



# SANILAC COUNTY HAZARD MITIGATION PLAN

FEMA Review  
Version



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# CHAPTER 1: INTRODUCTION

**Sanilac County** is located in the heart of Michigan's Thumb. Bordered by Huron County to the north, Tuscola County to the west, Lapeer and St. Clair Counties to the south, and Lake Huron to the east, it is the largest county in area in the lower peninsula of Michigan. Officially formed by the Michigan Territory on September 14, 1822, Sanilac County encompasses approximately 963 square miles or 616,320 acres. A combination of glacial action, topography, and vegetation has left the County with some of the richest farmland in the Midwest.

Regarded as a predominantly rural county with agricultural land occupying approximately three-quarters (74 percent) of the land within the County. Sanilac County is among the state's top producers in dairy products as well as sugar beets, corn, oats, hay, wheat, barley, soybeans, dry beans, and cattle.

North-south access is provided by M-25 along the Lake Huron shoreline on the east side of the County, M-19 in the central portion of the County, and M-53 along the western portion of the County. East-West access is provided by M-90 in the southern portion of the County and M-46 in the central portion.

## **What is Hazard Mitigation?**

Hazard Mitigation is any action taken before, during, or after a disaster to permanently eliminate or reduce the long-term risk to human life and property from natural, societal, and technological hazards. Hazard mitigation, along with preparedness, response, and recovery comprise the four phases of emergency management. There is a cyclical relationship between these four phases of emergency management: a community prepares for disaster, including hazard mitigation activities, and then responds to a disaster when it occurs. Following the response, there is a transition into the recovery process, during which hazard mitigation measures can be evaluated and adopted. This in turn, improves the resilience of the community for the next incident, and so on. When successful, hazard mitigation will lessen future impacts to such a degree that succeeding occurrences will remain incidents and not become disasters.

Hazard mitigation strives to reduce the impact of hazards on people and property through the coordination of resources, programs, and authorities so that, at the very least, communities do not contribute to the increasing severity of the problem. When repairs and reconstruction are completed as quickly as possible to pre-disaster conditions, then pre-disaster conditions may simply result in a cycle of repeated damages. However, post-disaster repairs and reconstruction provide an opportunity to strengthen a community's resilience. Recovery projects can rebuild things in a safer manner, informed by the lessons of past disasters, so that future disasters will not have as much of an impact.

Hazard mitigation is needed to ensure that such cycles are broken, that post-disaster repairs and reconstruction take place after damages are analyzed, and that sounder, less vulnerable conditions are produced. Through a combination of regulatory, administrative, and engineering approaches, losses can be limited by reducing susceptibility to damage. Hazard mitigation

provides the mechanism by which communities and individuals can break the cycle of damage, reconstruction, and damage again.

Recognizing the importance of reducing community vulnerability to natural and technological hazards, Sanilac County is actively addressing the issue through the development and subsequent implementation of this plan. The many benefits to be realized from this effort – protection of the public health and safety, preservation of essential services, prevention of property damage, and preservation of the local economic base, to mention just a few – will help ensure that Sanilac County remains a vibrant, safe, and enjoyable place in which to live, raise a family, and conduct business.

Under the Disaster Mitigation Act of 2000, state and local governments are required to develop individual hazard mitigation plans in order to be eligible for hazard mitigation funding from the federal government. This Plan was prepared in accordance with the following Federal Emergency Management Agency (FEMA) and Michigan State Police documents: Local Mitigation Planning Handbook (FEMA) and the Local Mitigation Plan Review Guide, and the Michigan State Police Emergency Management and Homeland Security Division (MSP/EMHSD) publication 207: Local Hazard Mitigation Planning Workbook.

The Sanilac County Hazard Mitigation Plan (“Plan”) serves as the foundation for hazard mitigation activities within the community. Implementation of the plan’s recommendations will assist in the reduction of injuries, loss of life, and destruction of property due to natural and technological hazards. The Plan provides a path toward continuous, proactive reduction of vulnerability to the most frequent hazards that result in repetitive and often severe social, economic and physical damage. The ideal end- state would be the total integration of hazard mitigation activities, programs, capabilities, and actions into normal, day-to-day governmental functions and management practices.

Sanilac County Emergency Management Director and the Sanilac County Hazard Mitigation Advisory Committee (CCHMAC) worked with the East Michigan Council of Governments (EMCOG) and the MSP/EMHSD to develop this Plan. The intent of the Plan is to work with those most familiar with Sanilac County to describe the County, and to create an action plan to protect the health, safety, and economic interests of residents through hazard mitigation, planning, awareness, and implementation.

