holcombe, Wissota has an emergency action plan based on a sunny day failure. A sunny day failure is one that occurs due to poor dam maintenance, damage/obstruction of outlet systems or vandalism. Typically, this 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 property owners. If one of the dams was to breach, residents would have approximately 12 hours until the flood waters reached Pepin County. While each of the dams could potentially bring varying flood heights and velocities to the area, flood prone areas could be devastated if the water levels were already high from recent weather events.

**Vulnerability Assessment**

Flooding has the potential to be very destructive and have long lasting impacts on affected areas. Since flooding is tied to topography, low lying areas are generally more vulnerable. Damages caused by flooding are often the result of inundated basements, although flood waters can move or destroy entire structures. Deaths and injury are relatively rare with river and lake flooding, since adequate warning time is usually available, however flash floods or dam failures tend to be more deadly as they occur quickly and without warning.

Flooding is a serious threat to the transportation infrastructure in Pepin County. Floods can wash out roads, bridges, and culverts as well as hinder the flow of traffic. Several roadways in Pepin County are subject to flooding when the Mississippi or Chippewa Rivers rise. Other streams and low areas can also result in water across the roadway, especially in flash flood events. It is important to note that half of flood related deaths can be attributed to vehicles attempting to drive through flooded areas or moving water. Debris carried by floodwaters can also cause damage to bridges, structures, or property; or this debris can obstruct the flow of water and cause additional flood damage. Travel along the Mississippi or Chippewa Rivers may be dangerous and should be avoided during significant flooding events. Private airports should not be impacted unless located in low-lying areas prone to flooding.

Agricultural fields in low lying areas are also commonly prone to flood damage. In some years, the floods arrive prior to planting, in which case the farmers need to wait for the soil to dry out before they can plant their crops. If the crops are impacted during the growing season in some cases the growth of the plants are stunted after being inundated by water which causes oxygen depletion. Additionally, the crops are likely to suffer from diseases which contribute to reduced yields. Late floods could also impact the ability of farmers to harvest their crop and may require them to test for contaminants prior to sale and/or animal consumption. Another change to farmers is repairing the physical damage to soil that occurs as flooding can cause erosion that could create gullies and gaps in their farm fields and displace productive top soils.
If floodwaters enter homes, moisture build up in the home (HVAC systems, carpeting, drywall, etc.) can cause long-term health problems with mold and mildew once the floodwaters have retreated. These risks can be avoided by locating electrical systems and equipment above the base flood height. Other concerns include the contamination of private wells, which should be inspected and tested prior to drinking. While there are many buildings considered to be at a high risk due to the potential for flooding, most were constructed prior to floodplain zoning requirements were implemented. Deer Island in the Town of Pepin has the greatest concentration of residences that could be flooded, however most homes are only used on a seasonal basis. During flood events access to the area is cut off as roadways are also under water, which limits the ability of emergency responders to provide support to permanent residents. The Village of Stockholm also has a large concentration of residential structures on a point that has limited access during flood conditions.

Within the entire county, including incorporated areas, only 22 properties in the floodplain have insurance under the National Floodplain Insurance Program. Outside of the floodplain, an additional 17 individuals have obtained floodplain insurance policies for their properties. Based on this information, it appears that many property owners in Pepin County living in the floodplain choose to go without flood insurance. There are currently two repetitive loss properties in the City of Durand and six on Deer Island in the Town of Pepin. Since 1978, there have been a total of 77 floodplain claims to the National Floodplain Insurance Program for flood damages exceeding half a million dollars for the entire county.

**Structures within the Floodplain in Pepin County**

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Number of Parcels with Structures</th>
<th>Residential</th>
<th>Commercial</th>
<th>Other</th>
<th>2016 Assessed Improvement Value</th>
<th>Total Assessed Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town of Albany</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td>$168,900</td>
<td>$186,900</td>
</tr>
<tr>
<td>Town of Durand</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td></td>
<td>$708,200</td>
<td>$756,300</td>
</tr>
<tr>
<td>Town of Frankfort</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td></td>
<td>$248,600</td>
<td>$319,700</td>
</tr>
<tr>
<td>Town of Lima</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td></td>
<td>$870,800</td>
<td>$940,200</td>
</tr>
<tr>
<td>Town of Pepin</td>
<td>66</td>
<td>65</td>
<td></td>
<td>1</td>
<td>$4,225,500</td>
<td>$8,094,900</td>
</tr>
<tr>
<td>Town of Stockholm</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Town of Waterville</td>
<td>26</td>
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<td>5</td>
<td>2</td>
<td>$1,003,500</td>
<td>$1,368,000</td>
</tr>
<tr>
<td>Town of Waubeek</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
<td>$137,900</td>
<td>$182,000</td>
</tr>
<tr>
<td>Village of Pepin</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>Village of Stockholm</td>
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<td></td>
<td></td>
<td>$983,700</td>
<td>$1,988,330</td>
</tr>
<tr>
<td>City of Durand</td>
<td>47</td>
<td>3</td>
<td>39</td>
<td>5</td>
<td>$3,446,400</td>
<td>$3,958,900</td>
</tr>
<tr>
<td>Pepin County</td>
<td>177</td>
<td>119</td>
<td>45</td>
<td>13</td>
<td>$10,524,600</td>
<td>$16,434,300</td>
</tr>
</tbody>
</table>
Businesses located in the floodplain are also vulnerable to flooding. This is especially true for the City of Durand which has a significant number of businesses located in the floodplain. Most businesses within Pepin County have adapted their operations over the years to minimize flood losses by using the basements only for storage and relocating items in basements to higher elevations when floods are predicted. Flooding may result in the loss of inventory as well as damage to computers and other equipment which has the potential to impact business operations. Some of the flood insurance policies in the county are likely associated with businesses, especially within the City of Durand.

A few critical facilities within Pepin County are in the floodplain; most notably the wastewater treatment plant for the City of Durand and the City Hall. There is greater concern about the flooding impacting the operations of the wastewater treatment plant as there is the potential for flood waters to overflow city sewer lines and exceed the capacity of the wastewater treatment plant to process materials. The City Hall in Durand doesn’t start flooding until flood stages reach the major criteria, usually the City has enough time to relocate equipment to safer elevations. Law enforcement agencies, emergency response groups, schools, hospitals, and medical clinics are located on at elevations outside of the floodplain and should not be disrupted by flood events unless transportation is limited. Sites storing hazardous materials near the floodplain could cause additional threats to the public, especially if tanks with propane or other substances weren’t anchored down and got carried away by flood waters.

Areas located downstream from dams within Pepin County are vulnerable to flooding if a dam failure were to occur. The county maintains 6 dams, which are identified in the community profile portion of this plan. Five of the dams have a low hazard rating, while Bogus Creek #2 was assigned a significant hazard rating by the Wisconsin Department of Natural Resources. Each of these six dams has a dam failure plan that identifies individuals to contact if the foundation fails, the design, construction, materials, or operation were deficient, or the flooding exceeds the capacity of the dam’s spillway which are the most common causes of dam failures. The Xcel dams which are located upstream along impoundments of the Chippewa River near Eau Claire and Chippewa Falls generally take over 24 hours for flood waters to reach Pepin County and would only threaten life or property if water levels were already elevated.

In the future, additional risks associated with flooding could occur based on climate modeling. The Wisconsin Initiative on Climate Change Impacts indicated that Pepin County experienced a significant change (7 inches) in annual precipitation between 1950 to 2006. Although models are unclear if these trends will continue, the scientists indicate that the frequency and magnitude of heavy rainfall events have been increasing which could contribute to flooding. Figuring out how to adapt to changing weather patterns will be key to reducing future flood risks within Pepin County.

**Flooding Risk Assessment Designation**

Flooding Historical Occurrence Rating: Moderately High – 7 points

Flooding Vulnerability Rating: Catastrophic – 5 points

Flooding Probability Rating: Likely – 9 points

Flooding Local Official Survey Rating: Medium – 4 points

Flooding Risk Assessment Designation: **High Threat - 25 points**
Flooding Mitigation Ideas

- Enforce existing zoning ordinances that limit development in the floodplain.
- Require that floodway areas be kept as open space.
- Residential structures in flood fringe shall be elevated at least two feet above the base flood elevation, existing structures should be elevated if possible.
- Acquire properties in flood prone areas, remove structures, and permanently preserve them as open space.
- Require properties in the floodplain to locate utilities and other mechanical devices above expected flood heights.
- Use of dry flood-proofing measures which help to keep water out of structures by strengthening walls, sealing openings, or by using water proof compounds or plastic sheeting on walls.
- Properties that cannot be structurally altered to prevent flooding should be wet flood-proofed by utilizing water resistant paints or other materials that allow for easy cleanup after flood exposure.
- All structures shall be built to standards identified in the local floodplain zoning ordinance.
- Encourage residents to purchase flood insurance, to reduce the owner’s financial exposure to loss from flood damage.
- Enhance use of technology and mapping to identify other areas of potential flood risk.
- Elevate roads above base flood elevation and utilize culverts to minimize ponding.
- Disseminate flood watches and warnings to inform residents about the potential of flooding in their area.
- Critical facilities should have a plan in place to protect key community assets from flood damage.
- Provide instructions for post-flood clean up and decontamination.
- Identify alternate routes to direct traffic away from areas that frequently flood and blockade flooded segments of road to prevent motorists from driving into flooded areas.
- Maintain culverts, drains, and waterways to reduce the impacts of flooding and remove flood debris from roads and right of ways.
- Install backflow valves to prevent public sewer lines from backing up into homes and businesses.
- Inspect and maintain dams to ensure the structural integrity
- Repair or replace structurally unsound dams
- Regulate development in a dam’s hydraulic shadow.
- Maintain dam failure emergency action plans.
D. Water Contamination

Water is a precious natural resource that is essential to human life. Over 17% of Wisconsin is covered by water, while slightly less abundant in Pepin County water plays a crucial role in the local economy by providing recreational activities and scenic views for numerous businesses. Residents depend on water when they utilize it to prepare food, drink, it or use it for their homes, businesses, and farms. Therefore, water contamination has become a hazard of interest within Pepin County in recent years. Water contamination can impact surface water, public water supplies, and privately owned wells and has the potential to compromise the health of residents and visitors.

Surface water contamination is the pollution of aquatic systems that are above ground, such as streams, lakes, and rivers. These waters become polluted when rainwater runoff carries pollutants, such as chemicals, sediment, and trash into the water. While these substances are detrimental to the natural ecosystems and aquatic life, water pollution can also contribute to harmful algae blooms which have been known to cause human and animal illnesses. Surface water contamination can also deter individuals from swimming, boating, fishing, and other forms of recreational activities.

Groundwater contamination occurs when man-made products get into the groundwater and cause it to become unsafe and unfit for human use. Since water is a solvent, it can dissolve chemicals as it moves through rocks and subsurface soil. Groundwater contaminates can be natural as some minerals and metals are present in rock and sediment layers. Other chemicals are related to industrial discharges, urban activities, agriculture, groundwater usage, and disposal of wastes. Since Pepin County is a rural area, groundwater contamination could also be associated with failing septic systems, farming practices including land spreading, utilization of high capacity irrigators, and the use of chemicals, and the use of road salt to melt ice and snow.

Public water systems are required to meet certain standards by the federal and state governments. Pepin County only has two public water systems, one in the City of Durand and the other in the Village of Pepin. They are required to submit water quality data to the Wisconsin Department of Natural Resources on an annual basis. If the groundwater is contaminated, the community and residents bear the costs of insuring that the water is safe to consume.

Private wells are generally the responsibility of the property owner to monitor and test if they are concerned about water contamination. Pepin County provides residents with the opportunity to test their private wells for the presence of nitrates and bacteria, which are recognized as the most common forms of groundwater contamination throughout the county. Other contaminants that may be present in groundwater include: arsenic, atrazine, pesticides, and volatile organic chemicals; these substances are being monitored as part of a longitudinal study.

Community Hazard History

There is limited history of incidents that may have contributed to water contamination in Pepin County. In an isolated incident that occurred in 1996, raw sewage escaped the Pepin Wastewater Treatment facility and entered the Mississippi River. Historically, most pollution in the Mississippi River (Lake Pepin) has been attributed to upstream uses in the Twin Cities metro area. Since farming has been one of the primary uses of land, it often gets blamed for surface and groundwater contamination. Fertilizer usage,
land spreading, and spills involving large quantities of liquid manure contribute to this viewpoint. However, there are many factors including soil type, depth of water table, type of bedrock formations, and age of septic systems which also contribute to groundwater contamination within Pepin County.

Pepin County started offering testing of private wells for nitrates and bacteria in the early 1980’s. The nitrate tests serve as an indicator of the general water quality, and residents with high nitrate levels are encouraged to test their water for other contaminants. Residents with high levels of nitrates are advised that they should not consume their water unless it is treated to remove or reduce nitrates. The Wisconsin Department of Health’s guidance strongly suggests that pregnant women, infants and young children, elderly, and individuals with compromised immune systems should not drink water that has high levels of nitrates (above 10 ppm). Approximately 100 individuals test their water for nitrates on an annual basis, on average 25-30% of them come back with unsafe levels. Nitrate levels can fluctuate throughout the year based on many factors, therefore residents may test their wells multiple times per year.

Bacteria tests are available at the county as well, although these water samples are sent to a water testing lab in Eau Claire. While some forms of bacteria are relatively harmless, other types such as E. coli indicate fecal contamination of the water and can cause illnesses. Individuals with bacteria present are instructed to disinfect their wells and to stop drinking their water until the well tests as being safe. Bacteria is most likely to be present after periods of heavy snowmelt, rainfall, or flooding.

**Vulnerability Assessment**

Areas with the highest vulnerability for surface water contamination include all waterways (lakes, rivers, streams, creeks) and wetlands within Pepin County. Wetlands are naturally designed to filter out contaminants and catch sediments before they reach other bodies of water. Groundwater in Pepin County tends to flow towards rivers and lakes, therefore we see higher concentrations of nitrates and other contaminants in these areas. Contamination of wells is a major concern after flood events, as wells could be submerged by flood waters. Other geological features, such as karst topography and soil types also play a role in water contamination. Karsts, or cracks in the bedrock, allow runoff and contaminates to directly enter the groundwater. Water infiltrates sandy soils quickly, therefore the central sandy plain in Pepin County typically sees higher levels of groundwater contamination. Density of housing in rural areas could also cause groundwater pollution, due to higher concentrations of septic systems. Areas with intensive farm use may also see higher rates of water contamination.

Drinking water that is contaminated can cause a variety of health issues. Nitrates in water are most commonly associated with “blue baby syndrome” which reduces the blood’s ability to carry oxygen. Research is still being conducted to see if nitrates are linked to other health issues including increased risk of birth defects, thyroid disease, diabetes, and certain types of cancer. Strains of harmful bacteria, such as E. coli can cause flu-like symptoms: nausea, vomiting, fever, and diarrhea. Other types of water contaminants can also present themselves in a variety of serious health concerns.

Although not likely to be damaged by water contamination, most critical facilities within Pepin County have the potential ability to contribute to greater environmental harm. Damage to the wastewater treatment plants and their containment areas could lead to surface water pollution. Most businesses, industries, and activities in the county, including agriculture and the maintenance of our road systems, utilize chemicals and other substances that would be detrimental if they reached lakes, rivers, and streams, or groundwater.
If municipal water sources are compromised, the communities that manage them would need to remove the contaminants, issue protective measure instructions (such as boil water orders), and identify ways to protect the wells from future contamination. Private wells should be installed up-gradient from septic systems to prevent contamination, therefore areas with high densities of housing may be more vulnerable to groundwater contamination. Residents living in areas with known contaminant issues should have their water tested frequently if they decide not to treat or obtain drinking water from other sources.

**Water Contamination Risk Assessment Designation**

Water Contamination Historical Occurrence Rating: Moderately High – 7 points  
Water Contamination Vulnerability Rating: Critical – 6 points  
Water Contamination Probability Rating: Likely – 7 points  
Water Contamination Local Official Survey Rating: Medium – 5 points  
Water Contamination Risk Assessment Designation: **High Threat - 25 points**

**Water Contamination Mitigation Ideas**

- Encourage residents to test their wells if concerned about their groundwater quality  
- Endorse the use of filtration systems that effectively remove contaminants from drinking water  
- Monitor the presence of water contaminants in groundwater  
- Obtain better water testing equipment  
- Promote farming practices that reduce erosion and/or chemical use  
- Educate residents about safety precautions for the use of residential fertilizers and chemicals, especially in regards to recommended application rates and disposal of leftover chemicals  
- Form a local water quality advisory council to address local groundwater concerns and issues.  
- Require that failing septic systems be repaired or replaced.  
- Advocate for the construction of a regional bio digester to reduce the amount of manure being spread on fields.  
- Encourage stronger regulations at the state level to protect groundwater quality.
E. Extreme Heat

Extreme heat can be described as a weather condition with excessive heat and/or humidity that has the potential to cause heat related illnesses or fatalities. In addition to posing a risk to public health, periods of excessive heat usually result in high electrical consumption for air conditioning, which can cause power outages and brown outs.

The National Weather Service tailors extreme heat terminology based on regionally defined criteria and provides the following definitions for these terms associated with extreme heat:

**Excessive Heat:** Occurs from a combination of high heat temperatures (significantly above normal) and high humidity. At certain levels, the human body cannot maintain proper internal temperatures and may experience heat stroke.

**Excessive Heat Watch:** Issued generally 12 to 48 hours in advance of any 24-hour period in which daytime heat index (HI) values are expected to exceed 115 for 3 hours or more and nighttime HI values will be 80 or higher.

**Excessive Heat Warning:** Issued 6 to 36 hours in advance of any occurrence of a 48-hour period in which daytime heat index values are expected to be 115 degrees or higher and nighttime heat index values will be 80 degrees or higher for a 48-hour period. Additionally, if four consecutive days of daytime heat index values of 100 degrees or higher are expected, an Excessive Heat Warning will be issued.

**Heat Advisory:** Issued 6 to 36 hours in advance of a daytime period in which daytime heat index values of 100 degrees or more are expected. Additionally, if daytime heat index values are expected to be 95 to 99 degrees for four consecutive days or more an advisory should be issued.

**Heat Exhaustion:** A mild form of heat stroke, characterized by faintness, dizziness, and heavy sweating.

**Heat Index:** The accurate measure of how hot it really feels when the relative humidity is added to the air temperature.

**Heat Stroke:** A condition resulting from excessive exposure to intense heat, characterized by high fever, collapse, and sometimes convulsions or coma.

**Heat Wave:** Prolonged period of excessive heat, often combined with excessive humidity.

**Outlook Statement:** Issued daily to highlight potential hazardous weather in the next 1 to 7 days. Periods when Heat Index will equal or exceed 95 are mentioned. Issued as a Hazardous Weather Outlook and broadcasted on NOAA Weather Radio All Hazards and posted on NWS websites.

Heat is one of the deadliest weather related hazards in the United States based on longitudinal data at the National Weather Service. The thirty-year average from 1986 through 2015 indicates that on average 130 people die from excessive heat per year; the ten-year average is 113. Current numbers for 2015 indicate that 45 lives have been claimed by extreme heat. Heat waves are also a considerable threat in Wisconsin; two heat waves in 1995 resulted in a significant number of heat-related deaths and heat-related illnesses.
Community Hazard History

The National Climatic Data Center was utilized to obtain extreme heat history and frequency for the original Hazard Mitigation Plan; due to criteria for being listed, these reports were unable to be verified but were included below nonetheless. Records of extreme heat prior to the 1990s require additional research to determine how Pepin County was impacted by earlier periods of “heat waves”. Online sources seem to indicate that the 1980’s had a few extreme heat events that caused droughts in the upper Midwest that were compared to the dust bowl era.

The National Centers for Environmental Information and NWS Weather Forecast Offices in Wisconsin were utilized to research and update the local hazard history for extreme heat events.

- **July 1936** – temperatures were above 90 for 14 consecutive days, several of these days were above 100 degrees.
- **July 16-19, 1986** – temperatures between 90-100 degrees persisted for a few days.
- **June 14, 1994** - temperatures between 90-100 degrees.
- **October 12, 1995** – temperatures in the 80’s (seasonally unusual).
- **July 23, 1999** – temperatures in the 100’s and heat index reaching 110.
- **July 29, 1999** – temperatures reaching in the 90’s with heat index of 95-121.
- **July 31, 2001 into August 2001** – temperatures reaching into the 90’s with a heat index reaching a high of 121.
- **July 31, 2006** – temperatures into the 100’s with a heat index of 102-107.
- **July 18-20, 2011** – heat index values varied from 108 to 116.
- **July 1-7, 2012** – temperatures in the 90’s and 100’s, heat index values of 100 to 115; 2012 was also the warmest year on record.

Additional days of extreme heat have likely occurred outside of the dates listed above. Almost every summer has a couple days that require the National Weather Service to issue a heat advisory, watch, or warning. Pepin County can continue to expect extreme heat events on nearly an annual basis. Climate change models predict that Wisconsin may become warmer which could result in an increase to the frequency of heat wave days seen in Pepin County.

Vulnerability Assessment

The Wisconsin Department of Health Services has identified an extensive list of populations vulnerable to heat. This list includes: adults over 65, people living alone and/or without air conditioning, individuals with disabilities, children under 5, people with chronic medical conditions, homeless, pets, outdoor workers, and non-English speakers. Some of these groups are unable to adapt to the extreme temperatures, realize they are at danger of heat related illnesses, or may rely on others to take care of them. Both homeless and non-English speakers may not be aware of resources available to them or have access to information about heat advisories and health risks. Those who work outdoors, are susceptible to becoming dehydrated and experiencing heat related illnesses. Each identified vulnerable population can be found in Pepin County, therefore it is crucial that the county work with its partners to make sure these individuals are aware of the dangers associated with extreme heat.