In the Plan, the hazard analysis section describes the major categories of hazards that affect Sanilac County (and provides some additional information about lesser hazards). The analysis of hazards makes use of community profile information that includes a description of community organization and potential resources. The hazards have been identified as severe weather, geological threats, fires, floods/drought, hazardous materials, infrastructure problems, public health emergencies, transportation incidents, seasonal population shifts, and civil unrest and war. For all of the natural hazards, the following is provided:

- Description of the hazard;
- Explanation of how it affects the County;

- Requirements/Rules affecting the County;
- Hazard mitigation Goal(s) that have been identified; and
- Description and explanation of the Action Item proposed.

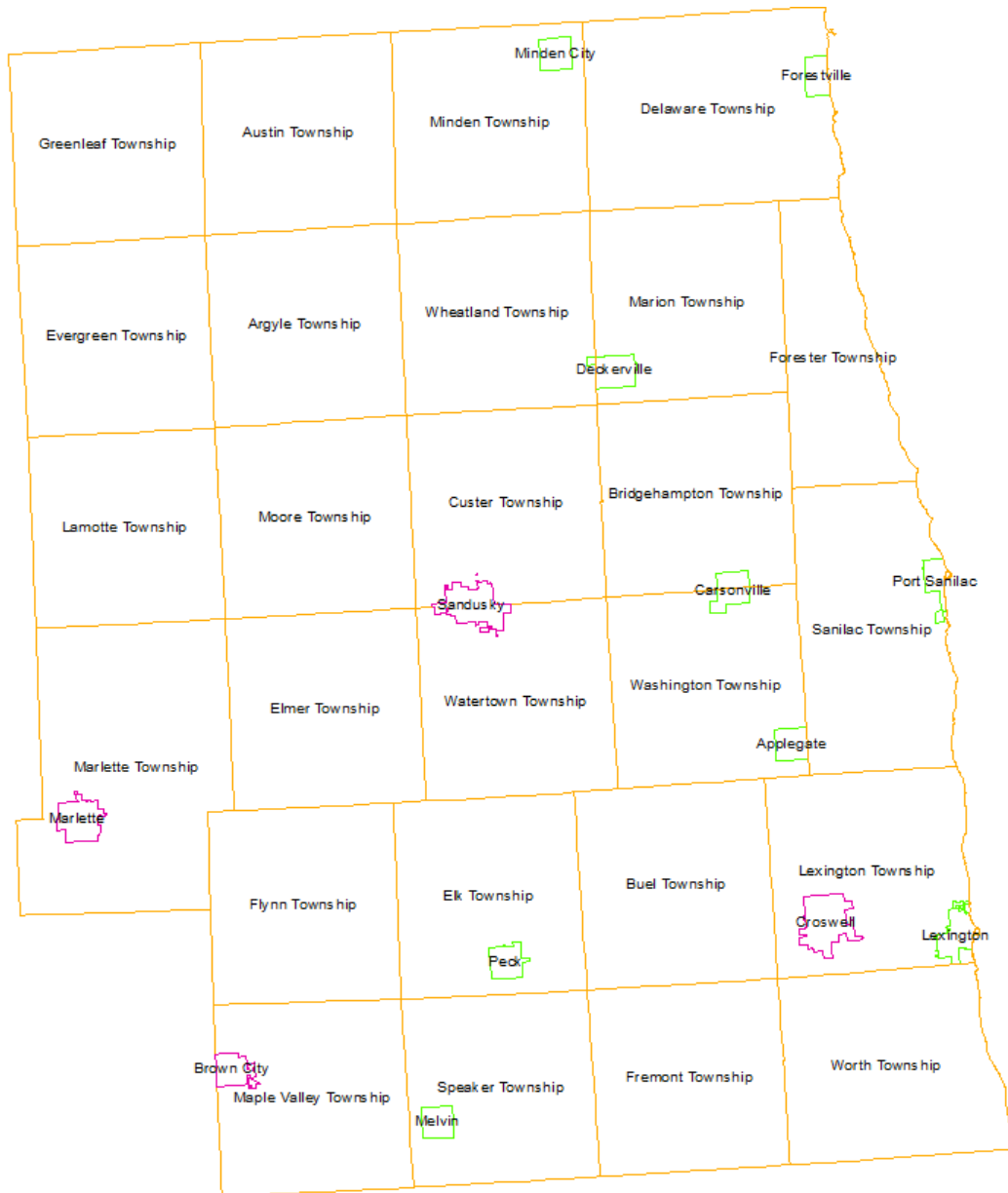
This new Plan updates the previous Sanilac County Hazard Mitigation Plan that was approved in 2007. This process began in 2016, as FEMA requires that recertification of the Hazard Mitigation Plan shall take place at least once every five (5) years or result in the expiration of the county's eligibility to apply for or directly benefit from FEMA's hazard mitigation project grant funds. This document has been modified so that it is easier to find and use information contained within it. This should be helpful for stakeholders to more easily review the information that is most relevant for their jurisdictions and areas of expertise/interest.