Extreme heat should not put critical facilities within Pepin County at risk, most of these buildings are equipped with air conditioning and are designated as cooling centers. Businesses and industry within the
county could be affected by extreme heat as the temperatures could potentially cause physical problems such as heat exhaustion or dehydration which could lower productivity. Additionally, mechanical equipment may experience problems functioning during extreme heat conditions which could potentially cause economic losses. As noted above, extreme heat conditions are particularly dangerous for those who work in construction and agriculture sectors of the economy as these workers typically are exposed to direct sun and heat.

Municipal water and wastewater treatment facilities should not be impacted by extreme heat, although extra water used by residents and businesses could put stress on these systems. Sites with hazardous materials should ensure that products are stored properly and that relief valves are operating correctly these substances do not volatilize in extreme heat.

Transportation could be impacted by this hazard as both roads and railroad lines could buckle or be damaged under extreme heat conditions. One of the most notable risks associated with extreme heat is the condition of passengers in vehicles; children, pets, and livestock can suffer from rising temperatures if left in a vehicle or trailer without air conditioning or ventilation. Some vehicles may be more prone to overheating in these conditions, which could leave motorists stranded. Extreme heat could potentially increase the number of recreational boaters on the lakes and rivers in Pepin County. Those owning private airports should keep their aircraft stored inside to minimize the chances of fuel volatilizing from the extreme heat.

**Extreme Heat Risk Assessment Designation**

- Extreme Heat Historical Occurrence Rating: Moderately High – 5 points
- Extreme Heat Vulnerability Rating: Catastrophic – 9 points
- Extreme Heat Probability Rating: Likely – 7 points
- Extreme Heat Local Official Survey Rating: Medium – 3 points
- Extreme Heat Risk Assessment Designation: **High Threat - 24 points**

**Extreme Heat Mitigation Ideas**

- Identify extreme heat event partners and define their roles and responsibilities.
- Develop a list of facilities and organizations that serve at-risk populations.
- Outreach to vulnerable populations during periods of extreme temperature.
- Designate and advertise the location of cooling centers.
- Encourage utility companies to offer special arrangements for paying utility bills.
- Disseminate information about the dangers of extreme heat.
- Consider the extension of hours at public pools and other public air conditioned places.
- Consider canceling or suspending outdoor public events.
F. Thunderstorms

Thunderstorms have three stages in their life cycle: The developing stage, the mature stage, and the dissipating stage. The developing stage of a thunderstorm is marked by a cumulus cloud that is being pushed upward by a rising column of air (updraft). The cumulus cloud soon looks like a tower (called towering cumulus) as the updraft continues to develop. There is little to no rain during this stage but occasional lightning. The thunderstorm enters the mature stage when the updraft continues to feed the storm, but precipitation begins to fall out of the storm, creating a downdraft (a column of air pushing downward). When the downdraft and rain-cooled air spreads out along the ground it forms a gust front, or a line of gusty winds. The mature stage is the most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes. Eventually, a large amount of precipitation is produced and the updraft is overcome by the downdraft beginning the dissipating stage. At the ground, the gust front moves out a long distance from the storm and cuts off the warm moist air that was feeding the thunderstorm. Rainfall decreases in intensity, but lightning remains a danger.

The National Weather Service provides the following definitions for these terms associated with thunderstorms:

Thunder: The sound caused by a lightning stroke as it heats the air and causes it to rapidly expand.

Thunderstorms: A storm with lightning and thunder, produced by a cumulonimbus cloud, usually producing gusty winds, heavy rain, and sometimes hail.

Additional hazards, such as lightning, rain, hail, strong winds, and tornados may accompany thunderstorms and are treated as separate hazards within this Hazard Mitigation Plan. However, the combined impact of these hazards contributes to the level of danger associated with thunderstorms. Severe thunderstorms are categorized based on the presence of hail (greater than one inch), wind gusts more than 57.5 miles per hour, and/or the possibility of a tornado. About 10% of thunderstorms meet severe thunderstorm criteria.

Community Hazard History

Thunderstorms are most likely to occur in the spring and summer months and during the afternoon and evening hours, but they can occur year-round and at all hours. In Wisconsin, they are most common May through September. While thunderstorms occur countless times per year across the United States, Wisconsin usually averages between 30 and 50 thunderstorm days per year. Based on these numbers and the geographic area of Wisconsin, the state estimates that any given county may experience ten or more thunderstorm days per year.

The National Center for Environmental Information has documented 45 thunderstorms since 1950. The information recorded varies throughout the decades, therefore we have more information about more recent storms than those from the past. Greater forecasting technology has also resulted in meteorologists being able to pinpoint the impacted area, so we see that some thunderstorms hit multiple communities within Pepin County; all duplicate storms have been removed from the table below. The National Center for Environmental Information appears to only include thunderstorms that meet the severe storm criteria based on wind speeds.
1960’s | 1 thunderstorm reported on May 2, 1960
---|---
1970’s | There were no thunderstorms listed in the NCEI database. However, the NOAA’s Storm Data Report from August 1975 indicates that a very heavy thunderstorm occurred August 21, 1975 with wind gusts exceeding 100 mph. The winds caused a significant amount of damage and resulted in one death from an overturned houseboat on Lake Pepin. Total damages from the storm were estimated at 2 million dollars, including damages to the Pepin Marina.
2010’s | 2 thunderstorms reported on June 10, 2016 and July 5, 2016 which impacted multiple communities and caused minor damages.

Vulnerability Assessment

Thunderstorms that meet severe criteria pose a high risk to all portions of Pepin County, therefore all residents, businesses, public institutions, and other facilities could potentially be impacted. Storms could impact portions of the county or the entire county; the severity of damages will likely be a result of the location and strength of the storm. Thunderstorms could produce heavy rains and downbursts that induce straight line winds with high wind speeds. Both buildings and natural features could be damaged by high winds and/or temporary flooding. Debris and broken tree limbs produced by thunderstorms can down power lines, which could result in power outages throughout Pepin County. Additionally, all properties within Pepin County are vulnerable to lightning, hail, and tornados which could accompany severe thunderstorms.

All forms of transportation can be negatively impacted by thunderstorms. Traveling via roads and highways during thunderstorms can be dangerous due to reduced visibility from heavy rains and localized flooding. Winds may also cause tree limbs and other debris to be in the roadway. Electrical power outages could cause the limited number traffic signals in Pepin County to be non-operational temporarily. Railroads could experience temporary malfunctioning of signals and electric switches due to electrical outages, washouts or flooding of tracks from rain, and wind can cause tree limbs and debris to cover railroad tracks. Rail cars could potentially also be damaged during severe storms, especially if the freight is being transported in poorly fitted cars or covered loads. Thunderstorms are considered to be the most severe weather hazard to flight due to strong winds, severe icing and turbulence, frequent lightning, heavy rain, and hazardous wind shear. Most commercial flights fly at altitudes above thunderstorms or adjust their flight patterns to avoid storm systems. Smaller aircraft, especially those that are owned and operated by private residents, could experience difficulties operating during thunderstorms. Traveling via water can also be dangerous during thunderstorms, recreational boaters are encouraged to get off the
Boaters who cannot get off the water should take preventative measures to protect themselves from impacts of the storm.

Agriculture is particularly vulnerable to thunderstorms as they have the potential to damage agricultural crops and buildings. Heavy rains can cause erosion, wash out seedlings, and contribute to standing water in fields, whereas strong winds can flatten fields of crops which can negatively impact plant growth and yields. Facilities that handle hazardous chemicals could be at risk if structures are damaged, depending on which materials are stored on site. Many chemicals stored in Pepin County are for farm use, therefore they are often diluted in water before use. Problems could occur if chemicals react to water, especially if storage buildings are damaged or in the event of a transportation accident. Municipal wells and wastewater treatment plants could be susceptible to damage to buildings and/or equipment, but it is very unlikely that it would disrupt services.

**Thunderstorm Risk Assessment Designation**

Thunderstorm Historical Occurrence Rating: Moderately High – 6 points

Thunderstorm Vulnerability Rating: Critical – 6 points

Thunderstorm Probability Rating: Highly Likely – 7 points

Thunderstorm Local Official Survey Rating: Medium – 3 points

Thunderstorm Risk Assessment Designation: **Moderate Threat - 22 points**

**Thunderstorm Mitigation Ideas**

- Utilize outreach programs to promote awareness of thunderstorm damages
- Promote being prepared and having a household or business disaster supply kit
- Invest in public early warning systems
- Train individuals to serve as weather spotters
- Provide weather radios to vulnerable populations and critical facilities
- Encourage the construction of structures to higher building code standards to minimize potential damages
- Advocate for changing National Weather Service office providing weather information to Pepin County to obtain more accurate and timely weather alerts.
- Bury power lines with consideration for maintenance and repair
- Maintain culverts, drainage ditches, and waterways to accommodate excess rainfall.
G. Lightning Storms

Lightning is one of the oldest observed natural phenomena on earth, it is commonly recognized as a giant spark of electricity in the atmosphere between clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity of the air breaks down and there is a rapid discharge of electricity that we know as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again.

The National Weather Service provides the following definitions for these terms associated with lightning storms:

**Dart Leader:** A faint, negatively charged channel that travels more or less directly and continuously from a cloud to ground.

**Leader:** The streamer which initiates the first phase of each stroke of a lightning discharge. The first stroke is led by a stepped leader, which may be preceded by a pilot streamer. All subsequent strokes begin with a dart leader.

**Lightning:** A visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground, or between the ground and a cloud.

**Lightning Channel:** The irregular path through the air along which a lightning discharge occurs. A typical discharge of flash between the ground and the cloud is actually a composite flash which is composed of several sequential lighting strokes, each of which is initiated by a leader and terminated by a return streamer.

**Lightning Discharge:** The series of electrical processes by which charge is transferred along a channel of high ion density between electrical charge centers of opposite sign. This can be between a cloud and the Earth’s surface of a cloud-to-ground discharge.

**Lightning Stroke:** Any of a series of repeated electrical discharges comprising a single lightning discharge (strike). Specifically, in the case of a cloud-to-ground discharge, a leader plus its subsequent return streamer.

**Return Stroke:** An electrical discharge that propagates upward along a lightning channel from the ground to the cloud.

**Stepped Leader:** A faint, negatively charged channel that emerges from the base of a thunderstorm and propagates toward the ground in a series of steps of about 1 microsecond duration and 50-100 meters in length, initiating a lightning stroke.

Lightning causes the sound that is known as thunder when the energy from the lightning channel heats the air and the air rapidly expands. The stepped leader causes the initial tearing sound, and the ground streamer causes the sharp click or crack heard at a very close range, just before the main crash of thunder. Thunder can be heard up to 25 miles away from the lightning discharge.
Lightning is often perceived as a minor hazard, however lightning caused damages, injuries, and deaths that help to designate lightning as a serious hazard associated with severe weather. 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)
4) The sudden power surge that can damage electrical/electronic equipment

Community Hazard History

The National Center for Environmental Information does not have any records of lightning events in Pepin County. However, since lightning creates the sound of thunder we can assume that every thunderstorm that has been documented within the county, also had lightning present. It is important to note that not every lightning strike causes damage. Local residents indicate that it isn’t unusual to hear about livestock, trees, or structures being hit by lightning from time to time. The local fire departments report that have responded to fires started by lightning about once or twice per decade. Further research in NOAA’s Storm Data archives indicates that lightning caused multiple minor fires in the City of Durand on June 19, 1971. More recently, lightning started a rural home on fire in the summer of 2016. However, isolated incidents are generally not reported or recorded consistently which contributes to a lack of history for this hazard locally. This trend of non-reporting is common across the state, especially in rural areas.

Vulnerability Assessment

Lightning poses a moderate risk to all areas of Pepin County and is dependent on the location of lightning strikes. Like thunderstorms, this hazard is not tied to a specific geographic location, therefore all residents, businesses, public institutions, and other facilities could potentially be impacted. Those outside during a storm event with lightning could be electrocuted by a lightning strike. Critical facilities, businesses, and industry establishments are most likely to be vulnerable to fires and power surges which can damage to electrical equipment, machinery, computers, and communications systems. Disturbances to critical facility services due to a lightning strike could potentially put the public at risk, while businesses and manufacturers could sustain economic losses if impacted. Municipal water and wastewater treatment facilities would only be disrupted if equipment was damaged.

Agricultural operations are also susceptible to losses due to lightning. Both humans and livestock can be struck by lightning; especially those in fields or open areas. Additionally, agricultural structures and equipment could be damaged or catch on fire causing devastating losses to an agricultural producer. Forested lands, especially in dry spells, have been known to catch fire from lightning; which could lead to losses of timber and homes. Lightning also has the potential to start a fire or explosion if one of the sites with hazardous materials was struck by lightning.

Those working outside and individuals engaged in outdoor recreational activities are the most at risk to losing their life to lightning per the Center for Disease Control. Organized outdoor activities, such as sporting events and construction projects should be put on hold if someone hears thunder or sees lightning. Individuals should relocate to a structure that offers good protection from the storm.
Among modes of transportation, lightning is the most dangerous to those participating in recreational activities on or near water. Railroads could be impacted as trees could fall across tracks and lightning could cause electrical signals, remote controlled switches, and radio communications to malfunction. Airway traffic could be dangerous due to disruption of aircraft communications and navigation devices; since all the airports in Pepin County are owned by private individuals there is a limited hazard to the general public when it comes to aviation. Travel along roads and highways via vehicles is generally possible during a storm event with lightning. However, it is possible that lightning could down a tree and block a roadway or that the storm is accompanied by heavy rain which limits visibility.

**Lightning Risk Assessment Designation**

Lightning Historical Occurrence Rating: Moderately High – 6 points
Lightning Vulnerability Rating: Limited – 4 points
Lightning Probability Rating: Likely – 6 points
Lightning Local Official Survey Rating: Medium – 5 points
Lightning Risk Assessment Designation: **Moderate Threat - 21 points**

**Lightning Mitigation Ideas**

- Conduct outreach initiatives to promote awareness of thunderstorm and lightning dangers
- Encourage people to seek shelter in the nearest building or enclosed vehicle if thunder is heard and to avoid trees, tall objects, high ground, water, open spaces, and metal objects
- When indoors, turn off appliances and electronic devices and remain indoors until the storm passes.
- Utilize surge protectors on critical electronic equipment
- Install protection devices such as lightning rods and grounding on critical facilities and communications towers.
- Establish indoor warning systems at critical facilities and public gathering locations
- Invest in public early warning systems/networks
- Train individuals to be weather spotters
- Hazardous material facilities and storage sites should be protected with properly installed lightning rods and other appropriate methods.
- Remove taller trees near vulnerable structures
- Encourage local (private) airports to suspend operations during lightning storms
H. Fog

Due to the features, natural landscape and proximity to water in Pepin County, fog is a frequently occurring hazard. The county considers it to be a significant hazard of concern due to the decreased visibility that results from this weather condition. Reduced visibility can contribute to a number of transportation related issues, including accidents.

The National Weather Service provides the following definitions for these terms associated with fog:

**Dew Point:** A measure of atmospheric moisture. It is the temperature to which air must be cooled in order to reach saturation. A higher dew point indicates more moisture present in the air.

**Dense Fog Advisory:** Issued when fog reduces visibility to 1/8 mile or less over a widespread area.

**Fog:** Water droplets suspended in the air at the Earth’s surface; it is considered to be hazardous when visibility is reduced to ¼ mile or less.

The same processes that produce clouds high above the ground can produce clouds near the surface; fog forms when air can no longer hold all the moisture it contains. This can occur under two circumstances, either the air is cooled to its dew point or the amount of moisture in the air increases. Once air has reached its dew point, it condenses into very small particles forming tiny water droplets that comprise fog. It is important to note that cool air can hold more moisture than warm air, which is why fog is more likely to occur in early mornings or late evenings as temperatures change.

**Community Hazard History**

Although fog is a common hazard, there is only one documented report of fog in Pepin County that have been recorded in the National Center for Environmental Information database. The sole reported incident of dense fog occurred on the evening on November 19, 2007. In general, there are very few records of fog events as fog is considered a unique hazard since it does not pose an immediate threat to life or property in most circumstances. Many accidents involving fog are isolated incidents involving individuals traveling in unsafe conditions. Fog can occur throughout the year, although it is generally the most common in early morning or late evenings. Within Pepin County, lowing lying landscapes and areas adjacent to bodies of water have fog the most frequently.

**Vulnerability Assessment**

Brick and mortar buildings including critical facilities, businesses, industries, community utilities, and homes are generally not impacted by fog events. Services will continue to be provided from these institutions, employees and consumers will still be able to go about their business. Agriculture is the primary sector of the local economy that could be impacted by fog. Several species of plants, including some crops, depend on fog for moisture and cooler temperatures from decreased sunlight. However, fog in combination with prolonged periods of heavy rain may contribute to an increase in plant diseases.

Most of the vulnerability associated with fog is related to transportation due to the lower visibility associated with the hazard. Since most Pepin County’s highways travel through low-lying areas or are
located near waterways, fog is particularly hazardous for those commuting or transporting goods via public roadways. Reduced visibility can lead to an increased number of accidents, including those involving other vehicles, wildlife, bicyclist, and pedestrians. The risk of getting in an accident is increased in early spring or late fall if freezing conditions cause the roadway to be icy, especially along highways as vehicles generally are traveling at higher speeds.

Since the BNSF Railroad line is located adjacent to the Mississippi River, train operators frequently travel through fog. Like motorist, train engineers may come across pedestrians or wildlife on the tracks and could also hit vehicles at railroad crossing locations. Both the Villages of Pepin and Stockholm have implemented quiet zones, prohibiting the sounding of train whistles and horns within their municipal boundaries which could contribute to increased accidents during fog as people may not be able to see or hear the train coming. Private airports in Pepin County are not equipped with radar or other technology to help airplanes maneuver in fog conditions, therefore local air travel would be limited. While commercial travel along the Mississippi River might be hindered by the fog, navigation would still be possible. Recreational boaters should make sure their lights are on and operate their vessels with caution.

Fog Risk Assessment Designation

Fog Historical Occurrence Rating: Moderately High – 5 points
Fog Vulnerability Rating: Critical – 7 points
Fog Probability Rating: Likely – 7 points
Fog Local Official Survey Rating: Low – 2 points
Fog Risk Assessment Designation: Moderate Threat - 21 points

Fog Mitigation Ideas

- Educate citizens on weather and road conditions through media outlets, including radio, cable television, internet, social media, and other sources of information.
- Encourage motorists to turn on their lights, drive slowly, and be cautious when visibility is reduced.
- Acquire and utilize portable electronic message boards to place along highway to display fog safety messages.
I. Hail Storms

Hail is a byproduct of thunderstorms that has the potential to cause property damage. Nearly all severe thunderstorms probably produce hail aloft, though it may melt before reaching the ground. Hail that does reach the ground may cause significant damage to crops, vehicles, homes, and other buildings. The National Weather Service altered the severe thunderstorm criteria for size of hail from ¾ inch to 1 inch in 2010, which aligns with the benchmarks for hail damage commonly used by insurance companies.

The National Weather Service defines hail as “precipitation in the form of balls or irregular lumps of ice produced by liquid precipitation, freezing and being coated by layers of ice as it is lifted and cooled in strong updrafts of a thunderstorm. Hail normally falls near the center of the moving storm along with the heaviest rain; however strong winds at high altitudes can blow the hailstones away from the storm center, causing unexpected hazards in other places.

Hail normally ranges from the size of a pea to that of a golf ball, however larger sizes can form in severe storms. The stronger the updraft, the larger the hailstone can grow. Hail falls to the ground when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards the earth. Generally, hail 2 inches or larger in diameter is associated with supercell thunderstorms due to sustained updrafts that support hail formation.

Community Hazard History

The National Weather Service records suggest that Wisconsin experiences hail a few times each year; despite Pepin County’s small geographic size history seems to show that the area is particularly vulnerable to damage from hail storms. The National Center for Environmental Information’s Storm Events Database includes 35 reports of hail from 1975 to present. Additional records of hail were discovered by searching NOAA’s Storm Data archives for storm events in Pepin County, which augments the hazard history for earlier decades.

| 1960’s | Two hail events: 6/23/62 (1-inch hail, crop damage) and 6/20/1964 (1 ¾ inch hail) |
| 1970’s | Three hail events: 7/16/72 (large hail), 7/29/73 (storm damage to boats and barns), and 9/10/75 (1-inch hail) |
| 1980’s | Four hail events: 7/8/80, 5/27/81, 7/17/81 (hail sizes reported from ½ inch to 2 inches), 7/25/1982 |
| 2000’s | Numerous hail events reported to the NCDC: 8/1/00 (Stockholm – ¾ inch), 8/26/00 (Stockholm 1 ¼ inch), 5/9/01 (Pepin - 1 ¼ inch), 6/11/2001 (Durand - 1 ¼ to 2 ¾ inch, $200,000 in property damages), 6/17/01 (Pepin and Stockholm – ¾ to 1 ¾ inch), 4/18/02 (Durand – 1 inch), 5/8/02 (Lund – 1 inch), 5/26/02 (Durand – ¾ inch), 6/25/02 (Durand – ¾ inch), 7/28/02 (Pepin and Stockholm – ¾ to 1 ¾ inch), 4/18/04 (Durand - 1 ¾ inch), 5/9/04 (Durand and Pepin - ¾ inch), 3/30/05 (Durand ¾ inch), 8/24/06 (Durand 1 ½ inch, estimates of 1.5 million in crop damages), 10/3/06 (Durand - 1 ¼ inch), 8/11/07 (Durand - 7/8 inch), 9/13/07 (Pepin – ¾ inch) |
The National Weather Service indicates that about 20% of severe weather events in Wisconsin are hail events in which hailstones are at least ¼ inch in diameter. Although hail events with hailstones of 1.5 inches or larger in diameter are not considered to be common, Pepin County storm events have exceeded this standard almost once each decade. Most reported hail events include hail with a diameter of ¾ to 1 inch, which can cause damage to property. Approximately 85% of hail storms occur between May and September, although hail has been recorded falling in Pepin County in other months of the year including March, April, and October.