Certain information that is considered confidential or too sensitive for widespread public distribution has been kept out of this document and will only be distributed at the discretion of the Sanilac County Office of Emergency Management.

This plan is the culmination of our interdisciplinary and interagency planning effort that required the assistance and expertise of numerous agencies, organizations, and individuals. Without their technical assistance and contributions of time and ideas this plan could not have been completed.

# Sanilac County

## Map 1.1



0 2.5 5 10 Miles

- Cities
- Townships
- Villages

## **Executive Summary**

The Sanilac County Hazard Mitigation Plan was created to protect the health, safety, and economic interests of the Sanilac County residents and businesses by reducing the impacts of natural and technological hazards through hazard mitigation planning, awareness, and implementation. The plan serves as the foundation for hazard mitigation activities and actions within Sanilac County. Implementation of recommendations will reduce loss of life, destruction of property, and economic losses due to natural and technological hazards. The plan provides a path toward continuous, proactive reduction of vulnerability to hazards which result in repetitive and often times severe social, economic, and physical damage. The ideal end state is full integration of hazard mitigation concepts into day-to-day governmental and business functions and management practices.

This plan employs a broad perspective in examining multi-hazard mitigation activities and opportunities in Sanilac County. Emphasis is placed on hazards which have resulted in threats to the public health, safety and welfare, as well as the social, economic and physical fabric of the community. This plan addresses such hazards as floods, tornadoes, windstorms, winter storms, forest fires, structural fires, hazardous material incidents and secondary technological hazards which result from natural hazard events. Each hazard is analyzed from a historical perspective, evaluated for potential risk, and considered for possible mitigative action. The plan also lays out the legal basis for planning and the tools to be used for its implementation.

## **Local Units of Government**

While the Hazard Mitigation Plan was performed by Sanilac County, it involved the participation of the communities within the County. The participating communities can be found on Table 1.1 on page 6. Sanilac County's communities consist of four cities, nine villages, and 26 Townships. The communities are listed below:

### **Cities**

Brown City, Croswell, Marlette, and Sandusky

### **Village**

Applegate, Carsonville, Deckerville, Forestville, Lexington, Melvin, Minden City, Peck, and Port Sanilac

### **Townships**

Argyle, Austin, Bridgehampton, Buel, Custer, Delaware, Elk, Elmer, Evergreen, Flynn, Forester, Fremont, Greenleaf, Lamotte, Lexington, Maple Valley, Marion, Marlette, Minden, Moore, Sanilac, Speaker, Washington, Watertown, Wheatland, and Worth