**Vulnerability Assessment**

Agriculture is the most likely sector of Pepin County’s rural economy to be impacted by a hail event. Approximately half of the county’s land is utilized for agricultural purposes, in the event there is a storm producing hail, it is very likely that a portion of the county’s crops could be damaged or destroyed. Since the planting, growing, and harvesting season coincides with the months when hail could impact the county, farmers should purchase insurance to reduce their vulnerability to monetary losses. Pea sized hail can cause damage to crops depending on the crop maturity, wind speed, and other factors.

Critical facilities including government buildings, medical facilities, and schools would likely have limited damage in the event of a storm event with hail; one could expect roofs and windows to potentially be damaged. In most cases services at these facilities should not be interrupted by a hail storm. Municipal water and sewer should also continue to be operational after a hail storm event. Most businesses and industries within the county can expect limited damages to roofs and windows as well. Some businesses, especially those with items for sale stored outside may experience more severe damage or property losses. Vehicle dealerships and plant nurseries/greenhouses are among the most vulnerable businesses that can be impaired by hail damage. The 1-inch hail standard for severe thunderstorms corresponds with roof damage to shingles on houses; institutions and private residents should notify their insurance agent if they experience any damage to their property from hail.

Transportation by vehicle, rail, air, or water can be impacted by hail events. Hail can cause damage to any vehicle exposed to the elements, whether moving or parked. Typically, it takes hail the size of a golf ball (1 ¾ inch) to damage a vehicle. Hail that is laying on the ground can cause icing conditions, although it usually melted away before mitigation actions such as sanding, salting, or plowing can be completed. Additionally, hail usually occurs in seasons when highway trucks are not setup for snow and ice control. Hail can damage aircraft and cause issues that diminish the safety of the aircraft and its control. In other parts of the country, hail has caused icing and clogging of engines of aircraft that have resulted in plane crashes. Hail can cause a few issues for transportation via rail; most notably it can temporarily stop the
work of railroad crews, as well as cause damage to windshields, signal lamp covers, and headlight covers of locomotives and Maintenance of Way (M of W) equipment. Hail can also damage watercraft windows, lights, instruments, and communication devices. Chemicals in transit are at a higher risk of being released due to an accident in a hail storm than chemicals stored at a fixed site.

Hail Risk Assessment Designation

Hail Historical Occurrence Rating: Moderately High – 6 points
Hail Vulnerability Rating: Limited – 4 points
Hail Probability Rating: Likely – 6 points
Hail Local Official Survey Rating: Medium – 4 points
Hail Risk Assessment Designation: Moderate Threat - 20 points

Hail 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 hail during severe weather awareness campaigns.
- Promote the purchase of hail insurance.
- Keep a plow and sander available so they can be quickly mounted to a highway truck to respond to emergency situations.
- Provide a shed or covered area to store government vehicles if a hail storm is predicted.
J. Tornado/High Winds

Tornadoes are a commonly recognizable hazard to most individuals due to their destructive tendencies being highlighted in the news and media. While outside the “tornado alley”, Wisconsin experiences at least a dozen tornadoes per year, which warrants that we keep this dangerous hazard on our radar.

The National Weather Service provides the following definitions and guidance for these terms associated with tornadoes and strong winds:

**Downburst**: A strong downdraft of air from a cumulonimbus cloud, often associated with intense thunderstorms. Downdrafts may produce damaging winds at the surface.

**Fujita Scale or F Scale**: A scale of tornado intensity in which wind speeds are inferred from an analysis of wind damage; this scale was updated in 2007.

**Funnel Cloud**: A condensation funnel extending from the base of a towering cumulus or cumulonimbus associated with a rotating column of air that is not in contact with the ground.

**High Winds**: Sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration; not associated with tornadoes.

**Macroburst**: A convective downdraft with an affected outflow area of at least 2 ½ miles wide and peak winds lasting between 5 and 20 minutes. Intense macrobursts may cause tornado-force damage of up to F3 intensity.

**Microburst**: A convective downdraft with an affected outflow area of less than 2 ½ miles wide and peak winds lasting less than 5 minutes. Microbursts may induce dangerous horizontal/vertical wind shears which can adversely affect aircraft performance and cause property damage.

**Tornado**: A violently rotating column of air, usually pendant to a cumulonimbus, with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a large roaring noise. On a local scale, it is the most destructive of all atmospheric phenomena.

**Tornado Emergency**: An exceedingly rare tornado warning issued when there is a severe threat to human life and catastrophic damage from an imminent or ongoing tornado. This tornado warning is reserved for situations when a reliable source confirms a tornado, or there is a clear radar evidence of the existence of a damaging tornado, such as the observation of debris.

**Tornado Family**: A series of tornadoes produced by a single supercell, resulting in damage path segments along the same general line.

**Tornado Warning**: This is issued when a tornado is indicated by radar or sighted by spotters; therefore, people in the affected area should seek safe shelter immediately. They are usually issued for a duration of around 30 minutes.

**Tornado Watch**: This is issued by the National Weather Service when conditions are favorable for the development of tornadoes in and close to the watch area. Their size can vary depending on the weather situation. They are usually issued for a duration of 4 to 8 hours. They normally are issued well in advance of the actual occurrence of severe weather. During the watch, people should review tornado safety rules and be prepared to move to a place of safety if threatening weather approaches.
The Fujita Tornado Damage Scale was developed in 1971 as a tool for rating the intensity of tornadoes. After adoption in 1973, tornadoes were rated after they occurred and the scale was applied retroactively to tornadoes reported between 1950 and 1972 in the National Oceanic and Atmospheric Administration National Tornado Database. In 2007, the Fujita scale was updated to the “Enhanced Fujita Scale”. Meteorologists and engineers deemed the wind speeds on the original scale as being greatly overestimated and engineering studies indicated that slower winds than initially estimated cause the respective degrees of damage. The enhanced scale accounts for different degrees of damage that occur with different types of structures, both man-made and natural.

**Original Fujita Tornado Damage Scale**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Wind Speeds</th>
<th>Damage</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>F0</td>
<td>40 to 72 MPH</td>
<td>Some damage to chimneys, TV antennas, roof shingles, trees and windows</td>
<td>29%</td>
</tr>
<tr>
<td>F1</td>
<td>73 to 112 MPH</td>
<td>Automobiles overturned, carports destroyed, trees uprooted</td>
<td>40%</td>
</tr>
<tr>
<td>F2</td>
<td>113 to 157 MPH</td>
<td>Roofs blown off houses, sheds and outbuildings demolished, mobile homes overturned</td>
<td>24%</td>
</tr>
<tr>
<td>F3</td>
<td>158 to 206 MPH</td>
<td>Exterior walls &amp; roofs blown off homes. Metal buildings collapsed or are severely damaged. Forests &amp; farmland flattened.</td>
<td>6%</td>
</tr>
<tr>
<td>F4</td>
<td>207 to 260 MPH</td>
<td>Few walls, if any, standing in well-built homes. Large steel and concrete missiles thrown far distances.</td>
<td>2%</td>
</tr>
<tr>
<td>F5</td>
<td>261 to 318 MPH</td>
<td>Homes leveled with all debris removed. Schools, motels and other larger structures have considerable damage with exterior walls and roofs gone. Top stories demolished.</td>
<td>Less than 1%</td>
</tr>
</tbody>
</table>

**Enhanced Fujita Tornado Damage Scale**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Wind Speeds</th>
<th>Damage</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF0</td>
<td>60 to 85 MPH</td>
<td>Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees</td>
<td>53.50%</td>
</tr>
<tr>
<td>EF1</td>
<td>86 to 110 MPH</td>
<td>Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; broken windows</td>
<td>31.60%</td>
</tr>
<tr>
<td>EF2</td>
<td>111 to 135 MPH</td>
<td>Considerable damage. Roofs torn off well-constructed houses; foundations shifted; mobile homes destroyed; trees uprooted; cars lifted</td>
<td>10.70%</td>
</tr>
<tr>
<td>EF3</td>
<td>136 to 165 MPH</td>
<td>Severe damage. Entire stories of houses destroyed; damage to large buildings; trains overturned</td>
<td>3.40%</td>
</tr>
<tr>
<td>EF4</td>
<td>166 to 200 MPH</td>
<td>Devastating damage. Houses leveled; and cars thrown</td>
<td>0.70%</td>
</tr>
<tr>
<td>EF5</td>
<td>&gt; 200 MPH</td>
<td>Total destruction. Houses swept off foundation; automobile sized missiles thrown through the air; high rise buildings deformed</td>
<td>Less than 0.1%</td>
</tr>
</tbody>
</table>
Generally, EF0 and EF1 tornadoes are classified as weak, EF2 and EF3 as strong, while EF4 and EF5 tornadoes are deemed to be violent. Climatologists consider EF2 and higher storms to be significant and EF3 and more severe tornadoes to be intense. Average winds in a tornado are never accurately measured, however most damage from tornadoes is a result of high wind velocities and sudden changes in pressure.

Downbursts are characterized by straight-line winds, which often cause localized damages that may resemble tornadoes. If occurring as part of the same storm system, interactions between tornadoes and downbursts are common and can cause the tornado’s path to change directions.

**Community Hazard History**

While the State of Wisconsin averages 15 to 20 tornadoes per year, Pepin County has only experienced 6 tornadoes since 1950. The National Weather Service has also recorded four high wind events with winds greater than 55 miles per hour since 1990. Additional strong wind events have likely occurred as they are commonly associated with thunderstorms and some winter storms, these types of wind events are included in other portions of the hazard mitigation plan. The National Climatic Data Center has placed an emphasis on documenting tornado data, therefore we can go further back in history for this hazard.

<table>
<thead>
<tr>
<th>Decade</th>
<th>Event Description</th>
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</thead>
<tbody>
<tr>
<td>1950’s</td>
<td>F3 Tornado reported on 9/12/1951 at 11:30 – estimated $250,000 in damage</td>
</tr>
<tr>
<td>1960’s</td>
<td>No tornadoes reported</td>
</tr>
<tr>
<td>1970’s</td>
<td>F1 Tornado reported on 6/7/1971 at 13:40</td>
</tr>
<tr>
<td>1980’s</td>
<td>F0 Tornado reported on 6/30/1983 at 19:30; F1 Tornado reported on 6/28/1987 – estimated $250,000 in damages</td>
</tr>
<tr>
<td>1990’s</td>
<td>High Winds reported on 10/29/1996 - estimated to have caused $100,000 in property damages; F3 Tornado reported on 5/15/1998 at 16:54 – estimated $100,000 in damages &amp; six people injured</td>
</tr>
<tr>
<td>2000’s</td>
<td>High Winds reported on 4/18/2004</td>
</tr>
<tr>
<td>2010’s</td>
<td>EF1 Tornado reported on 7/5/2016, accompanied by downbursts – estimated total damages $900,000</td>
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</table>

Based on the frequency of past events, Pepin County can expect a tornado every ten to 15 years. To date, the county has not experienced a tornado stronger than a F3 (EF3), but these storms are still capable of inflicting a great amount of damage to property within Pepin County. The amount of storm damage is variable based on the path of the tornado, in most areas of the county a tornado may impact field and forests and an occasional home or farm. However, estimated damages in more developed areas would add up more quickly as was evident in the 2016 storm event which damaged structures in a business park in addition to rural portions of the county.
Vulnerability Assessment

All areas of the county have the potential to be impacted by a tornado; the path and severity of the tornado would greatly influence the amount of havoc caused by the disaster. If a tornado damaged a critical facility such as a government building, school, hospital or nursing home, police or fire station, or municipal utility facility the impact on the community would likely be significant. Damages to these properties would necessitate repairs be made as soon as possible to ensure the continuation of services to the community.

Over one third of the population in Pepin County (25% City of Durand, 12% Village of Pepin) depends on municipal water, sewer, and police; damage to municipal facilities or equipment could limit the availability of services in urban areas. Rural residents may also experience loss of private utilities (sewer and wells) if the power is cut off due to the storm. Those living in trailers or mobile homes are particularly vulnerable to tornadoes, especially if they are not anchored to the ground.

Most businesses also are in urbanized areas; a tornado damaging properties in a business district would impact the local economy and could detract from tourists visiting our area. Businesses may also lose revenues making repairs to buildings; since damages are dependent on wind speed buildings could experience losses ranging from damage to chimneys, roof shingles, broken windows, exterior walls being structurally compromised, to roofs being blown off buildings, or total building collapse. The agricultural community is also susceptible to tornadoes which can cause significant damage to buildings, crops, and forests. Due to a lack of building standards for agricultural buildings, livestock are at risk of being lost to collapsed structures. Sites with hazardous materials should be reinforced to reduce vulnerability to storm damages.

Tornadoes poses a risk to many modes of transportation. It is not recommended that individuals try to outrun or drive through a tornado, instead it is best to seek a sturdy storm shelter. Those traveling via road may experience trouble handling their vehicle especially on bridges or areas with long wind sweeps. It is also particularly dangerous to be traveling along ridge tops in directions perpendicular (generally north/south) to the storm. High winds can blow fine soil, sand, and debris across the roadway and cause visibility problems or damage vehicles. Large truck trailers, especially those with high profiles or that are lightly loaded or empty are susceptible to being blown over. After the storm passes, debris blown by high winds such as large pieces of wood, tree limbs, and other materials can cause traveling safety issues along roadways. Rail cars should be stopped and properly choked and braked during tornadoes and high wind storm events, in a direction parallel to the storm if possible. Otherwise, high profile and lightly loaded cars can be blown over in strong wind events. Debris can damage rail cars, locomotives, and render the railroad tracks impassable.

Water traffic should be avoided in tornadoes and high wind events; wave action on the Mississippi River has the potential to separate barges and towboats. On the Mississippi River, the U.S. Coast Gard controls waterway operations and may limit individual’s ability to travel up and down the river. Individuals operating watercraft for pleasure should get off their boat and seek shelter immediately upon tornado warning being issued; those who cannot get to shore before the storm arrives should put on their personal floatation device and prepare for wind and rough waters. Individuals owning airplanes should avoid utilizing them in a tornado; to protect their aircraft from storm damage they should store them in a hanger.
**Tornado/High Wind Risk Assessment Designation**

Tornado/High Wind Historical Occurrence Rating: Moderately Low – 4 points

Tornado/High Wind Vulnerability Rating: Critical – 5 points

Tornado/High Wind Probability Rating: Likely – 5 points

Tornado/High Wind Local Official Survey Rating: Medium – 5 points

Tornado/High Wind Risk Assessment Designation: **Moderate Threat - 19 points**

**Tornado/High Wind Mitigation Ideas**

- Invest in public early warning systems/networks and maintain existing systems (sirens)
- Train people as weather spotters
- Provide weather radios to residents in rural areas, especially to vulnerable populations
- Promote public education during Severe Weather Awareness Week and throughout the year.
- Educate individuals about the importance of having a home emergency plan and having a disaster supply kit on hand.
- Construct and provide storm shelters in each community that is readily accessible to the public, especially in areas near mobile home parks, fairgrounds, parks, and other vulnerable public areas.
- Adopt building codes requiring weatherproofing such as wall and roof anchoring, reinforcement of walls, ceilings, floors, etc.
- Encourage use of structural bracing, straps and clips, anchor bolts, laminated or impact resistant glass, reinforced pedestrian and garage doors, window shutters, waterproof adhesive sealing strips, and interlocking roof shingles to protect private and public structures.
- Encourage the use of 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.
- Designate temporary debris disposal sites
- Bury power lines
- Secure loose yard items, such as yard and patio furniture
- Maintain debris management plan that spells out responsibilities of highway and public work departments for debris clearance operations to facilitate safe travel throughout the county.
K. Train Derailment

Derailments are the most common type of train accident in the United States. The Burlington Northern Santa Fe Railroad travels along the southern boundary of Pepin County along the Mississippi River. It passes through the Village of Pepin and the Village of Stockholm, as well as the towns of Pepin and Stockholm; these municipalities have expressed concern about the potential for a train derailment. The safety of the rail industry has been a local, state, and federal priority in recent years and new research focuses on optimizing the ability to prevent accidents in the most cost-effective manner.

Train derailments can be caused by a variety of causes including weather events, environmental factors, mechanical/operational/structural/equipment issues with the railroad or train cars/locomotive, collisions with other large objects, or intentional damage to the rail system by an activist. However, the Federal Railroad Administration (FRA) categorizes train accidents into the following major cause groups: track, equipment, human factors, signal, and miscellaneous. In the event of a train derailment, BNSF does a thorough analysis to determine the cause of the accident as required by the FRA and shares the final report upon request.

A report from Purdue University entitled “Analysis of Causes of Major Train Derailment and Their Effect on Accident Rates” investigated the reasons that most train derailed based on 2001-2010 data from the Federal Railroad Administration and provides us with a nationwide risk assessment based on past accident reports. The Rail Equipment Accident database records railroad, accident type, location, accident cause, severity, and other information important for accident analysis and prevention. The list to the right provides a summary of the primary causes of train derailments along main railroad lines. The report from Purdue also conducted an analysis to compare causes of accidents at different travel speeds, their results indicate that at higher rates of speed train derailments are more likely to be caused by track or equipment failures. While at slower speeds derailments are more likely to be impacted by human error, although track defects are still common.

Since other portions of this plan indicate that railroads may be vulnerable to many weather events; it should be noted that nationwide approximately one percent of train derailments are caused by weather issues. In Pepin County, the most likely weather related damage to the railroad would be from flooding, winter weather, extreme temperatures or landslides. Much of the BNSF Railroad that runs through Pepin County was built in the floodplain which has been reinforced with large boulder and rock rip-rap to protect it from potential flood damage. Flash floods have been known to cause washouts of tracks, while seasonal floods may make segments of the track impassable. In the fall of 2016, a portion of the BNSF railroad in Wisconsin was damaged by a landslide brought on by heavy rains. High temperatures in the summer can cause uneven thermal expansion, while extreme cold can also damage the tracks. Additionally, the buildup of snow and ice on the tracks in the winter can lead to decreased speeds and derailment. Weather can cause serious delays along the railroad, as was seen in many portions of the country during the 1993 Midwest floods.

<table>
<thead>
<tr>
<th>Top 10 Accident Cause of Freight Train Derailments</th>
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<tbody>
<tr>
<td>1) Broken rails or welds</td>
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<tr>
<td>2) Track geometry</td>
</tr>
<tr>
<td>3) Bearing failure (car)</td>
</tr>
<tr>
<td>4) Broken wheels (car)</td>
</tr>
<tr>
<td>5) Train handling (excluding brakes)</td>
</tr>
<tr>
<td>6) Wide gauge</td>
</tr>
<tr>
<td>7) Obstructions</td>
</tr>
<tr>
<td>8) Buckled track</td>
</tr>
<tr>
<td>9) Track-train interaction</td>
</tr>
<tr>
<td>10) Other axle or journal defects (car)</td>
</tr>
</tbody>
</table>

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Additional train accidents can be caused by obstructions on the tracks. There are approximately a dozen rail crossings in Pepin County. Both the Villages of Pepin and Stockholm have implemented quiet zones, which are designated segments of the railroad track where the routine sounding of train horns while approaching public crossings is not required. In lieu of sounding the horn, the communities or BNSF had to implement other warning devices such as flashing light signals with gates, constant warning time train detection circuitry, and power-off indicators visible to the train crew. However, the horn may be sounded at any time by the locomotive engineer for safety reasons. The quiet zones were implemented in 2015 (Village of Pepin) and 2016 (Village of Stockholm), therefore the county will monitor whether the lack of train horns results in additional accidents in the years to come.

**Community Hazard History**

There have been a handful of train derailments in Pepin County over the past few decades. Reports of these incidents were retrieved from local emergency responders and from local newspapers. As can be noted below, most of the derailments to date have involved commodities traveling via rail, and none have involved hazardous chemicals. There has been a lot of concern and training devoted to train derailments in the past few years due to the amount of crude oil and other hazardous materials that are being transported along the BNSF tracks.

- **1973** - Derailment in the Village of Stockholm, this involved 25-30 train cars which were carrying lumber and fertilizer.
- **1992** – No information about this derailment was available, other than referenced in a public meeting held in 1998.
- **February 1996** – A total of 57 out of 130 cars derailed less than half a mile from Stockholm carrying taconite. Nobody was injured and none of the materials spilled into Lake Pepin. A newspaper article from 1997 indicates that this is the third trail derailment in the last 20 years.
- **May 1997** – a combination of wheat and corn syrup were released when 32 train cars derailed near the Village of Pepin Wastewater Treatment Plant. This accident was attributed to a “hotbox” which is a problem caused when a wheel bearing runs dry of grease. The railroad installed a sensor device in Maiden Rock to monitor the temperatures of wheel bearings.
- **December 1997** – 23 cars carrying corn skidded off a southbound track near the Village of Pepin at around midnight. Emergency responders secured the incident until they determined it did not involve hazardous materials.