## Sanilac County Community Information

Table 1.1

Community Name	2010 pop.	2000 pop.	Change	Participated in the 2007 Plan	Currently a participant in 2020 plan	NFIP participant	NFIP map date
Brown City	1,316	1,328	-.90%	X	YES	X	1-6-12
Croswell	2,447	2,467	-.81%	X	YES	X	1-6-12
Marlette	1,875	2,104	-10.88%	X	YES	X	NSFHA
Sandusky	2,679	2,745	-2.40%		YES		
Applegate	248	287	-13.95%	X	YES		
Carsonville	527	502	4.98%	X	NO		
Deckerville	830	944	-12.08%	X	YES		
Forestville	136	127	7.09%		NO		
Lexington	1,178	1,104	6.70%		YES		
Melvin	180	160	12.5%		NO		
Minden City	197	242	-18.60%		NO		
Peck	632	599	5.51%		YES		
Port Sanilac	623	658	-5.32%	X	YES	X	1-6-12
Argyle Township	759	770	-1.43%	X	YES		
Austin Township	665	673	-1.19%		NO		
Bridgehampton Township	688	660	4.24%	X	NO		
Buel Township	1,265	1,237	2.26%	X	NO		
Custer Township	1,006	1,036	-2.98%		YES		
Delaware Township	720	803	-10.34%	X	YES		
Elk Township	894	985	-9.24%	X	YES		
Elmer Township	806	790	2.03%	X	YES		
Evergreen Township	924	995	-7.14%	X	NO	X	1-6-12
Flynn Township	1,050	1,040	.96%	X	YES	X	NSFHA
Forester Township	1,011	1,108	-8.75%		YES	X	1-6-12
Fremont Township	1,051	913	15.12%	X	YES		
Greenleaf Township	781	804	-2.86%		NO		
Lamotte Township	919	981	-6.32%	X	YES		
Lexington Township	2,480	2,584	-4.02%	X	NO	X	1-6-12
Maple Valley Township	1,221	1,114	9.61%	X	YES	X	1-6-12
Marion Township	829	859	-3.49%	X	YES		
Marlette Township	1,763	2,051	-14.04%		YES	X	NSFHA
Minden Township	348	391	-11.00%		YES		
Moore Township	1,203	1,262	-4.68%		YES		
Sanilac Township	1,808	1,951	-7.33%		YES	X	1-6-12
Speaker Township	1,303	1,248	4.41%	X	YES		
Washington Township	1,050	1,098	-4.37%		YES		
Watertown Township	1,320	1,376	-4.07%		YES		

Community Name	2000 pop.	2010 pop.	Change	Participated in the 2007 Plan	Currently a participant in 2020 plan	NFIP participant	NFIP map date
Wheatland Township	488	530	-7.92%	X	YES		
Worth Township	3,894	4,021	-3.16%		YES	X	1-6-12

NSFHA-Non-Special Flood Hazard Area

## CHAPTER 2: THE PLANNING PROCESS

In 2017, the Sanilac County Emergency Management staff began the update process by hosting a meeting at the Sanilac County Building with East Michigan Council of Governments (EMCOG) staff. The purpose of that meeting was to advise the public and Sanilac County representatives of the need to update the 2007 Sanilac County Hazard Mitigation Plan (Plan) and the process that would be utilized.

This update was made possible after the County was awarded a grant from the Federal Emergency Management Agency (FEMA) through the Michigan State Police to update their hazard mitigation plan. EMCOG staff worked with the Sanilac County Emergency Management Director (EMD), Todd Hillman and the Sanilac County Hazard Mitigation Advisory Committee (SCHMAC) who was designated as the steering committee for the Plan update.

The SCHMAC was formed with members of the Sanilac County Local Planning Team (LPT) along with other local representatives. It is composed of volunteers and professionals from county municipalities, county departments, and various agencies located throughout the county/region, including the Michigan State Police, American Red Cross, and Michigan Department of Health and Human Services.

To further promote the update and municipal participation, a written questionnaire was sent to the municipal governments for their input on the update process. The questionnaire sought information on the hazards and how they impacted the Municipality. A copy of the questionnaire is included in Appendix B, which also includes a summary of the municipalities' responses.

Through a series of open meetings to the public, the EMD and EMCOG staff directed the SCHMAC through an assessment of the Plan in order to determine what changes, if any, would be necessary for the update. The SCHMAC and municipal officials were provided meeting agendas and any accompanying memos regarding the Plan update the week before each meeting, at which time the agendas were also posted on the public bulletin board at the Sanilac Emergency Operations Center (EOC), located at 95 N. Dawson St., Sandusky, MI. The following table (Table 2.1) identifies the meeting dates, locations, and subject matter for the SCHMAC and township association meetings. At the end of this chapter are two tables identifying the agencies represented at the meetings (Table 2.2) and the individuals at each meeting (Table 2.3). Appendix A includes the sign-in sheets for all the public meetings for this update.

### Sanilac County Hazard Mitigation Advisory Committee Meeting Schedule/Discussion Topic

TABLE 2.1

Meeting Date	Meeting Location	Discussion Topic(s)
4-26-17	Sanilac County Emergency Operations Center, 95 N. Dawson St. Sandusky, MI	Kick-off meeting to provide information to the public on the Hazard Mitigation Plan (Plan) update process.