A 1998 newspaper indicates that of the 5 derailments in Pepin County, 4 were caused by failed journals and the 5th by a broken wheel. After the accidents in the 1990’s, Burlington Northern Santa Fe Railroad installed additional equipment to detect problems that may cause train derailments. Since that time, railroad safety standards have resulted in additional detectors being installed within the county; these systems send a signal to a dispatcher who then tells the train engineer of the problem so the train could be slowed or stopped prior to an accident occurring.
**Vulnerability Assessment**

Unlike weather related hazards, the vulnerability associated with train derailments is limited to the area closest to the railroad track. In general, the areas immediately adjacent to the track have the greatest potential to be damaged. For the purposes of emergency response to a train derailment with hazardous chemicals, all areas within a certain distance (varies by substance) of the impacted area would be told to shelter in place or evacuate as soon as possible.

The Village of Pepin would arguably be the most impacted by a train derailment within its municipal boundaries. The community’s wastewater treatment plant is immediately adjacent to the railroad track, making it a very vulnerable to any type of train derailment. There are a few businesses, including a marina on the lake side of the tracks. Many businesses are within a block or two from the tracks, as the views of Lake Pepin serve as an escape to countless visitors. The village also has several homes within a walking distance of the tracks, so keeping the residents safe would also be a top priority.

In the Village of Stockholm, the majority of the impacts would be to local small businesses as the community is a thriving tourist destination. The railroad divides a village park that serves as a campground from the business district; any individuals staying south of the tracks would need to evacuate via boat or ice as the tracks cut them off from the remainder of the county. With a population of 88, most of Stockholm’s houses are not occupied for most of the year or owned by local residents, which could be a challenge for insuring the safety of everyone in town on any given day.

Deer Island, a peninsula in the Town of Pepin would be another inhabited place of concern in the event of a train derailment; approximately 75 to 100 seasonal homes are located south of the railroad tracks. There is only one rail crossing allowing access to the peninsula, so if the crossing is blocked the public safety of these individuals may be a concern. The population of this area varies significantly throughout the year, as some individuals live there year around and others only use it as a vacation home. Some of these individuals may have boats, which may be useful if they need to evacuate.

In the event of a train derailment, transportation will likely become an issue. All the communities that could be impacted are along Highway 35, so traffic along the route would have to be restricted at checkpoints to ensure that emergency responders can get to the site of the incident. Evacuation routes could create congest county roadways as people attempt to leave town. Rescuing any individuals who are in a perilous position due to access to the mainland being cut off by a derailment would need to be done by boat or ice, depending on the season. A coordinated plan would be developed based on the exact location of the incident and other key factors, such as weather and wind direction. Notifying visitors could also be a challenge if a derailment happened during the peak tourism seasons.
Train Derailment Risk Assessment Designation

Train Derailment Historical Occurrence Rating: Low – 3 points
Train Derailment Vulnerability Rating: Critical – 5 points
Train Derailment Probability Rating: Likely – 5 points
Train Derailment Local Official Survey Rating: Medium – 5 points

Train Derailment Risk Assessment Designation: Moderate Threat - 18 points

Train Derailment Mitigation Ideas

- Encourage BNSF to place an emphasis on preventative measures, including rail inspection, rail grinding, rail repair, and renewal.
- Advocate for the use of wayside and onboard detection systems to identify and inform railroads and car owners about the need to remove or repair rolling stock defects before they cause an accident.
- Provide training and education related to train accidents and derailments to local emergency responders.
- Continue to support federal research initiatives to determine effective means of reducing train derailments and accidents.
L. Fire

As defined by the Merriam-Webster Dictionary, fire is commonly described as “(1) the phenomenon of combustion manifested in light, flame, and heat, (2) a fuel in a state of combustion, or (3) a destructive burning”. Although it has many definitions, it is a universally recognizable hazard as fire has been part of the Earth’s history from essentially the beginning of time; early civilizations learned to control fire to generate heat and light, cook food, and manage the environment. As time has passed, the use of fire has become progressively more sophisticated, especially in controlled settings such as internal combustion engines and the creation of electricity at some power plants.

Fires start when a combustible material (fuel) in combination with an oxidizer (generally oxygen) is exposed to a source of heat or ambient temperature and can sustain a rate of rapid oxidation that produces a chain reaction. Once ignited, a chain reaction must take place that allows the fire to sustain its own heat by additional release of heat energy via the combustion process through additional fuel and oxygen. Together, heat, oxygen, fuel and the chain reaction are known as a fire tetrahedron. Fire can be extinguished by removing any of the components of the fire tetrahedron, such as turning off gas source, covering flames completely to use up all available air, application of water to reduce heat, or application of a flame-retardant chemical.

A wildfire is any unwanted, unplanned fire in an area of combustible vegetation that occurs in the countryside or rural area. Depending on the type of vegetation in the area where it occurs, it could be classified as a forest fire, brush fire, or grass fire. Wildfires can be characterized in the terms of the cause of ignition, their physical properties, the combustible materials present, and the effect the weather has on the fire. In Pepin County, sources of wildfires could arise from any instance of uncontrolled burning of brush, marshes, grassland, or fields. Other causes of wildfires and forest fires include lightning, arson, and as the result of unintentional human actions such as discarded cigarettes, burning debris, unextinguished campfires, and the improper use and maintenance of equipment. Per the United States Forest Service most wildfires are caused by humans and could be prevented.

A structure fire is a fire involving the structural components of various types of residential, commercial, or industrial buildings. The National Fire Protection Association identifies candles, smoking, electrical and lighting issues, dryers and washing machines, lightning, children playing with fire, Christmas trees, and cooking as the most common causes of household fires. In all types of fires, heat and smoke from fire can be more dangerous than the flames, causing serious health impacts and possible death. Asphyxiation is the leading cause of fire deaths, exceeding burns by a three-to-one ratio.

Fires can occur at any time of the day and during any month of the year. The peak wildfire season in Wisconsin is normally from March through November; the season length and peak amounts may vary from year to year based on a variety of factors. Land use, vegetation, amount of combustible materials present, and weather conditions such as wind, low humidity, and lack of precipitation are chief factors influencing the number of fires and the 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.

Fires can cause significant injury, death, and damage to property. Approximately 46 percent of the state (16 million acres) is covered with forests. Per the Pepin County Comprehensive Plan just over 23 percent
of the land is assessed as forest or ag/forest use, however it is estimated that 95 percent of land is undeveloped if you include areas used exclusively for agricultural purposes and open space. The potential for property damage from fires increases each year as more recreational properties are developed on wooded land and an increasing number 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 fires include 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 and compound the damages.

Community Hazard History

Several significant structural fires have occurred throughout Pepin County’s history. Due to the rural nature of the area, fires damaging businesses have a large impact on the local economy. Several residential fires are also reported each year, creating a need to keep local volunteer fire departments trained and ready to respond. There have also been a few wildfires that have been documented in recent history. Based on fire department records, each volunteer agency typically responds to at least one small wildfire per year, although some years have a greater abundance of these events. An illustrative list of noteworthy fire events is listed below:

- **Early 1870’s** – a few fires impacted the community of Arkansaw; a fire destroyed a flour and grist mill in 1871 and the furniture factory burned down in 1872. The furniture factory employed about eighty men at the time of the fire.

- **December 25, 1881** – Considered to be the worst fire in the City of Durand’s history; this fire wiped out a total of 34 buildings in downtown Durand. The fire started at the Elklor House (a large hotel) and spread northward along River Street due to a wind out of the south. Buildings destroyed included Mons Anderson meat market, W.H. Huntington building, several harness shops, the Arkansaw Furniture Company, several general stores, brewery, and dozens of other shops including drug stores, dress shops, lawyer’s offices, a confectionary store, hardware store, two meat markets, the Odd Fellows Hall, and several houses. The wind shifted which helped to prevent the fire from spreading elsewhere in the city. The fire was determined to be ignited by a defective fuse in a chimney at the Elklor House. At the time, most buildings were uninsured because the community did not have adequate fire protection. After this fire, the local businessmen determined that when rebuilding, no buildings should be of frame structure. The Durand Volunteer Fire Department was created within the next decade; with the city providing all the equipment and a fire hall.

- **March 1931** – The downtown portion of Arkansaw was destroyed by a fire; the community rebuilt and most businesses were back in business within five years.

- **August 15, 1967** – The Bauer Built Retread Shop started on fire and caused hundreds of thousands of dollars of damage to the rubber working mill, tire molds, specialty tools, and thousands of tires. The Durand Fire Department had to call for mutual aid from all the surrounding counties. The facility was rebuilt on the same site in 1968. Bauer Built is one of the largest employers in Pepin County, and continues to be essential to the local economy.

- **August 1982** – A fire destroyed two sections of the warehouse of the Durand Canning Company, canning production had been discontinued in the previous year. The building was still used as a storage, shipping, and distribution center which employed 15 people year round and up to 200
individuals in the summer. This building has since been converted to another food processing facility.

- **June 9, 1984** – A fire destroyed the Pepin Hotel and Bar, which had been a community landmark since 1880 as it provided the only banquet facility for weddings and other large gatherings in the Pepin area. The building had recently been remodeled and was looking forward to the summer tourist season at the time of the fire; it was never rebuilt.

- **March 30, 1999** – A controlled burn started by the Wisconsin Department of Natural Resources resulted in 300 acres of grassland unintentionally being caught on fire in Pepin County. The DNR field agents believed that the fire had been extinguished and left the site; afternoon winds ignited smoldering embers. Six fire departments assisted protecting local residences and putting out the fire which took approximately seven hours to control.

- **April 18, 2006** – A large grass fire started in the Town of Albany; this incident resulted in several residents being evacuated from their homes. Five fire departments assisted in controlling the fire and managing the incident.

- **January 3, 2010** – A fire started in the Durand Cafe destroying the restaurant, Cottage Hill Floral, and Toni’s Interiors as well as causing smoke damage to a nearby hair salon. The fire destroyed half of the buildings on the block in the downtown district of the City of Durand.

- **February 28, 2014** - The Schafer Fisheries Northern Collection Facility in Pepin was lost to fire after a blaze started in the processing area. A combination of building materials and snow and ice made firefighting difficult as four fire departments attempted to put out the flames. Approximately 20-30 employees worked at the facility, which supported the processing of fish from more than 100 commercial fishermen within a 1,000-mile radius of the facility. It was not rebuilt and local catches are now sent to a processing plant in Iowa.

**Vulnerability Assessment**

All areas of the county are vulnerable to fires, although urban areas have a greater density of structures and therefore may have a greater frequency of fire events. Communities within Pepin County would be most impacted if critical facilities or large places of employment sustained substantial damage from a structural fire. Many of these structures should be equipped with fire suppression devices, however some critical facilities in Pepin County existed prior to regulations requiring automatic fire-extinguishing systems. The public water supply and wastewater treatment facilities should be able to continue to provide services in the event of most fire events, unless directly impacted.

As noted in the community hazard history, all businesses are vulnerable to fires although the source of the fire may vary. The lack of fire separation between buildings has been a significant issue within the City of Durand, despite the abundance of brick buildings instead of wooden frame structures. Businesses in rural areas may be more susceptible to wildfires, especially in areas adjacent to forests and grasslands. Businesses that store hazardous materials on site are vulnerable to fire, special resources may need to be devoted to fire suppression in some cases. In the event of approaching wildfires, some materials may be transported to a safe location to avoid the substance from starting on fire. Generally, agriculture is also considered to have a low hazard risk, although crops, livestock and agricultural buildings may be decimated if a blaze erupts.
Transportation may be impacted by fires, however generally it is an isolated occurrence. Smoke from fires can adversely affect the visibility for motorists. The movement of heavy and specialized firefighting equipment on public roadways to fire scenes can temporarily disrupt traffic patterns. Railroad operators could also be subject to decreased visibility due to smoke and may require communication with railroad dispatch. Water traffic may also be hindered if visibility is impacted; however modern equipment on boats (such as radar) would enable boats to continue to travel. The five privately owned airports in Pepin County could be an asset in the event of a fire if aircraft are utilized for observation or water drop purposes.

**Fire Risk Assessment Designation**

Wildfires Historical Occurrence Rating: Low – 3 points

Wildfires Vulnerability Rating: Limited – 3 points

Wildfires Probability Rating: Likely – 7 points

Wildfires Local Official Survey Rating: Medium – 4 points

Fire Risk Assessment Designation: **Moderate Threat - 17 points**

**Fire Mitigation Ideas**

- Promote public education on fire safety and wildfire prevention.
- Endorse the installation, testing, and maintenance of smoke alarms in all structures
- Advocate for the uses of non-combustible roofing, fire safe construction, and other fire retardant materials.
- Encourage the creation of defensible space or buffers around homes by eliminating dead vegetation, pruning, selective logging, planting fire resistant vegetation, creating fire breaks, and other fuel management techniques.
- Promote the utilization of fire separation measures and automated sprinkler systems in industrial, commercial, and multi-family housing
- Limit the development along steep slopes through bluffland zoning.
- Local governments can require burn permits to restrict campfires and outdoor burning.
- Encourage maintenance of power lines to reduce fires started by damaged lines.
- Continue to maintain cooperative fire agreements with the Wisconsin Department of Natural Resources.
M. Drought

Droughts are associated with a period of drier-than-normal conditions that results in water related problems. Droughts are generally a slowly progressing event that can last from weeks to years. When rainfall is less than normal for an extended period, the flow of streams and rivers decline, water levels decrease, and the depth to water in wells increases which can contribute to reduced drinking water availability and food insecurity as local agricultural crops would be impacted. A drought in another portion of the country may also affect Pepin County residents through agricultural commodity markets and lack of availability of produce.

The National Weather Service provides the following definitions for these terms associated with droughts:

**Aquifer:** In hydrologic terms, permeable layers of underground rock or sand that hold or transmit groundwater below the water table that will yield water to a well in sufficient quantities to produce water for beneficial use.

**Crop Moisture Index:** An index, created by Palmer, to assess short-term crop water conditions and needs across major crop-producing regions. This index is a useful tool in forecasting short-term drought conditions.

**Drought:** Drought is a deficiency of moisture that results in adverse impacts on people, animals, or vegetation over a sizeable area.

- **Agricultural Drought:** A drought that is based on the impacts to agriculture by factors such as rainfall deficits, soil water deficits, reduced groundwater, or reduced reservoir levels due to the need for irrigation.
- **Hydrological Drought:** A drought that is based on the impact of rainfall deficits on the water supply such as reduced stream flow, lowered reservoir and lake levels, and groundwater table decline.
- **Meteorological Drought:** A drought that is based on the degree of dryness (rainfall deficit) and the length of the dry period.

**Drought Assessments:** At the end of each month, the Climate Prediction Center (CPC) issues a long-term seasonal drought assessment. On Thursdays of each week, the CPC together with NOAA National Climatic Data Center, the United States Department of Agriculture, and the National Drought Mitigation Center in Lincoln, Nebraska, issues a weekly drought assessment called the United States Drought Monitor. These assessments review national drought conditions and indicate potential impacts for various economic sectors, such as agriculture and forestry.

**Drought Index:** In hydrologic terms, computed value which is related to some of the cumulative effects of a prolonged and abnormal moisture deficiency. (An index of hydrological drought corresponding to levels below the mean in streams, lakes, and reservoirs.)

**Palmer Drought Severity Index (PDSI):** An index used to gage the severity of drought conditions by using a water balance equation to track water supply and demand. This index is calculated weekly by the National Weather Service.
The severity of a drought depends on several factors:

- Duration
- Intensity
- Geographic extent
- Water supply demands for both human use and vegetation

Drought is difficult to define in exact terms as there is no exact and universally accepted definition. Determining when a drought begins and when it ends is often difficult as the conditions slowly develop while the impacts linger after its apparent end (precipitation arrives). Impacts of droughts may not be apparent to the entire population and the impacts may vary across a large geographic area.

The magnitude of a drought is measured using the Palmer Drought Severity Index. Factors including temperature, soil moisture, and precipitation are entered into an algorithm that returns results between -4 (extreme drought) and 4 (extremely moist) with zero being normal conditions. The index is most effective at determining drought over a period of months, but less effective over shorter timeframes. Droughts are rated by the U.S. Drought Monitor into the following categories based on five indicators including the Palmer Index and streamflow data. As noted above, the Crop Moisture Index was developed to measure soil moisture over shorter periods (up to four weeks); it has values between -3 (severely dry) and 3 (excessively wet), again with zero as normal conditions. The National Weather Service’s Climate Prediction Center publishes both Palmer Drought Severity and Crop Moisture indices for the country weekly.

**U.S. Drought Monitor Categories**

**D0: Abnormally Dry:**
- Going into drought: short-term dryness slowing planting and growth of crops or pastures.
- Coming out of drought: Some lingering water deficits, pastures or crops not fully recovered.

**D1: Moderate Drought**
- Some damage to crops and pastures
- Streams, reservoirs, or wells low, some water shortages developing or imminent
- Voluntary water-use restrictions requested

**D2: Severe Drought**
- Crop or pasture losses likely
- Water shortages common
- Water restrictions imposed

**D3: Extreme Drought**
- Major crop and pasture losses
- Widespread water shortages or restrictions

**D4 Exceptional Drought**
- Exceptional and widespread crop and pasture losses
- Shortages of water in reservoirs, streams, and wells creating water emergencies.

**Community Hazard History**

The National Weather Service Office providing service to Pepin County does not have any records of any droughts for counties in Wisconsin. Therefore, we are reliant on state records to determine a hazard history for past drought events.

- **1929-1934** – associated with an extreme drought that impacted most the United States during the Great Depression. The duration and severity of this drought contribute to this period being considered the worst drought in Wisconsin History.
• **1976-1977** – This drought resulted in 64 out of 72 counties in Wisconsin being declared Federal Drought Areas; Pepin County was included in the impacted area. Across the state, stream flow measuring stations were extremely low, wells were going dry, and state agricultural losses reached $624 million. The Chippewa River at the City of Durand was reduced to less than 3 inches in August 1976 and the Mississippi River was also reported to be very low and experiencing navigability problems.

• **1987-1989** – Records show that the entire state was affected by this drought which is often referred to as the North American Drought of 1988. This drought was characterized by below normal precipitation, persistent dry air, and above normal temperatures. All counties in Wisconsin were eligible for drought assistance, as half of the state’s farms suffered a loss of much of their crops and struggled to feed their livestock. The Chippewa River had a low water level of approximately 5 inches August 1988.

• **2006** – Very dry and above normal temperatures from mid-May to mid-July resulted in the development of drought conditions across western and northern Wisconsin. Although the drought was only considered to be moderate to severe, the Chippewa River at the City of Durand essentially ran dry with one-tenth of a foot of water, the lowest recorded level documented. Federal disaster assistance was required for several counties due to widespread crop losses.

• **Summer/Fall 2012** – This severe drought was accompanied by a heat wave which significantly reduced crop yields across the State of Wisconsin. Per historical Palmer Index records available through the NCDC, Pepin County experienced mostly moderate drought levels except for in the month of September where it increased to severe. Therefore, one can assume the county did not experience as drastic of agricultural losses as other portions of the state.

**Vulnerability Assessment**

The county’s susceptibility to drought will be based on the severity of the drought event. In most events, government, medical, emergency response, and school facilities should be able to function normally although water use may be restricted. Out of the listed types of critical facilities, fire departments are the most dependent on water to fight fires, especially wildfires which are more likely to occur during drought conditions. Municipal wells have gone dry in other communities in the State of Wisconsin in significant droughts of record. Therefore, it is possible that one of the four municipal wells in operation could go dry. Both the City of Durand and the Village of Pepin (the two communities with have municipal wells) have two wells to serve their residents. Private wells may also have trouble reaching water if the groundwater levels are affected by the drought. The three municipal wastewater treatment facilities within the county should not be impacted by a drought, as decreased water supply could result in diminished sewage flows.

Negative agricultural impacts are generally the first noticeable signs of a drought; even small droughts of a limited duration can significantly reduce crop growth and yields. The 2012 Census of Agriculture indicates that 103,604 acres (85% of the total area) in Pepin County are utilized for agricultural production. The losses to agricultural producers include: reduced yields and crop losses, increased insect infestation and plant disease, increased use of irrigation, costs associated with new or supplemental water resource development, wind erosion of topsoil, reduced milk production, increased feed costs, high livestock mortality rates, disruption of reproductive cycles, decreased stock weights, reduced productivity of land, and loss of dairy herds and/or farms.
Most businesses and industries in Pepin County would most likely not be impacted by a drought. Enterprises supporting agriculture, tourism related businesses, small watercraft dealers, marinas, and golf courses may see decreased business or increased costs associated with drought conditions. As a rural community dependent on farmers to support the local economy, other businesses may notice less profitable years if the drought impacts the discretionary budgets of agricultural producers. Droughts generally do not impact modes of transportation, although recreational boaters may be limited based on the depth of water and availability of docks.

**Drought Risk Assessment Designation**

Drought Historical Occurrence Rating: Low – 3 points
Drought Vulnerability Rating: Limited – 5 points
Drought Probability Rating: Likely – 5 points
Drought Local Official Survey Rating: Medium – 3 points
Drought Risk Assessment Designation: **Moderate Threat - 16 points**

**Drought Mitigation Ideas**

- Maintain adequate water storage for human consumption
- Encourage residents to take water saving measures
- Enact local ordinances to prioritize or control water usage in emergency situations
- Develop contingency plans for municipal water delivery systems to reduce risks associated with droughts
- Encourage farmers to purchase crop insurance
N. Agricultural Hazards

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, agricultural has driven the State of Wisconsin’s economy. In Pepin County, over 1,000 residents are supported by agricultural businesses.

As noted elsewhere in this plan, there are many natural hazards that can affect agricultural production in the State. Droughts reduce crop growth and yields or can decimate cropland. Extreme temperatures, high winds, hail, tornadoes, heavy rainfalls or floods, and other extreme weather are typically associated with causing damage to crops, equipment, and structures. Those depending on agriculture as a way of life may also identify insects or plant and animal diseases among threats to their livelihood.