6-29-17	Sanilac County Emergency Operations Center	Initial meeting of Sanilac County Hazard Mitigation Advisory Committee (SCHMAC), they were provided an overview of the process, a discussion was held on hazards occurring in Sanilac County, with a discussion initiated on the risk assessment.
8-3-17	Sanilac County Emergency Operations Center	The list of hazards was finalized, and the risk assessment was completed.
9-7-17	Sanilac County Emergency Operations Center	Vulnerability assessment initiated creating a priority list of hazards to be addressed. Discussion initiated on hazardous events and the need to identify the most significant events.
10-5-17	Sanilac County Emergency Operations Center	Reviewed the hazards as identified and the priority of addressing the hazards (high, medium, and low). Completed an initial review of the proposed survey and made several suggestions to the cover memo and form. Reviewed the goals and objectives from the 2007 plan and made one suggestion to Goal 1, by adding a means to identify a system to monitor safety personnel and equipment in the County.
11-2-17	Sanilac County Emergency Operations Center	Reviewed the implementation strategy and the status of projects identified in the strategy. Modified the municipal survey, based on projects identified in the implementation strategy. Significant events were requested of the SCHMAC members.
12-7-17	Sanilac County Emergency Operations Center	Initiated the search for alternative mitigation strategies by identifying the 2007 implementation strategies that are still relevant.
1-18-18	Sanilac County Emergency Operations Center	Began the review of alternative mitigation strategies as identified in the 2014 State of Michigan Hazard Mitigation Plan. Received several municipal surveys from members and discussed the need to resend the survey to all municipalities for their submittal.
2-22-18	Sanilac County Emergency Operations Center	Continued with the identification of alternative mitigation strategies that should be included when identifying potential projects for the Plan. Discussed the need to identify significant hazards that have occurred in the recent past, which could assist in the identification of projects. Also discussed the process to select projects that will make up Chapter 6: Action Items.

3-15-18	Sanilac County Emergency Operations Center	Completed the identification of alternative mitigation strategies. Modified several strategies and finalized them. Identified several hazardous events that could be included in the Plan update. Began the process of identifying projects to be included in Action List.
4-19-18	Sanilac County Emergency Operations Center	Completed the list of action items to be included in the Plan update. After completing the list, the advisory committee then prioritized them with a high, medium, or moderate priority. Priority was based on need of the action item and availability to complete the item, based on cost and personnel.
5-17-18	Sandusky Fire Department 161 S. Elk St, Sandusky	EMD and EMCOG staff met and identified the action list criteria.
7-12-18	Sanilac County Emergency Operations Center	A review of the action items was completed with priorities identified and participating agencies also added. Chapter 5: Analysis of Alternative Actions (Action list from 2007.) was proofed by EMD and volunteers were identified to also proof the chapter. The annual review process was discussed and approved.
8-13-18	Liberty Lanes 100 Kristian St., Sandusky	The EMD and EMCOG staff met with the township representatives at the quarterly meeting of the Michigan Township Association. They were advised of the process and encouraged to participate in the update process. Those members that had yet to submit a community survey, did so at the meeting. Unfortunately, only 7 representatives, from 4 townships attended.
9-27-18	Sanilac County Emergency Operations Center	A discussion was held on improving input from the county residents as well as from the municipalities. It was decided to send another letter to municipal representatives to promote their participation in the update process. A survey was agreed upon and would be available online for anyone to complete. A follow-up meeting at the township association was also discussed as the December meeting is usually well attended.
12-10-18	Liberty Lanes 100 Kristian St., Sandusky	The EMD met with the township representatives at the quarterly meeting of the Michigan Township Association. They were advised of the process and encouraged to participate in the update process. Those members that had yet to submit a community survey, did so at the meeting.

12-13-18	Sanilac County Emergency Operations Center	With a number of attendees not previously attending previous meetings, the discussion centered on the Action List items in order to finalize it.
1-24-19	Sanilac County Emergency Operations Center	The first discussion centered on the completion of the Plan update, with several members volunteering to proof chapters 2, 4, and 7. There was also a lengthy discussion on municipal capacity. Bill stated that additional information was needed on that issue, and that a questionnaire was being developed to get the information. That information will be put in Chapter 3: Community Profile. Todd also discussed the possibility of getting the Equalization Department to do the maps for the update.
2-21-19	Sanilac County Emergency Operations Center	The EMD and EMCOG staff member advised the committee members on the municipal capacity requirement, which is that every participating municipality must identify a FEMA-eligible project or state the reason why they are not participating in a project. (EMCOG staff was later advised that each participating municipality must support one hazard mitigation action.) The EMD will begin contacting municipalities to get their response on participating. The committee added a project, Upgrade the sanitary sewer system to the Action list in Chapter 6. EMCOG staff will submit the Action List to MSP for review and comment. Committee members also returned comments from proofing chapters 2, 4, and 7.
3-21-19	Sanilac County Emergency Operations Center	EMCOG staff recommended that an extension request be submitted as soon as possible as the grant to complete the plan ends June 21, 2019. The committee members agreed that an extension would be in order. EMCOG staff also discussed the need for municipalities to identify measures that will mitigate damages resulting from floods. Drainage ditches were identified as being used throughout the County. Modifications to the Action list were made based on municipal involvement on FEMA-eligible projects.