One of the hazards that has been recorded that is not accounted for in other categories is frost. The National Weather Service defines frost as the formation of thin ice crystals on the ground or other surfaces in the form of scales, needles, feathers, or fans. Frost develops under conditions similar to dew, except the temperatures of the Earth’s surface and earthbound objects fall below freezing. This condition is primarily significant during the growing season as it could potentially end or shorten the number of days available to grow produce. Frost can also damage crops or reduce future crop yields. In temperate climates, such as those in Wisconsin, it most commonly appears as fragile white crystals or frozen dew drops near the ground. Local weather station data recorded from 1935 to present in the City of Durand suggests that the last spring freeze can typically be expected to occur between April 15th and June 1st whereas fall freezes are likely to happen between September 15th and October 22nd.

Community Hazard History

The history of agricultural losses due to droughts, floods, extreme temperatures, high winds, hail, and other extreme weather events are detailed under the appropriate natural hazard section. Throughout the county’s history, a few frost events have been reported as impacting agricultural production; this information is primarily derived from NOAA’s historical database.

- **September 1974** - Two separate events occurred including frost and freezing temperatures that hit the northern half of Wisconsin over Labor Day Weekend, destroying countless acres of crops. This freeze was estimated to cause over 107 million dollars in crop damage. Later in the month, another burst of cold air brought an extensive freeze to the entire state. NOAA records indicate that this was unparalleled in recorded history with over $200 million in crop damages.

- **June 1992** - A late frost damaged agricultural crops and produce across the state. Per the USDA, the corn crop suffered a 30-40% reduction in yield during this growing season. In addition to commercial producers, this frost likely damaged many backyard gardens across the county and state.

- **May 2016** – A late frost was particularly damaging to fruit crops including apples and grapes, due to the topography of Pepin County some areas were affected greater than others. The local winery reported that vineyard losses varied by location which they attributed to slope, elevation, aspect, and lake effect off Lake Pepin.
Vulnerability Assessment

Unlike most hazards, agricultural hazards present a very low risk to critical facilities, transportation, municipal water and wastewater facilities, and hazardous material sites. The most impacted sector of the economy from agricultural hazards, is anything related to agricultural production. Businesses and industries that are involved in the growth, production, processing, manufacturing, distribution, and wholesale and retail sales of agricultural 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.

In a rural area, such as Pepin County, the impacts of agricultural hazards may be widespread and have ripple effects into other segments of the population. Local businesses may see decreased spending by those who depend on agriculture as their primary source of income. In recent years, Pepin County has seen an increased number of agri-tourism related businesses, so agricultural hazards could potentially impact tourism related expenditures throughout the area.

Agricultural Hazards Risk Assessment Designation

Agricultural Hazards Historical Occurrence Rating: Low – 3 points
Agricultural Hazards Vulnerability Rating: Limited – 5 points
Agricultural Hazards Probability Rating: Likely – 5 points
Agricultural Hazards Local Official Survey Rating: Medium – 3 points

Agricultural Hazards Risk Assessment Designation: **Moderate Threat - 16 points**

Agricultural Hazards Mitigation Ideas

- Provide information in regards to minimizing hazards through site selection assessments for specialty crops.
- Encourage the use of frost protection methods such as protective fabrics, floating row covers, sprinkler irrigation, or wind machines to protect crops from frost.
- Promote the importance of purchasing crop insurance
- See other portions of plan for agricultural mitigation ideas related to droughts, floods, extreme temperatures, high winds, and hail.
O. Chemical Spill/Accident

A chemical accident is the unintentional release of one or more hazardous substances which could harm human health or the environment. Chemical hazards are systems where chemical accidents could occur under certain circumstances. Such events include fires, explosions, leakages or releases of toxic or hazardous materials that can cause people illness, injury, disability, or death. A hazardous material is any substance or agent (biological, chemical, radiological, and/or physical) which can pose an unreasonable risk to humans, the environment, and property.

While chemical accidents may occur whenever toxic materials are stored, transported, or used, the most severe accidents are industrial accidents, involving major chemical manufacturing and storage facilities. The most significant chemical accident in recorded history was the 1984 Bhopal disaster in India which killed over 3,000 people. After this incident, the United States passed the 1986 Emergency Planning and Community Right-to-Know Act (EPCRA) which requires local emergency planning efforts throughout the country. The law also requires companies to make information publicly available about the storage of toxic chemicals so that residents can identify the vulnerable zones where severe toxic releases could cause harm or death. The federal government has also established the Chemical Safety and Hazard Investigation Board to determine the root causes of chemical accidents and issue safety recommendations to prevent future disasters.

Pepin County currently has four sites with extremely hazardous substances and typically averages 20 other businesses that report the storage of chemicals on site under EPCRA. These numbers may vary from year to year, which is why the Pepin County Local Emergency Planning Council meets at least annually to review any changes. Each release or spill of hazardous materials will require a different response based on a variety of factors, including the amount, type, and location of the spill. Each location should have its own specific cleanup procedure and all personnel handling hazardous materials should receive instruction on that procedure.

Community Hazard History

There have been several documented chemical spills and accidents recorded in Pepin County. All incidents involving chemical spills are required to be reported to the Wisconsin Department of Natural Resources, who shares this information with Pepin County. In addition to being summarized below, spills are documented in the Pepin County Hazardous Materials Strategic Plan with records starting in 1978.

- Nearly 2000 gallons of petroleum products have been spilled in Pepin County in the last 40 years. This encompasses spills of various types including fuel oil, diesel, gasoline, hydraulic oil, and mixtures of gasoline and oil. These discharges occurred because of either transportation related accidents and overruns at fixed site, as well as from damages to natural gas lines that cross the county.
- A large amount (2200 gallons) of Ethylene Glycol, a main component of antifreeze was reported as being spilled in the basement of the Pepin County Government Center.
- Several releases of chemicals used for agricultural purposes including: 15 gallons of Anhydrous Ammonia, 40 gallons of prow, 40 pounds of fertilizer, 400 pounds of urea, and 4000 pounds of potash all due to transportation accidents. Additionally, a couple other agricultural products were released at fixed locations.
• Two documented cases of PCB spills in the 1980s.
• Metallic mercury was identified as escaping its container at three fixed locations within the county; including damaged equipment in the Pepin County Health Department.

Vulnerability Assessment

Chemical spills and accidents can occur at essentially any location throughout Pepin County. When reported, spills are generally identified as being at a fixed site or being released during transport. Facilities considered to be hazardous material sites are required to have plans in place to respond to any accidents that may occur if there is a release of chemicals at that location. Additionally, spill sites may be considered fixed if it occurred at a spot where the spill can be contained. Transportation related incidents can occur along any roadway, as well as fields within Pepin County. These types of accidents often involve spills that are more difficult to contain.

Most of the critical facilities in Pepin County utilize chemicals at some point throughout the year to fuel equipment and generators; human error can lead to some of these materials escaping containment from time to time. The municipal water and wastewater treatment plants in the City of Durand use chlorine to ensure water is safe to both drink and be returned to the natural environment; while the Village of Pepin utilizes other processes to provide these services. Sites with hazardous materials pose an increased community vulnerability to chemical spills; most of these sites are located within the City of Durand, although there are a couple in Pepin and rural portions of the county. Approximately 15% of Pepin County businesses and industries are considered to have hazardous materials on site based on TIER II reporting. However, many other businesses rely on hazardous materials to conduct their daily operations which may expose them to harm if improperly handled or stored. Agricultural activities use biological agents for a variety of purposes and increase the community’s vulnerability to chemical spills; many the past spill events involved chemicals utilized to support farming. Additionally, there is a nuclear power plant in Minnesota; Pepin County is in the ingestion zone which means that livestock and crops may be impacted in the event of a radiological release.

All forms of transportation are vulnerable to chemical spills. Many chemicals are transported via public highways and road; as with any motor vehicle there is always a risk involved with traveling which can include hitting another vehicle, running into an animal, experiencing weather related hazards, or simply inattentive driving. All vehicles transporting chemicals are required to be placarded to identify which substances are being transported. Chemicals that are produced and/or used in other areas of the state may be transported through the county, increasing the potential risk. Many commodities are transported by rail, including some hazardous materials. The proximity of the railroad line to the Mississippi River can pose environmental issues as well as a challenge for cleanup activities especially if located in an isolated area. Spills on the waterways, from boats or barges, could also occur on the Mississippi and Chippewa Rivers. Even small, non-navigable waterways in Pepin County are susceptible to contamination from land based spills and may serve as a conduit spreading pollution to other areas. Airports and aircraft could be a source of additional spills from refueling activities, maintenance issues, or unexpected malfunctions.
Chemical Spill/Accident Risk Assessment Designation

Chemical Spill/Accident Historical Occurrence Rating: Low – 3 points
Chemical Spill/Accident Vulnerability Rating: Limited – 3 points
Chemical Spill/Accident Probability Rating: Likely – 5 points
Chemical Spill/Accident Local Official Survey Rating: Medium – 5 points
Chemical Spill/Accident Risk Assessment Designation: Moderate Threat - 16 points

Chemical Spill/Accident Mitigation Ideas

- Provide training to local emergency responders to the operational and technician level to enable local response to chemical incidents.
- Require that all chemicals being transported are labeled and secured.
- Urge all businesses and industries utilizing hazardous chemicals to keep updated response plans and containment materials on site.
- Continue to offer residents and businesses the opportunity to discard chemicals through clean sweep campaigns
- Promote public education campaigns focusing on safe use, handling, and storage of hazardous materials.
- Educate residents about the ingestion risks associated with the Prairie Island Nuclear Power Plant.
P. Public Health Outbreaks

The Merriam-Webster Dictionary defines public health as the “art and science dealing with the protection and improvement of community health by organized community effort and including preventative medicine and sanitary and social science”. Generally public health has been concerned with threats to health based on population health analysis. The focus of a public health intervention is to prevent and manage diseases, injuries, and other health conditions through surveillance of cases and the promotion of healthy behaviors, communities, and environments.

The public health community spends a considerable amount of time investigating the spread of communicable diseases, which are defined as “an infectious disease transmissible (as from person to person) by direct contact with an affected individual or the individual’s discharges or by indirect means (as by a vector)”. Many diseases are preventable through simple, nonmedical behaviors. For example, research has shown that the simple act of hand washing with soap can prevent many contagious diseases. In other cases, treating a disease or controlling a pathogen can be vital to preventing its spread to others, such as during an outbreak of infectious disease or contamination of food or water supplies.

Public health outbreaks of special concern include emerging infectious diseases, which are defined by the National Institute of Health as “infectious diseases that have newly appeared in a population or have existed but are rapidly increasing in incidence or geographic range, or that are one of the National Institute of Allergy and Infectious Diseases (NIAID) Category A, B, or C priority pathogens. Category A pathogens include organisms or biological agents that pose the highest risk to national security and public health as they can easily be disseminated or transmitted from person to person, result in high mortality rates and have the potential for major public health impact, might cause public panic and social disruption, and require special action for public health preparedness. Category B pathogens are the second highest priority since they are moderately easy to disseminate, result in moderate morbidity rates and low mortality rates, and require specific enhancements for diagnostic capacity and enhanced disease surveillance. Category C pathogens include emerging pathogens that could be engineered for mass dissemination in the future due to availability, ease of production and dissemination, and potential for high morbidity and mortality rates and major health impacts.

Zoonotic diseases are illnesses associated with animals that can be transmitted to humans. The animal passing along the disease are commonly referred to as vectors which formulates the term “vector-borne diseases”. Generally, mosquitos and ticks are usually associated with vector-borne diseases, although in recent years, the avian influenza has become a widespread concern. Bacteria, parasites, and viral diseases may contribute to public health outbreaks when individuals consume contaminated food or beverages.

Common Factors Contributing to Disease Emergence
- Microbial adaption
- Changing human susceptibility
- Climate and weather
- Change in human demographics and trade
- Economic development
- Breakdown of public health
- Poverty and social inequality
- War and famine
- Bioterrorism
Community Hazard History

The State of Wisconsin Department of Health Services publishes public health profiles annually to provide concise health and demographic information about each county. Review of the available profiles for Pepin County indicate that there have been relatively few confirmed cases of communicable diseases over the past decade. The public health outbreaks listed below were significant for Pepin County due to the number of people impacted.

- **September 2014** – A public health emergency resulted after 38 individuals associated with the Durand High School football team became sick after attending a potluck. The Wisconsin Department of Health Services laboratory identified a bacterium called *Campylobacter jejuni* that was linked to 26 of the reported illnesses; symptoms included nausea, vomiting, diarrhea, and fever.

- **March-September 2016** – An outbreak of the highly contagious bacterial respiratory infection commonly known as whooping cough impacted many middle and high school students in Pepin County. Most the cases were reported to be impacting students at the Durand School District. In total, a record number of 159 whooping cough cases were reported to the Pepin County Health Department in 2016.

Vulnerability Assessment

Public health has the potential to impact all people who live, work, or visit Pepin County. Places identified as critical facilities, such as schools, hospitals and healthcare facilities, government buildings, and headquarters emergency response agencies could potentially be vulnerable in a public health outbreak as they could reduce the availability of services to the community. Additionally, hospitals and clinics would likely be inundated by an increased number of patients. Business and industry within the county may also be affected by employees that are unable to come to work due to illness or provision of care to sick family members. Furthermore, customers may avoid going to businesses due to a fear of coming down with a contagious disease. Farmers may also get sick which could impact their ability to tend to their animals or crops. The agricultural community may be more vulnerable to zoonotic and vector borne diseases due to the nature of their work; some zoonotic diseases also can modify the health of livestock. Modes of transportation may help the public health outbreak to other areas, but otherwise the mobility of the population should not be impacted.

The University of Wisconsin Population Health Institute has produced County Health Rankings since 2003 for all counties in Wisconsin; in 2010 it was expanded to be a nationwide assessment. The County Health Rankings attempt to identify what we know when it comes to making people sick or healthy; they are accompanied by Roadmaps that recognize steps communities can take to create healthier places to live, learn, work, and play. The health rankings take into account health outcomes, health factors such as health behaviors, clinical care, social and economic factors, and physical environment, as well as statewide and local policies and programs. In 2016, Pepin County ranked 5th out of 72 counties for health outcomes which considers premature death, low birthweight, and percent of people reporting as having poor physical or mental health.

Pepin County has an average overall ranking (36 out of 72) for health factors. This component is derived from health behaviors, such as smoking, obesity levels, access to food, physical inactivity, drinking habits, and risky sexual activities which contribute to a ranking of 21 out of 72 counties. Access to clinical care
ranked 69 out of 72 counties, due to a low number of physicians and dentists per capita in the county compared to the rest of the state. While this ranking has historically been poor, residents of Pepin County can access quality healthcare from within the county and surrounding areas. Countywide social and economic factors and physical environment were both given a rank of 15 out of 72 counties.

**Public Health Outbreak Risk Assessment Designation**

Public Health Outbreak Historical Occurrence Rating: Low – 3 points  
Public Health Outbreak Vulnerability Rating: Critical – 6 points  
Public Health Outbreak Probability Rating: Likely – 5 points  
Public Health Outbreak Local Official Survey Rating: Low – 1 points  
Public Health Outbreak Risk Assessment Designation: **Moderate Threat - 15 points**

**Public Health Outbreak Mitigation Ideas**

- Continue public health campaigns based upon infectious disease control and good hygiene practices to reduce public health outbreaks  
- Isolate and treat all individuals displaying signs of emerging health concern  
- Advocate for voluntary home quarantine of impacted households  
- Encourage the temporary closure of schools, day-cares  
- Adopt social distancing measures to reduce contact between adults in the community and workplace
Q. Landslides

Due to the natural features of Pepin County, portions of the landscape are susceptible to landslides. The definition of a landslide refers to the lateral displacement of earth materials on a slope or hillside. The United States Geological Survey uses the term landslide to include a wide range of ground movement, such as rock falls and the failure of slopes. The movement of the soil can cause damage to structures by removing the support for the foundation of a building. Additionally, structures located at the base of a hillside or bluff can be damaged by dirt or debris colliding with or covering a structure. The most common causes of landslides include: heavy rain, bank or bluff erosion, or other natural causes.

Nature provides a few warning signs that can be used to help detect the potential for landslides. Individuals in landslide prone areas should be careful to note any of the following changes on their property:

- Springs, seeps, or saturated ground in areas that have not typically been wet before.
- New cracks or unusual bulges in the ground, street pavements or sidewalks.
- Soil moving away from foundations.
- Ancillary structures such as decks and patios tilting and/or moving relative to the main house.
- Tilting or cracking of concrete floors and foundations.
- Leaning telephone poles, trees, retaining walls or fences.
- Offset fence lines.
- Sunken or down-dropped road beds.
- Rapid increase in creek water levels, possibly accompanied by increased turbidity (soil content).
- Sudden decrease in creek water levels though rain is still falling or just recently stopped.
- A faint rumbling sound that increases in volume is noticeable as the landslide nears.
- Unusual sounds, such as trees cracking or boulders knocking together, might indicate moving debris.

Community Hazard History

While there are portions of Pepin County that are susceptible to landslides, at this time there is no recorded history of landslides causing damage to structures or public roadways. Pepin County adopted a bluffland ordinance in the early 1990’s to require property owners to build at least 40 feet back from 30 percent slopes in an effort to reduce the risk of loss of property and life from landslides. The ordinance also has provisions to keep individuals from building at the base of the bluffs as an additional means of reducing the risk from this hazard.

Within the State of Wisconsin, the Highway 35 corridor along the Mississippi River is known to have rock falls from surrounding bluffs that have caused damage to the highway or blocked traffic, especially during the spring thaw months. The September 2016 flooding in southwestern Wisconsin caused landslides in Vernon County that resulted in a death when a house slid off the bluffs. Additional disaster situations have occurred because of mud and debris flows in the coulee region causing significant damage to homes and roadways.
**Vulnerability Assessment**

As a highly site specific hazard, landslides are not likely to impact most of the individuals or property within Pepin County. Areas identified as having the highest risk include those with structures along the bluffs, especially homes built prior to the adoption of the bluffland ordinance as most are not setback from the edge. Other areas of concern include: locations at the base of slopes, along minor drainage hollows, and sloped areas with large amounts of fill.

Generally, there are very few buildings located at the base of the bluffs within Pepin County. The one exception is the Village of Stockholm, which is wedged at the base of the bluffs. Therefore, if a landslide were to fall on the community one can expect damage to buildings and infrastructure below. Although most businesses in the Village are located further away from the bluffs, media reports of the impact could be detrimental to the community’s tourism based economy.

All the critical facilities, municipal utilities, and hazardous material sites within Pepin County are not located in areas prone to landslides. Impacts to businesses and industry are limited to those located on the bluffs, steep slopes, or below these features. Agriculture should not be impacted as these areas are generally unsafe to use for cultivation purposes. Within Pepin County, landslides pose serious threats to highways and railroads as rock could fall and damage the roadway or tracks and impede traffic. However, in most cases, air and water transportation should not be impacted by landslides.

**Landslides Risk Assessment Designation**

- Landslides Historical Occurrence Rating: Low – 3 points
- Landslides Vulnerability Rating: Limited – 3 points
- Landslides Probability Rating: Possible – 3 points
- Landslides Local Official Survey Rating: Low – 1 points
- Landslides Risk Assessment Designation: **Low Threat - 10 points**

**Landslides Mitigation Ideas**

- Enforce Pepin County’s bluffland zoning ordinance to ensure buffers between structures and high risk areas.
- Discourage residents and developers from building in areas susceptible to landslides.
- Investigate methods to reduce the risk of landslides that result from saturated soils.
- Consider adopting additional regulations to limit development on slopes and other landslide prone areas.
- Encourage individuals to install restraining structures designed to hold the soil in place.
- Promote the use of vegetation as a method of increasing soil stability
- Locate utilities outside of landslide prone areas to decrease risk of service disruption
- Private developments can utilize restrictive covenants to impose restrictions on land use
R. Acts of Terrorism

Pepin County has chosen to utilize the term “acts of terrorism” to encompass a variety of human based threats to society, including active shooters, bomb threats, and other human-based threats. Under the USA Patriot Act, acts of (domestic) terrorism are those which: (A) involve acts dangerous to human life that are a violation of the criminal laws of the United States or any State; (B) appear to be intended – (i) to intimidate or coerce a civilian population; (ii) to influence the policy of a government by intimidation or coercion; or (iii) to affect the conduct of a government by mass destruction, assassination, or kidnapping.

An active shooter is described as an individual actively engaged in killing or attempting to kill people in a confined and populated area. In most cases, there is no pattern or method to their selection of victims. Nationwide, commonly identified motives for active shooters include anger, revenge, differences in ideology, and untreated mental illness. Most active shooter situations are unpredictable and evolve quickly. Because most incidents are over within minutes, it is important that individuals are prepared to deal with the situation until law enforcement personnel arrive.

A bomb threat is generally defined as a threat, usually verbal or written, to detonate an explosive or incendiary device to cause property damage, death, or injuries, whether such a device exists.

Community Hazard History

Acts of terrorism occur on occasion within Pepin County, however based on past events it is rare that people have been injured. Law enforcement agencies report that bomb threats primarily occur at the schools. To date, none of these past threats have materialized and investigations of the hazardous situation have not resulted in finding suspicious items or experiencing detonations. Two confrontations in the 1990’s required law enforcement involvement and would be classified as active shooter situations. The first involved an individual who was attempting to shoot their ex-spouse while following her vehicle to various locations throughout the City of Durand. The second event resulted when a high-speed chase ended with the driver exiting his damaged vehicle and directing gunfire at deputies and their vehicles. Although law enforcement escaped with minor injuries, some of the sheriff’s vehicles were damaged by the shoot-out. Additionally, controversial topics are occasionally addressed which may result in protests or large groups of residents attempting to influence government decision making.

Vulnerability Assessment

Critical facilities, municipal utilities, sites with hazardous materials, and large places of employment are the most likely targets for acts of terrorism within Pepin County. Therefore, it is important that schools, government buildings, businesses, and law enforcement agencies continue to plan, train employees, and monitor for indicators of workplace violence, suspicious activities, and threats to community safety. Depending on the type of human based threat, buildings could be destroyed and individuals could be injured or killed. In these types of incidents, preparedness and awareness are key to helping protect employees and customers. It is possible that farms could also be targets of domestic terrorism, especially by groups concerned about animal cruelty and factory farms.

Transportation routes could also be a victim of terrorist acts that could have wide reaching impacts on Pepin County. Intentional destruction of roads or bridges could impact economic activities throughout
the county by preventing residents from getting to work, materials from being transported, goods and services from being exchanged, limiting access to businesses, and preventing tourists from visiting. The railroads that cross the county would also be vulnerable to efforts to sabotage the tracks. Actions leading to the derailment of a train could result in cascading events that may be hazardous to nearby communities or residents. It is unlikely that active shooter or bomb threat would impact waterways in Pepin County, although weapons are commonly transported by boats during hunting seasons. All airports in the county are privately owned, therefore owners should monitor those utilizing their property to minimize risks associated with this hazard.

**Risk Assessment Designation**

Historical Occurrence Rating: Low – 1 points  
Vulnerability Rating: Limited – 3 points  
Probability Rating: Possible – 3 points  
Local Official Survey Rating: Medium – 1 points  
Risk Assessment Designation: **Low Threat - 8 points**

**Mitigation Ideas**

- Provide training related to active shooter and bomb threats with the help of law enforcement and emergency response agencies.  
- Continue to conduct exercise related to acts of terrorism at all public facilities, including schools, medical clinics, hospitals, and government buildings.  
- Encourage businesses to participate in training activities and develop their own plan to recognize and respond to terrorism incidents.  
- Inform residents of how to recognize potential signs of workplace violence.
S. Subsidence

Due to geological formations known as karst topography, Pepin County is susceptible to subsidence. Land subsidence is the gradual or sudden sinking of the Earth’s surface due to subsurface movements of earth materials. The principal causes nationally include aquifer system compaction, drainage of organic soils, underground mining, hydro-compaction, natural compaction, and sinkholes. Sinkholes are the most common type of subsidence; they are described as a depression or hole in the ground caused by some form of collapse of the surface layer. While sinkholes are typically caused by natural causes, they can also be caused by human activity. Human induced causes are often correlated to land use practices including groundwater pumping, broken water or drain pipes, or improperly compacted soil.

Subsidence is likely to occur in areas that have bedrock containing soluble rocks such as limestone and dolomite, which are often referred to as areas with karst topography. In these areas, fluid flows can dissolve bedrock and create voids or caves, if the voids collapse the earth will fall into the space causing the surface to sink. Sinkholes in Wisconsin tend to be smaller than 10 feet across. The depth of sinkholes can be highly variable, although most are about as deep as they are wide.

Community Hazard History

There is no information available in regards to major subsidence events within Pepin County. Subsidence is included as a hazard as the karst topography underlying portions of the county may present a threat in the future. Most cases of subsidence in Pepin County develop gradually and are small. There was one small sinkhole reported in 2016, which is being reviewed to determine whether it was naturally occurring or due to human-induced actions. A couple other small sinkholes are scattered throughout the county, and are primarily located in forested or agricultural areas and are monitored by individual property owners. Pepin County will continue to monitor its LiDAR data to determine if there is an increased number of sinkhole’s forming throughout the county.

Vulnerability Assessment

Although buildings are susceptible to sinkholes which can cause a wide range of loss to structures including damage to foundations, partial collapse, and/or total destruction of buildings, most critical facilities, utilities, and businesses are safe from subsidence based upon their location in Pepin County. Sinkholes have not been a factor in any natural disasters in the county to date, therefore it is not expected that they would interrupt essential services or businesses. Sinkholes may take some agricultural land out of production, however the impact on the farmer’s yield would likely be negligible. In most cases, the hazard would be an isolated incident and damages would be confined to a limited area.

Transportation could be impacted by subsidence, especially in the portions of the Pepin County that have carbonate bedrock as shown on the image to the right. Roads built in areas with karst topography are susceptible to sinkholes. The danger of a sinkhole forming is a threat to an unsuspecting motorist and it is essential that barricades are put up if they damage the roadway to reduce
further injuries. The threat of subsidence is greater on the ridge top and side hill areas than in the valleys. Although not located in the area identified as having karst topography, subsidence along the railroad tracks could come from direct undermining of the banks by river action which could cause a train derailment. If sinkholes occur on land owned by private airports, aircraft would be endangered if the landing area was compromised. Water traffic should not be impacted by land subsidence events.

**Subsidence Risk Assessment Designation**

Subsidence Historical Occurrence Rating: Low – 1 points
Subsidence Vulnerability Rating: Negligible – 1 points
Subsidence Probability Rating: Unlikely – 1 points
Subsidence Local Official Survey Rating: Low – 1 points
Subsidence Risk Assessment Designation: **Low Threat - 4 points**

**Subsidence Mitigation Ideas**

- Promote community awareness of subsidence risks and effects
- Encourage areas of subsidence to be fenced off or marked so people are alerted to the hazard
- Build a small berm around sinkholes to prevent unfiltered surface runoff from entering the groundwater.
- Identify and map old mining areas and geologically unstable terrain to prevent and limit development in those areas
- Maintain areas susceptible to collapse as public open space
- Fill or buttress subterranean open spaces and abandoned mines
- Monitor groundwater levels in subsidence-prone areas
T. Hazards Removed from Hazard Mitigation Plan

When the steering committee reviewed, and updated the hazards that could potentially impact Pepin County, they decided to remove a couple of hazards that were included in the community survey. Both coastal hazards and earthquakes were included in the community surveys but not included in the Hazard Mitigation Plan due to the very low chances of the hazards occurring within Pepin County.

Coastal hazard is an umbrella term used to refer to the risks of life and property of the coastline that are created by coastal flooding, high wind and waves, short and long term shoreline erosion, and storm surges. This hazard was not described or evaluated in the original plan either as Pepin County is not a coastal community. FEMA has recently designated counties along the Great Lakes (Lake Michigan and Lake Superior) as being susceptible to coastal hazards, so this hazard could occur in other portions of the state.

Earthquake is a term used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity or other sudden stress changes in the earth. This hazard previously had a low threat rating, with no history of this hazard occurring within Pepin County. The USGS suggests that all areas of Wisconsin have less than a 1% chance of having damage from an earthquake. The closest fault line is the New Madrid Fault Line near the convergence of the Missouri, Arkansas, Kentucky, Tennessee, and Illinois borders. The steering committee felt that this hazard did not pose a risk to the residents of Pepin County.
Section 4. Pepin County Mitigation Strategies

Pepin County continues to maintain the overall all-hazards goal of striving to identify economical and environmentally sound ways to protect life, health, and property from future hazards.

As part of the update process, participants discussed the progress of existing goals, revisions to goals that were previously included, new goals to add, reorganization of goals, new “all-hazards" goals, clarifying responsible parties, and goals that could be removed from the list due to completion of projects. In response to outreach, each of the unincorporated towns within Pepin County contacted the plan developer to indicate that they had no proposed changes to the countywide goals. Since each individual township had the same goals as the county and these areas are unincorporated places, the town goals have been removed from the plan to avoid being redundant.

The City of Durand and the Villages of Pepin and Stockholm also revisited their community goals. Through correspondence with municipal officials, the plan developer received information pertaining to the progress of the communities to reaching their goals. Since the Villages of Pepin and Stockholm share the same clerk, we did identify that some of the hazards in the original plan were assigned to the wrong community; which have been rectified in the updated version of the plan.

Updated lists of projects and actions by local governments or organizations that are designed to achieve economically and environmentally sound ways to protect life, health, and property from future hazards are included on the following pages. These goals, actions, and projects are the result of the public participation process outlined in Section 1 and the hazard risk assessment conducted as part of Section 3.

Elements of the Pepin County Hazard Mitigation plan are incorporated into the Pepin County Comprehensive Plan, as well as Comprehensive Plans for the Villages of Pepin and Stockholm and the City of Durand. All units of government within Wisconsin are required to have a comprehensive plan; most hazard related goals are included in the natural resource, land use or transportation element. Some goals and projects are incorporated into department or agency specific annual plans of work; while all communities report that they try to make progress towards these goals as part of their annual budget process. The City of Durand also reported including the goals and projects being included in their Capital Improvement Plan and has made significant progress on past goals and projects using this methodology.

Cost effectiveness is not used to prioritize projects due to costs being unknown until the time the project study is launched. A cost effectiveness study will be completed when costs for the project are known and sources of funds have been committed to undertake specific projects. The project timetable on the following pages is how Pepin County and municipalities will prioritize these goals, actions, and projects. Each municipal timetable for incorporated communities was obtained from and updated by a municipal representative of each respective community. Municipal officials did stress that due to financial considerations, if funding for a specific project becomes available, then that project would become its priority. Once funding becomes available, a cost benefit review would be completed to prioritize which projects would be completed.
A. Pepin County Mitigation Goals, Actions, and Projects

**All-Hazards Goal:** Enhance Pepin County's ability to prepare for, mitigate against, respond to, and recover from natural and man-made disasters through improving infrastructure, communications, and resources available to emergency response agencies.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct new communications towers and upgrade communications equipment to support emergency communications.</td>
<td>County budget, grants, loans.</td>
<td>Pepin County Board of Supervisors</td>
<td>2017-2022</td>
<td>High Priority Project</td>
<td>Revised</td>
</tr>
<tr>
<td>Create all-hazards household preparedness handbooks to inform residents of steps to be prepared in the event of a disaster or emergency situation.</td>
<td>Existing county resources, grants, donations</td>
<td>Pepin County Emergency Management Director</td>
<td>When funding becomes available</td>
<td></td>
<td>New</td>
</tr>
<tr>
<td>Improve and update communication and advanced warning systems to inform the public of impending and/or potential threats of hazards.</td>
<td>County budget, grants</td>
<td>Pepin County Board of Supervisors</td>
<td>When funding becomes available</td>
<td></td>
<td>Revised</td>
</tr>
<tr>
<td>Bury electrical, telecommunication, telephone, and other utility lines to prevent damage from natural hazards.</td>
<td>Private utilities, grants</td>
<td>Private utilities</td>
<td>Continual program</td>
<td></td>
<td>Revised, On-going</td>
</tr>
<tr>
<td>Increase the capacity of the County Government Center backup generator to support additional departments in a power outage.</td>
<td>County budget, grants, loans.</td>
<td>Pepin County Board of Supervisors</td>
<td>When funding becomes available</td>
<td></td>
<td>New</td>
</tr>
<tr>
<td>Upgrade back-up generators for communication tower sites.</td>
<td>County budget</td>
<td>Pepin County Board of Supervisors</td>
<td>When funding becomes available</td>
<td></td>
<td>New</td>
</tr>
<tr>
<td>Acquire and utilize portable electronic message boards to place along highways and roadways to display safety messages and closure information.</td>
<td>County budget, grants.</td>
<td>Pepin County Board of Supervisors</td>
<td>When funding becomes available</td>
<td></td>
<td>New</td>
</tr>
<tr>
<td>Project Description</td>
<td>Funding Sources</td>
<td>Responsible Party</td>
<td>Timeframe</td>
<td>Status</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
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<td>------------------------------------------</td>
<td>-----------------------</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>Purchase emergency backup generators for emergency shelters</td>
<td>Grants and donations</td>
<td>Owner of shelter</td>
<td>Continual program</td>
<td>On-going</td>
<td></td>
</tr>
<tr>
<td>Invest in alternative energy sources to provide power to critical facilities and supported continued operations</td>
<td>County budget, grants</td>
<td>Pepin County Board of Supervisors</td>
<td>When funding becomes available</td>
<td>Revised (expanded from propane)</td>
<td></td>
</tr>
<tr>
<td>Obtain an all-terrain vehicle or utility task vehicle to provide emergency response capability to remote areas in the event of an emergency or derailment</td>
<td>Grants and donations</td>
<td>Pepin County Emergency Response Agencies</td>
<td>2018</td>
<td>New</td>
<td></td>
</tr>
<tr>
<td>Obtain a mobile command center to support operations in remote areas.</td>
<td>County budget, grants</td>
<td>Pepin County Board of Supervisors</td>
<td>When funding becomes available</td>
<td>New</td>
<td></td>
</tr>
<tr>
<td>Provide workshops, training and exercise opportunities to help the community prepare for emergencies and natural disasters.</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Emergency Management Director</td>
<td>Continual program</td>
<td>New</td>
<td></td>
</tr>
</tbody>
</table>
**Flooding Goal:** Protect the health and safety of residents and property in high water events through disseminating information, planning, implementing preventative measures, and improving infrastructure.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Action Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 measures to protect health, public safety and welfare.</td>
<td>Existing Pepin County staff and resources</td>
<td>Zoning Administrator, Law Enforcement Committee</td>
<td>Annually</td>
<td></td>
<td>Revised</td>
</tr>
<tr>
<td>Continue to monitor and enforce NR 116 Floodplain Regulations and any changes to it.</td>
<td>Pepin County Zoning</td>
<td>Pepin County Zoning Administrator</td>
<td>Annually</td>
<td>Relates to NFIP compliance</td>
<td>On-going</td>
</tr>
<tr>
<td>Work to reduce or eliminate repetitive loss or substantially damaged structures.</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Emergency Management Director</td>
<td>Biannually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>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.</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Zoning Administrator</td>
<td>Annually</td>
<td>Relates to NFIP compliance</td>
<td>On-going</td>
</tr>
<tr>
<td>Assess and identify any Pepin County bridges which need to be replaced, repaired, or studied due to flooding issues.</td>
<td>Varies by project - County Highway Dept., DOT, and HMP grants</td>
<td>Pepin County Highway Commissioner</td>
<td>Biannually</td>
<td></td>
<td>Revised</td>
</tr>
</tbody>
</table>
To maintain Pepin County's compliance with the National Flood Insurance Program the County will take the following actions: (1) The County Zoning Administrator shall attend floodplain zoning seminars and workshops to keep informed on floodplain issues and regulations. (2) The County Zoning Administrator shall report monthly on floodplain permit activity to the Law Enforcement Committee. (3) The County's Zoning Administrator shall administer, enforce, and update the County's floodplain ordinance as prescribed by law.

<table>
<thead>
<tr>
<th>Action</th>
<th>Responsible Party</th>
<th>Frequency</th>
<th>Relates to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review flood disaster impacts to incorporate new flood hazard mitigation projects and strategies into plan update process.</td>
<td>Existing Pepin County staff and resources</td>
<td>After each flood disaster</td>
<td>Amended</td>
</tr>
<tr>
<td>Inspect and maintain county owned dams to ensure the structural integrity and prevent damage in hydraulic shadow.</td>
<td>Pepin County budget</td>
<td>Annually</td>
<td>New</td>
</tr>
<tr>
<td></td>
<td>Pepin County Land Conservation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Severe Storms Goal:
Inform residents of the dangers associated with hail, lightning, thunderstorms, high winds, and tornadoes and take actions to reduce losses from these hazards.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilize the Severe Weather Awareness Week to alert residents of actions they can take to minimize their losses from these hazards</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Emergency Management Director</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Encourage the use of anchoring on new mobile home residences, carports, and porches.</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Zoning Administrator, town zoning officials</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Encourage the use of interlocked roofing shingles and other weather resistant materials</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Zoning Administrator, town zoning officials</td>
<td>Continual Program</td>
<td></td>
<td>Revised, on-going</td>
</tr>
<tr>
<td>Construct and provide storm shelters in each community that are readily accessible to the public, especially in areas near mobile home parks, fairgrounds, parks, and other vulnerable public areas.</td>
<td>HMPG</td>
<td>Pepin County Emergency Management Director</td>
<td>Continual Program</td>
<td></td>
<td>Revised</td>
</tr>
<tr>
<td>Identify buildings that would provide protection to the public in the event of a tornado or high wind event.</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Emergency Management Director</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Increase the number of outdoor warning sirens to alert a greater number of residents of potential severe weather.</td>
<td>HMPG, county budget</td>
<td>Pepin County Emergency Management Director</td>
<td>Continual Program</td>
<td></td>
<td>New</td>
</tr>
<tr>
<td>Distribute weather radios to vulnerable populations within the county that cannot hear outdoor warning sirens</td>
<td>HMPG, county budget</td>
<td>Pepin County Emergency Management Director</td>
<td>Continual Program</td>
<td></td>
<td>New</td>
</tr>
</tbody>
</table>
Install protection devices such as lightning rods and grounding on critical facilities and communications towers. **HMPG, county budget** Pepin County Board of Supervisors Continual Program **New**

Purchase and install a backup generator at the County Highway Shop **County budget** Pepin County Board of Supervisors Complete **Complete 2012**

Purchase and install a backup generator at the County Government Center **County budget** Pepin County Board of Supervisors Complete **Complete 2013**

**Extreme Cold and Heat Events Goal:** Inform the public on the dangers of extreme heat and cold to reduce loss of life associated with these hazards.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify buildings that could be used as shelters with appropriate heating, ventilation, and air conditioning for housing the segment of the population that are most vulnerable to extreme temperature events, such as the low income, elderly, and sick.</td>
<td>Existing Pepin County staff and resources</td>
<td>Emergency Management Director, in collaboration with Human Services Department and City and Villages</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Develop a program that identifies and directs vulnerable populations to resources in times of extreme heat and cold.</td>
<td>Existing Pepin County staff and resources</td>
<td>Emergency Management Director, in collaboration with Human Services Department</td>
<td>Continual Program</td>
<td></td>
<td>Revised, On-going</td>
</tr>
<tr>
<td>Continue support of the Salvation Army</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Board of Supervisors</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
</tbody>
</table>
### Fires: Promote the awareness of fire safety and wildfire prevention activities.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage periodic cutting of Conservation Reserve Program (CRP) land per program requirements</td>
<td>Existing Pepin County staff and resources</td>
<td>National Resource Conservation Service</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Implement burning restrictions to restrict campfires and outdoor fires during periods with high fire risk.</td>
<td>Local resources</td>
<td>Town Boards</td>
<td>Continual Program</td>
<td></td>
<td>Revised, On-going</td>
</tr>
<tr>
<td>Promote the utilization of fire separation measures and automated sprinkler systems in industrial, commercial, and multi-family housing.</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Zoning Administrator, town zoning officials</td>
<td>Continual Program</td>
<td></td>
<td>New</td>
</tr>
</tbody>
</table>

### Winter Storms: Inform the public about the threat of heavy snow, ice storms, and blizzards and take actions to reduce losses associated with these hazards.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare timely releases that inform the public on actions and precautions they can take to minimize disruptions and losses.</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Emergency Management Director</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Identify locations in the County where snow fences, or other means of preventing drifting snow across roadways could be implemented to increase motor vehicle safety.</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Highway Commissioner</td>
<td>Annually</td>
<td></td>
<td>Revised, On-going</td>
</tr>
</tbody>
</table>
**Landslides and Subsidence:** Lessen the impact of landslides and subsidence on persons and property.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop an inventory/prioritization of roads/road segments that have shoulders conducive to erosion and land/mudslides. The roads/road segments identified can be stabilized as funding becomes available.</td>
<td>Existing Pepin County staff and resources</td>
<td>Highway Commissioner and Highway Safety Committee</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Develop a zoning ordinance regarding width, slope, and maintenance of driveways</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Law Enforcement Committee</td>
<td>2013</td>
<td>Complete 2004</td>
<td></td>
</tr>
<tr>
<td>Continue to monitor and enforce the Mississippi River Bluffland Ordinance to restrict development along areas prone to landslides and rock falls from bluffs</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Zoning Administrator</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
</tbody>
</table>

**Agricultural and Drought:** Inform the public on the hazards associated with drought and provide information on methods to reduce water usage and minimize agricultural losses.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop an education/information program that informs agricultural producers and residents about water conservation measures, other ways to protect their crops, and the importance of crop insurance.</td>
<td>Existing Pepin County staff and resources</td>
<td>UW-Extension, Land Conservation</td>
<td>Continual Program</td>
<td>Amended, On-going</td>
<td></td>
</tr>
</tbody>
</table>
**Water Contamination:** Protect surface and groundwater quality and quantity within Pepin County.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor and enforce shoreland zoning ordinance in an effort to protect surface water quality.</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Zoning Administrator</td>
<td>Continual Program</td>
<td></td>
<td>New</td>
</tr>
<tr>
<td>Adopt an overlay zoning district to protect public drinking water sources</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Zoning Administrator</td>
<td>2017</td>
<td></td>
<td>New</td>
</tr>
<tr>
<td>Require that failing septic systems be repaired or replaced</td>
<td>Existing Pepin County staff and resources</td>
<td>Pepin County Zoning Administrator</td>
<td>Continual Program</td>
<td></td>
<td>New</td>
</tr>
<tr>
<td>Advocate for the construction of a regional bio digester to reduce the amount of manure being spread on fields</td>
<td>Grants, private investment</td>
<td>Mississippi River Regional Planning Commission</td>
<td>Whenever funding is available</td>
<td></td>
<td>New</td>
</tr>
</tbody>
</table>
### B. City of Durand Mitigation Goals, Actions, and Projects

**Flooding Goal:** Protect the health and safety of residents and property in high water events through disseminating information, planning, implementing preventative measures, and improving infrastructure.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Action Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 the interest in flood proofing and/or elevating their properties to protect health, safety, and welfare.</td>
<td>Existing City and County Resources</td>
<td>City of Durand Council, County Law Enforcement Committee</td>
<td>Annually</td>
<td>NFIP Compliance Issue</td>
<td>On-going</td>
</tr>
<tr>
<td>Cooperate with the County on monitoring an enforcement of N.R. 116 Floodplain Regulations and any changes to it.</td>
<td>Existing County Staff</td>
<td>City of Durand in conjunction with Pepin County Zoning Administrator</td>
<td>Annually</td>
<td>NFIP Compliance Issue</td>
<td>On-going</td>
</tr>
<tr>
<td>Assist the County in working to reduce or eliminate repetitive loss or substantially damaged structures.</td>
<td>Existing City Official and County Resources</td>
<td>City of Durand in conjunction with Pepin County Zoning Administrator</td>
<td>Biannually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>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.</td>
<td>Existing City and County Staff Resources</td>
<td>City of Durand Council</td>
<td>Annually</td>
<td>NFIP Compliance Issue</td>
<td>On-going</td>
</tr>
<tr>
<td>Investigate moving the City garage out of the floodplain.</td>
<td>City Budget and HMP grant</td>
<td>City of Durand Council</td>
<td>2018</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Line sewers along Main and Wells Street

Replace Culvert/bridge on STH 25 near St. Mary’s/Bauer Built

Gerber Creek Bank Improvements

Storm Drainage Improvements on Madison and Washington Streets

The City will work in conjunction with the 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 County Emergency Management Director and the City Administrator shall meet and report in a timely manner to the County Law Enforcement Committee on potential changes to the County's Multi-Hazard Mitigation Plan.