6-20-19	Sanilac County Emergency Operations Center	Emergency Management Director suggested adding an item to the action list to address flooding concerns. There was a discussion on the item and to address it as a result of a special event and not as a maintenance item. The committee agreed and the item was added. Committee was asked to identify all FEMA-eligible items to make sure their municipality is participating in those projects. They were asked to verify for the July meeting. Committee advised of extension approval. Committee member volunteered to assist with mapping.
9-20-19	Sanilac County Emergency Operations Center	EMCOG staff told the advisory committee that the new maps were completed, and they would be reviewed and inserted into the Plan. The advisory was also informed that feedback on the Hazard Analysis section of the Plan would have to be modified to meet FEMA guidelines. EMCOG staff is in the process of updating the chapter and will resubmit to MSP for their review. A review of the Action list was also completed, based on the changes discussed in June.
2-6-2020	Sanilac County Emergency Operations Center	Last meeting of the advisory committee. Many new community representatives attended and submitted community surveys, provided their list of projects they would be willing to participate in should funding become available, and identified the hazards by impact (high, medium, or moderate) for their community. Two new high priority projects were added due to recent events. They addressed HazMat spills on private property and completing an analysis of the impact of shoreline erosion on shoreline properties.

Through the meetings above, the chapters of the Plan were evaluated and modified accordingly. Below are the results of the chapter reviews for each chapter in the Plan.

- Reviewed and updated Chapter 1: Introduction. Reviewed and updated information on Sanilac County, as well as on the process. Information is included in Chapter 1: Introduction, and Chapter 2: Planning Process of the update.
- Reviewed and updated Chapter 2: Environment. Reviewed and updated information on the physical characteristics of Sanilac County. Information is included in Chapter 3: Community Profile of the update.
- Reviewed and updated Chapter 3: Social Features. Reviewed, updated, and modified the social and demographic data of Sanilac County. Information is included in Chapter 3: Community Profile of the update.
- Reviewed and updated Chapter 4: Land Use Characteristics. Reviewed land use characteristics of Sanilac County. Information is included in Chapter 3: Community Profile of the update.

- Reviewed and updated Chapter 5: Public Facilities and Services. Updated and reviewed the public services being available in Sanilac County. Information is included in Chapter 3: Community Profile of the update.
- Reviewed and updated Chapter 6: Advanced Analysis. Reviewed and updated the analyses for the hazards identified in Sanilac County. Information is included in Chapter 4: Hazard Analysis of the update.
- Reviewed and updated Chapter 7: Risk and Vulnerability Assessment. Reviewed and updated the risk and vulnerability assessments for Sanilac County. Information is included in Chapter 2: Planning Process of the update.
- Reviewed and updated Chapter 8: Goals and Objectives. Reviewed and updated the goals and objectives for Sanilac County. Updated goals and objectives are found in Chapter 6: Action Items.
- Reviewed and updated Chapter 9: Mitigation Strategies and Priorities. Reviewed the mitigation strategies and priorities for Sanilac County. Status of the mitigation strategies is found in Chapter 5: Evaluation of Alternatives. Selected alternative strategies are found in Appendix C.
- Reviewed and updated Chapter 10: Approval and Implementation. Reviewed and updated the approval and implementation schedule for Sanilac County. The revised implementation process is included in Chapter 7: Follow-up.

This update process included the review of the Sanilac County Master Plan, the 2019 Michigan Hazard Mitigation Plan, county maps and studies, municipal master plans, as well as ongoing activities. This included the review of informational sources such as: U.S. Census, National Weather Services, emergency management plans, Michigan Department of Transportation, Michigan Department of Natural Resources, and local health departments.

In April 2018, the proposed action list was sent to the EMHSD staff for their review and comment. This list was then sent to FEMA staff for their comments. In May, the EMD and EMCOG staff were notified that FEMA staff suggested that a larger proportion of action items should involve mitigation activities rather than education and preparedness activities.