**Fires:** Promote the awareness of fire safety and wildfire prevention activities.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop/maintain cooperative fire agreements with area fire departments and the DNR as necessary</td>
<td>Existing City and County Resources</td>
<td>City of Durand Council</td>
<td>Continual Program</td>
<td>Existing Mutual Aid Agreements</td>
<td>On-going</td>
</tr>
</tbody>
</table>
**Severe Storms Goal:** Inform residents of the dangers associated with hail, lightning, thunderstorms, high winds, and tornadoes and take actions to reduce losses from these hazards.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Require anchoring of new mobile home residences, carports, and porches</td>
<td>Existing City and County Resources</td>
<td>City of Durand Council in conjunction with County Law Enforcement Committee</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Encourage the burying of underground power, cable, and telephone lines</td>
<td>Existing City and County Resources</td>
<td>City of Durand Council in conjunction with County Law Enforcement Committee</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Encourage the use of interlocked roofing shingles</td>
<td>Existing City and County Resources</td>
<td>Zoning Administrator</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Construct and provide storm shelters in each community that are readily accessible to the public, especially in areas near mobile home parks, fairgrounds, parks, and other vulnerable public areas.</td>
<td>HMPG</td>
<td>City of Durand Council in conjunction with County Law Enforcement Committee</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Purchase Portable Generator for Water, Wastewater, and Fire Department</td>
<td>City Budget and Debt</td>
<td>City of Durand Council</td>
<td>2014-2015</td>
<td></td>
<td>Completed</td>
</tr>
<tr>
<td></td>
<td>City Staff</td>
<td>City of Durand Council</td>
<td>Continual Program</td>
<td></td>
<td>Dead Trees Selected for timely removal by property owners</td>
</tr>
</tbody>
</table>
Identify buildings that will provide protection to the public in the event of a tornado or high winds and create agreements for use with owners

City of Durand Council in conjunction with County Law Enforcement Committee

Continual Program

Purchase cots, blankets, and other materials needed to supply shelters

City of Durand Council in conjunction with County Law Enforcement Committee

On-going

City Budget

Already in possession. Will Replace/add more as needed

**Winter Storms:** Inform the public about the threat of heavy snow, ice storms, and blizzards and take actions to reduce losses associated with these hazards.

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<tbody>
<tr>
<td>Cooperate with the County in preparing timely releases that inform the public on actions and precautions they can take to minimize disruptions and losses</td>
<td>Existing County Staff Resources</td>
<td>City and County Emergency Government Director</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Investigate the concept of identifying locations in the City where snow fences could be constructed or trees and bushes (living snow fence) could be planted to increase motor vehicle safety</td>
<td>Existing City and County Resources</td>
<td>Pepin County Highway Commissioner and City Officials</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
</tbody>
</table>
**Extreme Cold and Heat Events Goal:** Inform the public on the dangers of extreme heat and cold to reduce loss of life associated with these hazards.

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<th>Mitigation Actions and Projects</th>
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</tr>
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<tbody>
<tr>
<td>Identify buildings that could be used as shelters with appropriate heating, ventilation, and air conditioning for housing the segment of the population that are most vulnerable to extreme temperature events, such as the low income, elderly, and sick.</td>
<td>Existing Pepin County staff and resources</td>
<td>City of Durand Council in Conjunction with County Law Enforcement Committee</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Create and Emergency Response Pamphlet</td>
<td>Existing City Resources</td>
<td>City of Durand Council in Conjunction with County Law Enforcement Committee</td>
<td>2019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investigate the concept of developing an agreement with neighboring communities for the use of emergency shelters</td>
<td>Existing City Resources</td>
<td>City of Durand Council in Conjunction with County Law Enforcement Committee</td>
<td>2020</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Purchase alternate heating/cooling source to be used in shelters</td>
<td>Existing City and County Resources</td>
<td>City of Durand Council in Conjunction with County Law Enforcement Committee</td>
<td>2020</td>
<td>Recent Furnace Upgrades at Fire Department</td>
<td></td>
</tr>
</tbody>
</table>
**Landslides and Subsidence:** *Lessen the impact of landslides and subsidence on persons and property.*

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
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<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop an inventory/prioritization of roads/road segments that have shoulders conducive to erosion and land/mudslides. The roads/road segments identified can be stabilized as funding becomes available.</td>
<td>Existing City and County Resources</td>
<td>Highway Commissioner and Highway Safety Committee and City Officials</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Periodically inspect ravines to identify potential landslide areas</td>
<td>Existing City Resources</td>
<td>City of Durand Council</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
</tbody>
</table>

**Agricultural and Drought:** *Inform the public on the hazards associated with drought and provide information on methods to reduce water usage and minimize agricultural losses.*

<table>
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<tr>
<th>Mitigation Actions and Projects</th>
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<tbody>
<tr>
<td>Develop an education/information program that informs agricultural producers and residents about water conservation measures, other ways to protect their crops, and the importance of crop insurance.</td>
<td>Existing Pepin County staff and resources</td>
<td>UW-Extension, Land Conservation</td>
<td>Continual Program</td>
<td></td>
<td>Amended, On-going</td>
</tr>
<tr>
<td>Investigate the Idea of developing a water conservation rate</td>
<td>Existing City Resources</td>
<td>City of Durand Board</td>
<td>2018</td>
<td>Can be used temporarily. But we don't want a negative revenue scenario</td>
<td>New</td>
</tr>
</tbody>
</table>
C. Village of Pepin Mitigation Goals, Actions, and Projects

**Flooding Goal:** Protect the health and safety of residents and property in high water events through disseminating information, planning, implementing preventative measures, and improving infrastructure.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
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<th>Action Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 measures to protect health, public safety and welfare.</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Village of Pepin Board, Law Enforcement Committee</td>
<td>Annually</td>
<td>Relates to NFIP compliance</td>
<td>Revised</td>
</tr>
<tr>
<td>Continue to monitor and enforce NR 116 Floodplain Regulations and any changes to it.</td>
<td>Village Zoning Administrator</td>
<td>Zoning Administrator</td>
<td>Annually</td>
<td>Relates to NFIP compliance</td>
<td>On-going</td>
</tr>
<tr>
<td>Assist the county in working to reduce or eliminate repetitive loss or substantially damaged structures.</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Village of Pepin Board and Pepin County Emergency Management Director</td>
<td>Biannually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>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.</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Village of Pepin Board</td>
<td>Annually</td>
<td>Relates to NFIP compliance</td>
<td>On-going</td>
</tr>
<tr>
<td>Add rip rap to inside of breakwater wall to prevent erosion</td>
<td>Village budget and HMP grant</td>
<td>Village of Pepin Board</td>
<td>When funding can be located</td>
<td></td>
<td>On-going</td>
</tr>
</tbody>
</table>
The Village will 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 County Emergency Management Director and a Village Representative shall meet and report in a timely manner to the County Law Enforcement Committee on potential changes to the County’s Multi-Hazards Mitigation Plan.

**Extreme Cold and Heat Events Goal:** Inform the public on the dangers of extreme heat and cold to reduce loss of life associated with these hazards.

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<th>Mitigation Actions and Projects</th>
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<tbody>
<tr>
<td>In conjunction with the County identify buildings that could be used as shelters with appropriate heating, ventilation, and air conditioning for housing the segment of the population that are most vulnerable to extreme temperature events, such as the low income, elderly, and sick.</td>
<td>County Zoning Administrator, Village of Pepin Board, Emergency Management Director, Law Enforcement Committee</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>After each flood disaster</td>
<td>Relates to NFIP compliance</td>
<td>On-going</td>
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</table>
**Severe Storms Goal:** Inform residents of the dangers associated with hail, lightning, thunderstorms, high winds, and tornadoes and take actions to reduce losses from these hazards.

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<th>Mitigation Actions and Projects</th>
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</thead>
<tbody>
<tr>
<td>Assist the County in utilizing the Severe Weather Awareness Week to alert residents of actions they can take to minimize their losses from these hazards</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Village and Pepin County Emergency Management Director</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Encourage the use of anchoring on new mobile home residences, carports, and porches.</td>
<td>Existing Pepin County staff and resources</td>
<td>Zoning Administrator</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Encourage the use of interlocked roofing shingles and other weather resistant materials</td>
<td>Existing Pepin County staff and resources</td>
<td>Zoning Administrator</td>
<td>Continual Program</td>
<td></td>
<td>Revised, on-going</td>
</tr>
<tr>
<td>Construct and provide storm shelters in each community that are readily accessible to the public, especially in areas near mobile home parks, fairgrounds, parks, and other vulnerable public areas.</td>
<td>HMPG</td>
<td>Pepin County Emergency Management Director</td>
<td>Continual Program</td>
<td></td>
<td>Revised</td>
</tr>
<tr>
<td>Identify buildings that would provide protection to the public in the event of a tornado or high wind event.</td>
<td>Existing Pepin County staff and resources</td>
<td>Village Board and Pepin County Emergency Management Director</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Upgrade outdoor warning sirens to alert a greater number of residents of potential severe weather.</td>
<td>HMPG, county budget</td>
<td>Village Board and Pepin County Emergency Management Director</td>
<td>Continual Program</td>
<td></td>
<td>New</td>
</tr>
</tbody>
</table>
Distribute weather radios to vulnerable populations within the county that cannot hear outdoor warning sirens. HMPG, county budget Pepin County Emergency Management Director Continual Program New

Bury electrical, telecommunication, telephone, and other utility lines to prevent damage from natural hazards. Private utilities, grants Private utilities Continual program Revised, On-going

**Fires: Promote the awareness of fire safety and wildfire prevention activities.**

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<th>Mitigation Actions and Projects</th>
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<tbody>
<tr>
<td>Develop/maintain cooperative fire agreements with area fire departments and the DNR as necessary</td>
<td>Existing Village and County staff and resources</td>
<td>Village of Pepin</td>
<td>Continual Program</td>
<td>On-going</td>
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**Landslides and Subsidence: Lessen the impact of landslides and subsidence on persons and property.**

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<tbody>
<tr>
<td>Develop an inventory/prioritization of roads/road segments that have shoulders conducive to erosion and land/mudslides. The roads/road segments identified can be stabilized as funding becomes available.</td>
<td>Existing Village resources</td>
<td>Highway Commissioner and Village Officials</td>
<td>Continual Program</td>
<td>On-going</td>
<td></td>
</tr>
</tbody>
</table>
**Winter Storms:** Inform the public about the threat of heavy snow, ice storms, and blizzards and take actions to reduce losses associated with these hazards.

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<tr>
<th>Mitigation Actions and Projects</th>
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<tbody>
<tr>
<td>Prepare timely releases that inform the public on actions and precautions they can take to minimize disruptions and losses.</td>
<td>Existing Village and County staff and resources</td>
<td>Village and Pepin County Emergency Management Director</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Identify locations in the Village where snow fences, or other means of preventing drifting snow across roadways could be implemented to increase motor vehicle safety.</td>
<td>Existing Village and County staff and resources</td>
<td>Pepin County Highway Commissioner and Village Officials</td>
<td>Annually</td>
<td></td>
<td>Revised, On-going</td>
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**Agricultural and Drought:** Inform the public on the hazards associated with drought and provide information on methods to reduce water usage and minimize agricultural losses.

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<tbody>
<tr>
<td>Develop an education/information program that informs agricultural producers and residents about water conservation measures, other ways to protect their crops, and the importance of crop insurance.</td>
<td>Existing Pepin County staff and resources</td>
<td>UW-Extension, Land Conservation</td>
<td>Continual Program</td>
<td></td>
<td>Amended, On-going</td>
</tr>
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</table>

**Water Contamination:** Protect surface and groundwater quality and quantity within Pepin County.

<table>
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<tr>
<th>Mitigation Actions and Projects</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Develop extraterritorial zoning agreement with the Town of Pepin to protect Village water sources</td>
<td>Village staff and resources</td>
<td>Town and Village of Pepin</td>
<td>Continual Program</td>
<td></td>
<td>New</td>
</tr>
</tbody>
</table>
### D. Village of Stockholm Mitigation Goals, Actions, and Projects

**Flooding Goal:** Protect the health and safety of residents and property in high water events through disseminating information, planning, implementing preventative measures, and improving infrastructure.

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<tr>
<td>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 measures to protect health, public safety and welfare.</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Village of Stockholm Board, Law Enforcement Committee</td>
<td>Annually</td>
<td>Relates to NFIP compliance</td>
<td>Revised</td>
</tr>
<tr>
<td>Continue to monitor and enforce NR 116 Floodplain Regulations and any changes to it.</td>
<td>Village Zoning Administrator</td>
<td>Zoning Administrator</td>
<td>Annually</td>
<td>Relates to NFIP compliance</td>
<td>On-going</td>
</tr>
<tr>
<td>Assist the county in working to reduce or eliminate repetitive loss or substantially damaged structures.</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Village of Stockholm Board and Pepin County Emergency Management Director</td>
<td>Biannually</td>
<td>On-going</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Village of Stockholm Board</td>
<td>Annually</td>
<td>Relates to NFIP compliance</td>
<td>On-going</td>
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</table>
The Village will 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 County Emergency Management Director and a Village Representative shall meet and report in a timely manner to the County Law Enforcement Committee on potential changes to the County’s Multi-Hazards Mitigation Plan.

| Clean out the cement waterway running through the Village | Village budget | Village of Stockholm Board | When funding can be located | On-going |
| Repair and/or replace drainage ditch | Village budget and HMP grant | Village of Stockholm Board | When funding can be located | Started |
| Replace 2nd Street Bridge | Village budget and HMP grant | Village of Stockholm Board | When funding can be located | Complete |
| Replace Cemetery Road culvert and widen road | Village budget | Village of Stockholm Board | | |

**Fires:** Promote the awareness of fire safety and wildfire prevention activities.

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<tbody>
<tr>
<td>Develop/maintain cooperative fire agreements with area fire departments and the DNR as necessary</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Village of Stockholm</td>
<td>Continual Program</td>
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**Severe Storms Goal:** Inform residents of the dangers associated with hail, lightning, thunderstorms, high winds, and tornadoes and take actions to reduce losses from these hazards.

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<tr>
<td>Assist the County in utilizing the Severe Weather Awareness Week to alert residents of actions they can take to minimize their losses from these hazards</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Village and Pepin County Emergency Management Director</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Encourage the use of anchoring on new mobile home residences, carports, and porches.</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Zoning Administrator</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Encourage the use of interlocked roofing shingles and other weather resistant materials</td>
<td>Existing Village and Pepin County staff and resources</td>
<td>Zoning Administrator</td>
<td>Continual Program</td>
<td>Revised, on-going</td>
<td></td>
</tr>
<tr>
<td>Construct and provide storm shelters in each community that are readily accessible to the public, especially in areas near mobile home parks, fairgrounds, parks, and other vulnerable public areas.</td>
<td>HMPG</td>
<td>Pepin County Emergency Management Director</td>
<td>Continual Program</td>
<td></td>
<td>Revised</td>
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<tr>
<td>Identify buildings that would provide protection to the public in the event of a tornado or high wind event.</td>
<td>Existing Pepin County staff and resources</td>
<td>Village Board and Pepin County Emergency Management Director</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
</tbody>
</table>
Purchase and Install a warning siren

| Purchase and Install a warning siren | HMPG, county or village budget | Village Board and Pepin County Emergency Management Director | Continual Program | New |

Bury electrical, telecommunication, telephone, and other utility lines to prevent damage from natural hazards.

| Bury electrical, telecommunication, telephone, and other utility lines to prevent damage from natural hazards. | Private utilities, grants | Private utilities | Continual program | Revised, On-going |

**Extreme Cold and Heat Events Goal:** Inform the public on the dangers of extreme heat and cold to reduce loss of life associated with these hazards.

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<tr>
<th>Extreme Cold and Heat Events Goal</th>
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<tbody>
<tr>
<td>In conjunction with the County identify buildings that could be used as shelters with appropriate heating, ventilation, and air conditioning for housing the segment of the population that are most vulnerable to extreme temperature events, such as the low income, elderly, and sick.</td>
<td>Existing Pepin County staff and resources</td>
<td>Emergency Management Director, in collaboration with Human Services Department and City and Villages</td>
<td>Continual Program</td>
<td>On-going</td>
<td></td>
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**Winter Storms:** Inform the public about the threat of heavy snow, ice storms, and blizzards and take actions to reduce losses associated with these hazards.

<table>
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<tr>
<th>Winter Storms</th>
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<tbody>
<tr>
<td>Cooperate with the County in preparing timely releases that inform the public on actions and precautions they can take to minimize disruptions and losses.</td>
<td>Existing Village and County staff and resources</td>
<td>Village and Pepin County Emergency Management Director</td>
<td>Annually</td>
<td></td>
<td>On-going</td>
</tr>
<tr>
<td>Identify locations in the Village where snow fences, or other means of preventing drifting snow across roadways could be implemented to increase motor vehicle safety.</td>
<td>Existing Village and County staff and resources</td>
<td>Pepin County Highway Commissioner and Village Officials</td>
<td>Annually</td>
<td></td>
<td>Revised, On-going</td>
</tr>
</tbody>
</table>
**Landslides and Subsidence:** Lessen the impact of landslides and subsidence on persons and property.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop an inventory/prioritization of roads/road segments that have shoulders conducive to erosion and land/mudsides. The roads/road segments identified can be stabilized as funding becomes available.</td>
<td>Existing Village resources</td>
<td>Highway Commissioner and Village Officials</td>
<td>Continual Program</td>
<td></td>
<td>On-going</td>
</tr>
</tbody>
</table>

**Agricultural and Drought:** Inform the public on the hazards associated with drought and provide information on methods to reduce water usage and minimize agricultural losses.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop an education/information program that informs agricultural producers and residents about water conservation measures, other ways to protect their crops, and the importance of crop insurance.</td>
<td>Existing Pepin County staff and resources</td>
<td>UW-Extension, Land Conservation</td>
<td>Continual Program</td>
<td></td>
<td>Amended, On-going</td>
</tr>
</tbody>
</table>

**Water Contamination:** Protect surface and groundwater quality and quantity within Pepin County.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Require that failing septic systems be repaired or replaced</td>
<td>Grants and loans, private investment</td>
<td>Pepin County Zoning Administrator</td>
<td>Continual Program</td>
<td></td>
<td>New</td>
</tr>
</tbody>
</table>
E.  Pepin County Multi-Hazards Mitigation Plan Maintenance and Adoption Action Plan

**Plan Maintenance and Adoption Goal:** Provide a continual opportunity for local officials to update, maintain, and implement the Pepin County Multi-Hazards Mitigation Plan.

<table>
<thead>
<tr>
<th>Mitigation Actions and Projects</th>
<th>Funding Source(s)</th>
<th>Responsible Party</th>
<th>Project Timetable</th>
<th>Comments</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continual monitoring of progress made toward achieving plan goals, projects, and action items by the Emergency Management Director.</td>
<td>Existing Pepin County Resources</td>
<td>Pepin County Emergency Management Director</td>
<td>Annually</td>
<td>See Chapter 5</td>
<td>On-going</td>
</tr>
<tr>
<td>Post disaster All Hazard Mitigation Plan review and comment period for plan stakeholders.</td>
<td>Existing Pepin County Resources</td>
<td>Pepin County Emergency Management Director</td>
<td>Post Disaster</td>
<td>See Chapter 5</td>
<td>As needed</td>
</tr>
<tr>
<td>Hold an annual All Hazards Mitigation Plan review and comment period for plan stakeholders</td>
<td>Existing Pepin County Resources</td>
<td>Pepin County Emergency Management Director</td>
<td>Annually</td>
<td>See Chapter 5</td>
<td>On-going</td>
</tr>
<tr>
<td>Obtain County, City, and Village plan approval by adopting resolutions</td>
<td>Existing Pepin County Resources</td>
<td>Pepin County Emergency Management Director in cooperation with County, City, and Village officials</td>
<td>After plan modification</td>
<td>See Chapter 5</td>
<td>When updated</td>
</tr>
</tbody>
</table>
Section 5. Plan Maintenance and Adoption

Plan Maintenance

Since changes across Pepin 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 Pepin County Emergency Management Director should review the hazard mitigation strategies and projects annually and report to the Law Enforcement Committee on the progress made pertaining to goals, projects, and actions contained in the plan.

It has also been determined that the Pepin County Law Enforcement Committee will evaluate relevant hazard sections after disasters to determine if the information, goals, and actions are still appropriate in the light of the given disaster. As part of after action reports, the county will evaluate whether the goals and objectives address current or expected conditions; if 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.

As required by the Disaster Mitigation Act of 2000, the entire Pepin County Multi-Hazards Mitigation Plan will be evaluated and updated by the Pepin County Law Enforcement Committee at least every five years to remain eligible for assistance.

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 Pepin 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 Pepin County Law Enforcement Committee meetings are open to the public and agendas are posted prior to each meeting.

Plan Coordination

Upon adoption of the plan by Pepin County and other participating local units of government, the Pepin 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 annual plan evaluation policy should serve as a suitable method to ensure that the information, findings, goals, actions, and projects in the plan are incorporated into other planning projects and initiatives across the County. The Pepin 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 Pepin County Emergency Management Director will send out letters to all participating local units of government and county department directors indicating their respective mitigation projects listings should be incorporated into any new or revised comprehensive plans, emergency plans, ordinances, and codes.
Plan Approval Process

The adoption of this plan by Pepin 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 will designate Pepin 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 Pepin County. Each of these incorporated municipalities that has adopted this plan are indicated with a check mark. The adoption resolutions from each local government follow this list.

☐ Pepin County (includes all unincorporated areas of the county)

☐ Village of Pepin

☐ Village of Stockholm

☐ City of Durand
Appendix A: Risk Assessment Public Participation

Pepin County Emergency Management

Maria Holl, Director

740 7th Avenue West
P.O. Box 39
Durand, WI 54736

PHONE: 715-672-8897 FAX: 715-672-8677
E-MAIL: pepza@co.pepin.wi.us

MEMORANDUM

Date: April 19, 2016

To: All Elected Officials of Local Governments of Pepin County

From: Maria Holl, Emergency Management Director

Subject: Multi-Hazards Mitigation Information

Pepin County is in the process of preparing a Multi-Hazards Mitigation Plan. The County applied for and received a grant from Wisconsin Emergency Management and FEMA to update the existing plan. Pepin County is required to update the Multi-Hazards Mitigation Plan every five years. This plan describes the hazards that occur in Pepin County and lists strategies, goals and projects which will eliminate or minimize the loss of life and property damage. The plan will cover a variety of different natural hazards, i.e. tornadoes, hail, severe winds, flooding, extreme heat or cold, drought, snow storms, etc. We are also updating the plan to include man-made hazards of local interest.

In order to get better idea of your particular hazards and the areas affected we are asking for your assistance in this process. Enclosed you will find a “Hazards Risk Survey” that we are asking you to complete and mail it back in the enclosed envelope no later than May 15, 2016.

The plan will list goals and strategies to mitigate damages so please list any needs within your jurisdiction regarding the mitigation of a hazard. For example, if you know of a road that floods every spring and cuts off residents please make a note of it. Pepin County will be holding several hazard based workshops over the next year to inform the public of mitigation opportunities that could be implemented to reduce the risk of hazards.

If you have any questions or would like additional information you can contact me at (715) 672-8897, email pepza@co.pepin.wi.us. Thank you in advance for providing your input!

Enc: Pepin County Hazard Risk Assessment Survey, SAS Envelope
PEPIN COUNTY HAZARD 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 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.

A 5-year period was chosen because that is how often Pepin County must update their All Hazards Mitigation Plan. This survey is one of the methods Pepin 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.

<table>
<thead>
<tr>
<th>HAZARDS - Each natural hazard should receive either a low, medium, or high risk rating check mark.</th>
<th>Low Risk Rating ✓</th>
<th>Medium Risk Rating ✓</th>
<th>High Risk Rating ✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hail Storms</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Lightning Storms</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Thunderstorms</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tornado/High Winds</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Flash Flooding</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Rivieree Floodings</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Lake Flooding</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Stormwater Flooding</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Dam Failure Flooding</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Forest Fires</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Wildland Fires</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Coastal Hazards</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Heavy Snow Storm</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ice Storm</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Blizzard</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Extreme Cold</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Earthquake</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Extreme Heat</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Agricultural</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Drought</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Fog</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Landslide</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Subsidence</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pandemic Flu</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Train Derailment</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Chemical Spill/Accident</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Other:</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Other:</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

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 Maria Holl, Pepin County Land Management Office, 740 7th Ave West, Durand, WI by May 15, 2016
Appendix B: Hazard Mitigation Goal Review and Update Letter

Pepin County Land Management
Maria Nelson, Director
740 7th Avenue West
P.O. Box 99
Durand, WI 54736
PHONE: 715-672-8897   FAX: 715-672-8877
E-MAIL: pepin@co.pepin.wi.us

TO: City and Villages in Pepin County
FROM: Maria (Holl) Nelson
SUBJECT: Update to Town Hazard Mitigation Goals
DATE: January 16, 2017

Pepin County received a grant from FEMA to update its existing Hazard Mitigation Plan. As part of the update process, the hazard mitigation action plan (community goals/projects) for the county and each municipality needs to be updated. Enclosed is a list of the county’s and each individual municipality’s action plans as they exist in the current hazard mitigation plan. I need your community to review these documents and identify any additional goals that they might want to pursue in the next five years. Each community may determine if they want to discuss it as a public meeting, otherwise I will accept responses from an individual representative. If I don’t hear back from your municipality by January 27th, 2017; I will call and/or visit the chief elected official or staff to obtain an updated list of goals.

A few side notes based on the existing Mitigation Action Plan:

1) The Villages and City are required to enforce Floodplain Zoning (NFIP regulations) within their boundaries, while the county is responsible for all land in towns.
2) The county did add new hazards to the plan, which include: water contamination, acts of terrorism (active shooters, bomb threats, etc.), train derailments, chemical spills – if you have any goals related to these hazards please identify them.
3) If the village/city has any unique hazard mitigation goals they would like to accomplish, please identify these projects.
4) If there is a hazard mitigation project that is very important to your community and in need of funding, please let me know so that I can try to help secure grant funding through federal and state grants. It must be included in the plan to obtain FEMA grants.
5) Also please identify any existing goals that have been completed in the last five years.
6) Ideally, I would like to create new simplified lists for each community that reflect hazard mitigation goals that are within the village/city’s ability to accomplish (not a private utility or the county’s responsibility).

If you have any questions, please call or email our office.
Appendix C: Examples of Agendas, Minutes, and Public Notices

PEPIN COUNTY LAW ENFORCEMENT COMMITTEE
740 SEVENTH AVENUE WEST
P.O. BOX 39
BURAND, WISCONSIN 54736
TELEPHONE (715) 672-8557

Committee Members
Steve Anderson-Chair, Gerald Bauer, Jeffrey Fregene, James Kraft & Bruce Peterson

NOTICE OF LAW ENFORCEMENT/EMERGENCY MANAGEMENT COMMITTEE MEETING

In accordance with the provisions of Section 19.84 of the Wisconsin State Statutes, notice is hereby given that a meeting of the Pepin County Law Enforcement Committee will be held Wednesday, July 27, 2016 at 5:00 pm, in the first floor County Board Room at the Pepin County Government Center, Durand, WI.

1. Call to order
2. Call of the roll
3. Public Comments
4. Approval of the agenda
5. Consent Agenda Items
   a. Approval of the June 13, 2016, Law Enforcement Committee meeting minutes
   b. Voucher approval
6. Reports
   a. Circuit Court Judge 2015 Annual Report
   b. Treatment Alternative and Diversion (TAD) Grant Update
   c. Review of Quarterly review of inmate counts, Trust Account, Huber Account, and Canned Account
   d. Update to Pepin County Hazard Mitigation Plan
      i) Hazard Rankings and Assessments
      ii) Identification of critical facilities
   e. National Flood Plain Training Report
   f. Report on Damages from July 5, 2016 severe storm
   g. Review of Shoreland Ordinance
7. Business Items
   a. Resolutions
      i) 2016 Budget Modification - Sheriff’s Department Software Project
      ii) 2016 Budget Modification - Sheriff Deputy and Jail Communications Expense
      iii) Adding 4th part time position with in the Sheriff’s Office
   b. Sale of Sheriff’s car
8. Future Agenda items and next meeting date (August 8, 2016 at 4:00 p.m.)
9. Adjournment

Posted 7-20-2016 mr

Any person wishing to attend the meeting who requires special accommodation because of a disability should contact the Pepin County Clerk’s Office at 715-672-8557 at least 48 hours before the meeting begins so that appropriate accommodations can be made. Hearing impaired may call Wisconsin Relay at 7-1-1.
PEPIN COUNTY LAW ENFORCEMENT COMMITTEE
740 SEVENTH AVENUE WEST
P. O. BOX 39, DURAND, WI 54736
TELEPHONE (715) 672-8857

Committee Members
Steve Anderson-Chair, Gerald Bauer, Jeffrey Fregine, James Kraft & Bruce Peterson

NOTICE OF LAW ENFORCEMENT/EMERGENCY MANAGEMENT COMMITTEE MEETING

In accordance with the provisions of Section 19.84 of the Wisconsin State Statutes, notice is hereby given that a meeting of the Pepin County Law Enforcement Committee will be held Monday, January 9th, at 4:00 p.m. in the first floor County Board Room at the Pepin County Government Center, Durand, WI

1. Call to order
2. Call of the roll
3. Public Comments
4. Approval of the agenda
5. Consent Agenda Items
   a. Approval of the December 12, 2016, Law Enforcement Committee meeting minutes
   b. Voucher approval
6. Reports
   a. Communication/Consultant study
   b. Discussion on Amending Pepin County Code of Ordinance 179- Chapter 9.16 - Prohibiting the shining of animals from public highways
7. Business Items
   a. Opening sealed bids for 2017 squad car purchase
   b. Hazard Mitigation Plan
      i. Identifying and prioritizing mitigation ideas for hazards
      ii. Review and Refine Pepin County Hazard Goals
      iii. Update Countywide Hazard Mitigation Action Items
   c. Potential Hazard Mitigation Grant opportunities
   d. Rent budget for the District Attorney and Victim Witness Offices
8. Future Agenda items and next meeting date
9. Adjournment
PEPIN COUNTY LAW ENFORCEMENT COMMITTEE MEETING MINUTES

January 9, 2017

Meeting was called to order by Committee Chair Steve Anderson at 4:00 p.m. The meeting was held in the County Board Room of the Government Center, Durand, WI and was properly noticed in accordance with the provisions of Section 19.84 of the Wisconsin State Statutes and complies with Sections 19.81-19.90, Open Meeting Law.

Members present: Steve Anderson, Gerald M. Bauer, James Kraft and Bruce Peterson.

Public Comments
The Clerk of Courts asked for direction from the Committee on disposal of older Law Library books. The Historical Society has not been interested in these in the past. The Committee advised her to attempt to recycle the books first and if that was not practical to dispose of them on the dumpster.

Approval of the Agenda
Supervisor Hergen, who could not make the meeting, asked that the agenda item “Discussion on Amending Pepin County Code of Ordinance 179- Chapter 9.16- Prohibiting the Shining of Animals from Public Highways” be postponed until the February meeting. There were no objections.

Consent Agenda Items
Approval of the December 12, 2016, Law Enforcement Committee Meeting Minutes
Voucher Approval
Motion by Supervisor Pettersen, seconded by Supervisor Bauer, to approve the consent agenda items. Motion carried by voice vote with no negative votes.

REPORTS
Communication/Consultant Study
Sheriff Wener stated that earlier today he had met with Steve Anderson, Dwight Jelle and Pamela DeWitt. The purpose of the meeting was to decide on a direction to take with the communication system upgrade. A sub-committee was formed with these four people, Steve Anderson will Chair. It was decided to have Gary Therkelson, from G.J. Therkelson & Associates, present a report to the full County Board on March 15, 2017.

Discussion on Amending Pepin County Code of Ordinance 179- Chapter 9.16- Prohibiting the Shining of Animals from Public Highways
This item was postponed until the February meeting.

BUSINESS ITEMS
Opening Sealed Bids for 2017 Squad Car Purchase
There were two sealed bids submitted. The proposed bids were:
Ellsworth Ford Inc, Ellsworth – 2017 Interceptor - $28,995.00
Motion by Supervisor Bauer, seconded by Supervisor Kraft to authorize the Sheriff’s Department to award the bid. Motion carried by voice vote with no negative votes.
Rent Budget for the District Attorney and Victim Witness Offices
District Attorney Jon Seifert and Administrative Coordinator Pamela DeWitt provided background on the situation of the current arrangement with the District Attorney’s office and the Victim Witness office. District Attorney Jon Seifert had previously agreed to reduce his rent requirements by half when an office space is made available for use by the District Attorney and the Victim Witness. This space would be mainly used on Court days. Pamela DeWitt thought an office space might be ready in May or June of this year.
Motion by Supervisor Bauer, seconded by Supervisor Kraft, to accept the arrangement with the District Attorney and Victim Witness on the rental agreement to reduce the rent by half to be prorated for the year when the office space becomes available. Motion carried by voice vote with no negative votes.

Hazard Mitigation Plan

Identifying and Prioritizing Mitigation Ideas for Hazards
Maria Nelson, Emergency Management Director, led the Committee through a review of the current plan, listing the goals in each section and noting the changes suggested by the Committee.

Review and Refine Pepin County Hazard Goals
Maria Nelson reviewed the Pepin County All Natural Hazards Mitigation Action Plan, answering questions from the Committee. There were a few changes suggested.

Update Countywide Hazard Mitigation Action Items
Maria Nelson reviewed the action items and explained that the bridge section of this report would be changed to more generic language.

Potential Hazard Mitigation Grant Opportunities
Maria Nelson provided a list of projects for possible grant opportunities. This list included a tower for communications, household booklets of emergency procedures, storm shelters, outdoor warning systems, search and rescue vehicles, removing repetitive loss properties from flood plains, weather radios for rural areas and bridge updates.

Future Agenda Items and Next Meeting Date
Future agenda items: Discussion on Amending Pepin County Code of Ordinance 179-Chapter 9.16- Prohibiting the Shining of Animals from Public Highways, Hazard Mitigation Plan, Closed session for Performance Review. The next meeting date was set for February 13, 2017, at 4:00 p.m.

Adjourn
The Chair adjourned the meeting at 5:50 p.m.

Submitted by,
Maureen Manore
Deputy County Clerk

Approved by the Law Enforcement Committee on the 13th day of February, 2017.

/s/ Steven L. Anderson, Chair
Appendix D: Adopting Resolutions

To be included when available
Appendix E: Sources of Information

This page contains sources of information used to support updates to each section of the Hazard Mitigation Plan

Planning Process, Hazard Mitigation Strategy, and Plan Maintenance and Adoption Sections

- Pepin County 2016 – 2017 Directory – utilized to contact stakeholders and municipal board members.
- Beyond the Basics – Best Practices in Local Mitigation Planning [www.mitigationguide.org]
- Pepin County Multi-Hazards Mitigation Plan 2012-2016 – general information and guidance
- Mitigation for Emergency Managers Student Manual and associated resources from training.
- The All Hazards Mitigation Planning Workshop binder to ensure minimum plan requirements were achieved during the plan update process.

Community Profile – Pepin County

- Pepin County Comprehensive Plan – existing information on housing, land use, transportation, natural features, cultural resources, and other pertinent data.
- U.S. Census Bureau – to find data that helps describe demographic and economic factors within Pepin County.
- Pepin County Multi-Hazards Mitigation Plan 2012-2016 – general information and guidance
- Wisconsin Hazmat Online Planning and Reporting System – hazardous sites
- WI-DNR Dam Search tool – to identify potential dams of interest in the county
- National Climatic Data Center, National Centers for Environmental Information, Climate Data Online – climate data and information for the weather station in the City of Durand

Pepin County Risk Assessment

- State of Wisconsin Hazard Mitigation Plan – general information about hazards that commonly impact the State of Wisconsin, mitigation ideas, and historic information.
- National Climatic Data Center, National Centers for Environmental – historic data from the Storm Event Database
- National Weather Service Event Summaries, La Crosse and Chanhassen websites – to identify recent and historic weather related events of interest
- National Climatic Data Center, FTP server – additional historic data about past storm data and unusual weather phenomena.
- NOAA’s National Weather Service Glossary – definitions of weather related terminology.
- National Severe Storms Laboratory – General information about weather related hazards.
- Wisconsin’s Changing Climate Impacts and Adaption “WICCI Report” – general information about the potential changes to the area’s weather patterns if the modeling predictions for the future are accurate.
- WI-DNR Floodplain Historic Event – to identify additional floods that impacted Pepin County.
- Wisconsin Geological & Natural History Survey – information about subsidence, karsts, sinkholes, and groundwater contamination.
- Courier Wedge and Leader Telegram (newspaper) archives to identify historic local disasters and emergencies.
- School District of Durand archived website with community history pages
- Wisconsin’s Changing Climate: Impacts and Adaption. (2011) Wisconsin Initiative on Climate Change Impacts – Utilized as a source of past climate changes within the State of Wisconsin, particularly increased precipitation amounts over the last 50 years.
- Railroad Hazards – to identify information pertaining to potential causes of train derailments.
  - Rosetti, Michael A. Potential Impacts of Climate Change on Railroads
  - Saat, M. R., et. al. Analysis of Cause of Major Train Derailments and Their Effect on Accident Rates
- Public Health Hazards – Information and definitions related to public health.
  - Wisconsin Department of Health Services – reviewing the public health profiles for Pepin County and identifying key terminology.
  - National Institute of Allergy and Infectious Disease – to identify the types of diseases that are commonly associated with public health outbreaks.
  - County Health Rankings and Roadmaps
- Pepin County Strategic HazMat Plan – history of chemical spills within the county.
Appendix F: Summary of Changes by Section

The 2017 Pepin County Multi-Hazards Mitigation Plan was a complete review and update to the previous version of the hazard mitigation plan. This section highlights the major changes since the 2011 plan organized by plan section.

Planning Process

- Entire section updated to describe the planning process since the plan project was undertaken by in-house staff instead of the regional planning commission.
- Inclusion of progress made to achieve community goals.
- Surveys were sent to a greater number of people and were available for all members of the public to fill out.
- Increased efforts to engage the public through press releases and public awareness seminars throughout the planning process.
- More oversight committee meetings with review and discussion of elements to be included in the plan.
- Outreach to key stakeholders in the community who had additional information to support the contents of the plan.

Community Profile

- Entire section updated and expanded to provide greater information about Pepin County and its resources; including new maps and tables listing critical facilities.
- New sub-section that includes the natural features and environmental characteristics of the county, including information pertaining to bodies of water, watersheds, wetlands, floodplains, and the general climate of the area.
- Updated sub-section on demographic, economic, and land use factors that could impact hazard mitigation planning.
- New sub-sections indicating the critical facilities and emergency services, facilities storing hazardous materials, transportation systems, and natural and cultural resources within Pepin County and a map of their respective locations.

Pepin County Risk Assessment

- The risk assessment and vulnerability ratings were updated based on survey results and input from the oversight committee., the hazards are now listed in order of greatest perceived threat to those considered to be less dangerous. The final rankings were established at a public meeting by the oversight committee members.
- A few new hazards were added to the plan based on input from community members and the oversight committee, these include: water contamination, train derailments, chemical spills, and acts of terrorism.
- The hazard “pandemic flu” was changed to “public health outbreak” to be more inclusive of potential health related threats to the community.
• Some hazard profiles were recommended to be combined to reduce redundancy within the plan, such as winter storms and various types of flooding.
• All hazard profiles were updated to include more definitions, general information, better community history, updated vulnerability analysis and reviewed by the oversight committee.
• Researched additional sources of information to support hazard histories.
• The flood history section now includes our 100-year floods which were previously excluded from the plan; more complete flood histories were compiled for the three areas of the county that are the most prone to flood events (Mississippi River, Chippewa River, and Arkansaw River).
• The oversight committee made suggestions to remove mitigation ideas that they felt were redundant and to add new mitigation ideas for some hazards to reduce risks.
• Removed earthquakes from plan due to very low chances of the hazard occurring.
• Committee decided not to include coastal hazards which was on the survey (but not in the previous plan) since Pepin County is not adjacent to bodies of water capable of producing coastal hazards.

Hazard Mitigation Strategy

• All strategies from the previous plan were reviewed for potential inclusion as 2017 recommendations, some with suggested modifications that were determined to be more appropriate.
• Unincorporated towns decided to be included under the Pepin County goals rather than having their own list of goals and strategies, due to limited budgets and capacities at the town level to try to implement projects.
• A new “all hazards” goal was developed and used to reflect projects that could potentially support more than one hazard; especially those associated with hazards in more than one season of the year.
• Each of the incorporated communities updated their mitigation goals and strategies that they hope to address over the period of the plan; this included corrections to the Village of Pepin and Stockholm which the original plan assigned some of the unique goals to the wrong community.
• Extensive conversations with the Highway Department in regards to the goals associated with flooding and roadways to determine what are considered practical solutions.

Plan Maintenance and Adoption Sections

• The oversight committee clarified the plan maintenance process they would like to see for updates that could occur between the mandatory plan update process; this was defined as an annual review of potential projects and mitigation goals, post-disaster review of individual hazards, and plan update on a five-year basis.
• Adoption was altered slightly; the towns are being included under the county adoption rather than adopting via town resolution since they are unincorporated communities.

Appendices

• Updated to reflect process of revising plan – surveys and letters to stakeholders, agendas of meetings, sources of information, and change documentation.
• New adopting resolutions will be included after plan review process is completed.