In January 2019, EMCOG staff was advised by MSP staff that in order for FEMA to approve the plan participating municipalities would have to identify FEMA-eligible projects to participate in or state that they are not able to participate and state the reason(s) why they cannot participate. This process took many months to complete, which resulted in seeking an extension to complete the update process.

In June of 2019 a new project was added to address the flooding due to blockage of culverts, man-made waterways and drainage ditches. At this time, municipalities were again encouraged to identify projects that they would be willing to participate in, including at least one FEMA-eligible project.

Chapters were being reviewed as they were being completed. After they were proofed by members of the advisory committee, the chapters were sent to the MSP Hazard Mitigation Planner for his review and comments. Based on feedback from the MSP Hazard Mitigation Planner, changes were made to the chapters. These changes were reviewed by the committee and modified again as appropriate.

In February 2020. The advisory committee again met, with new attendees asked to complete the community survey and to identify projects to participate in on the action list of projects. They were also advised of the approval process. Volunteers were also requested to proof the Plan before it is sent to the Sanilac County Board for the public hearing that will begin the approval process.

On March 17, 2020, Sanilac County held a public hearing as part of the Board of Commissioners meeting to present the final draft of the Sanilac County Hazard Mitigation Plan update and to begin the 30-day comment period. On March 27<sup>th</sup> the draft was submitted to the Michigan State Police for their review. Two comments were received during the 30-day comment period. The first comment was to add Minden City Police Department to the list of Police Departments within Sanilac County. The second comment was requesting to consider the addition of maps or lists in the Plan for several items and mentioned typographical errors. Some of the requested items do not exist and noted as such (dams), some of them are listed, but not mapped (hospitals), and finally the listing of action items is Chapter 6 and the table after the listing is a summary of municipal participation in the activities should they be funded.

## Sanilac County Hazard Mitigation Advisory Committee Attendance Table

TABLE 2.2

Participating Agency or Jurisdiction	Returned Survey	Meeting Attended																					
		4-17-17	6-29	8-3	9-7	10-5	11-2	12-7	1-18-18	2-22	3-15	4-19	7-12	8-13	9-27	12-10	12-13	1-24-19	2-21	3-21	6-19	9-19	2-6-2020
East Michigan Council of Governments		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
Sanilac County		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brown City	X					X		X	X	X	X	X	X		X		X	X			X	X	X
Croswell	X		X	X	X	X		X					X		X		X	X				X	X
Marlette	X					X			X	X		X											X
Sandusky	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X
Applegate	X				X																		
Deckerville	X																						
Lexington	X			X								X	X		X				X		X		X
Peck																				X			
Port Sanilac	X																						X
Argyle Township	X													X		X	X	X		X	X		X
Custer Township						X					X						X			X			
Delaware Township	X											X	X		X				X		X		X
Elk Township	X		X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X
Elmer Township	X																						X
Flynn Township	X													X		X							
Forester Township	X															X	X				X		
Fremont Township									X			X											

Participating Agency or Jurisdiction	Returned Survey	Meeting Attended																					
		4-17-17	6-29	8-3	9-7	10-5	11-2	12-7	1-18-18	2-22	3-15	4-19	7-12	8-13	9-27	12-10	12-13	1-24-19	2-21	3-21	6-19	9-19	2-6-2020
Lamotte Township	x																						x
Maple Valley Township	x					x	x	x	x	x		x	x		x	x	x						
Marion Township																x							
Marlette Township	x																						x
Minden Township	x			x	x		x		x	x	x	x			x		x	x	x	x		x	x
Moore Township	x															x	x						x
Sanilac Township	x																						x
Speaker Township	x																	x			x	x	x
Washington Township	x																						x
Watertown Township	x																						x
Wheatland Township	x								x	x	x	x	x	x	x	x							x
Worth Township	x																						x
Sanilac County Sheriff		x																					
Deckerville Community Hospital									x	x	x	x	x		x								
Michigan Township Assn														x									
Congressman Mitchell's Office																x							

## Sanilac County Hazard Mitigation Advisory Committee Attendance Table

**TABLE 2.3**

<b>Person</b>	<b>Agency</b>	<b>Number of Meetings Attended</b>
Brian Anklam, Twp. Trustee	Elk Township	1
Steve Bales, Fire Chief	Croswell Fire Dept	12
Brent Banks, Twp. Treasurer	Flynn Township	1
Janice Bartle, Twp. Clerk	Maple Valley Township	1
Phil Bartle, Twp. Trustee	Maple Valley Township	1
Lesli Billot, Twp. Treasurer	Moore Township	1
Brady Brown, Twp. Trustee	Flynn Township	1
Grant Burgess, Twp. Supervisor	Flynn Township	1
Laurie Burns, City Clerk	City of Sandusky	1
Scott Cameron, Twp. Deputy Clerk	Wheatland Township	2
Chery Conely, Twp. Deputy Clerk	Flynn Township	2
Dawn Cubitt, Twp. Clerk	Speaker Township	1
Gary Daley, Twp. Supervisor	Forester Township	2
Greg Dorman, Twp Supervisor	Moore Township	3
Bill Ernat, Regional Planner	East Michigan Council of Governments	21
Jeff Furness, Twp. Supervisor	Fremont Township	2
Wanda Grifka, Twp. Clerk	Elk Township	1
Matt Harris, DPW Director	City of Sandusky	1
Gary Heberling, Trustee	Sanilac County Board of Commissioners	1
Chris Heiden, Water Plant Manager/Firefighter	Village of Lexington/Delaware Township	6
Naysa Heilig, Twp Clerk	Moore Township	2
Todd Hillman, Emergency Mgmt. Dir./Fire Chief	Sanilac County Emergency Management/Sandusky Fire Chief	21
Marge Hoenicke, Twp. Clerk	Forester Township	1
Clint Holmes, City Manager	City of Brown City	12
Jeff Johnston, Asst. Fire Chief	Applegate Fire Dept	1
Jeff Keesler, Twp. Trustee	Flynn Township	1
Kathy Kelly, Twp. Treasurer	Elmer Township	1
Scott Kenny, Twp. Trustee	Watertown Township	1
Ernie Kilgus, Fire Chief	Elk Fire Dept	11

<b>Person</b>	<b>Agency</b>	<b>Number of Meetings Attended</b>
Catherine Knoerr, Department Supervisor	Custer Township	1
John Knoerr, Twp. Supervisor	Custer Township	3
Darlene McCelland, Twp. Trustee	Elk Township	8
Brian McGinnis, Police Chief	City of Marlette	1
Rick Mitchell, Twp. Supervisor	Maple Valley Township	9
Doug Neumayer, Twp Supervisor	Wheatland Township/ Deckerville Hospital	7
Susan Nichol, Twp Treasurer	Wheatland Township	2
Jason Nielson, Twp. Supervisor	Speaker Township	3
Terry O'Connor, Twp. Supervisor	Minden Township	14
Michael Patterson, Twp. Supervisor	Elk Township	13
Jan O'Keefe, Zoning Administrator	Sanilac Township	1
Larry O'Keefe, Business Mgr.	Port Sanilac	1
Ed Pfaff, Twp. Clerk	Argyle Township	7
Ellen Pfaff, Deputy Twp. Clerk	Argyle Township	7
Glen Phillips, Twp Trustee/Zoning Administrator	Marlette Township	1
Bill Pringle, Twp. Trustee	Moore Township	3
Keefe Radtke, Fire Chief	Village of Lexington	1
Brad Rich, Twp. Trustee	Elmer Township	1
Paul Rich, Sgt/Police Chief	Sanilac County Sheriff's Department/Peck Police Department	2
Neil Roggenbuck, Twp. Trustee	Lamotte Township	1
Bill Sarkella, Trustee	Sanilac County Board of Commissioners	6
Corey Schmidt, City Manager	City of Marlette	4
Audrey Stolicker, Twp. Treasurer	Marion Township	1
Deborah Williamson, Twp. Clerk	Marion Township	1
Tina Willis, Twp. Clerk	Washington Township	1
Katherine Wilson, Twp. Clerk	Flynn Township	2
Dale Wood. Twp. Trustee	Marlette Township	1

## CHAPTER 3: COMMUNITY PROFILE



### NATURAL FEATURES OF SANILAC COUNTY

Sanilac County is located in the heart of Michigan's Thumb. Bordered by Huron County to the north, Tuscola County to the west, Lapeer and St. Clair Counties to the south, and Lake Huron to the east, it is the largest county in area in the lower peninsula of Michigan.

Officially formed by the Michigan Territory on September 14, 1822, Sanilac County encompasses approximately 963 square miles or 616,320 acres. A combination of glacial action, topography, and vegetation has left the County with some of the richest farmland in the Midwest. According to the US Census of Agriculture, seventy-four (74) percent of the land is dedicated to agricultural production. Sanilac County is the state's top producer of dairy products, while ranking high in the output of sugar beets, corn, oats, hay, wheat, barley, soybeans, dry beans, and cattle.

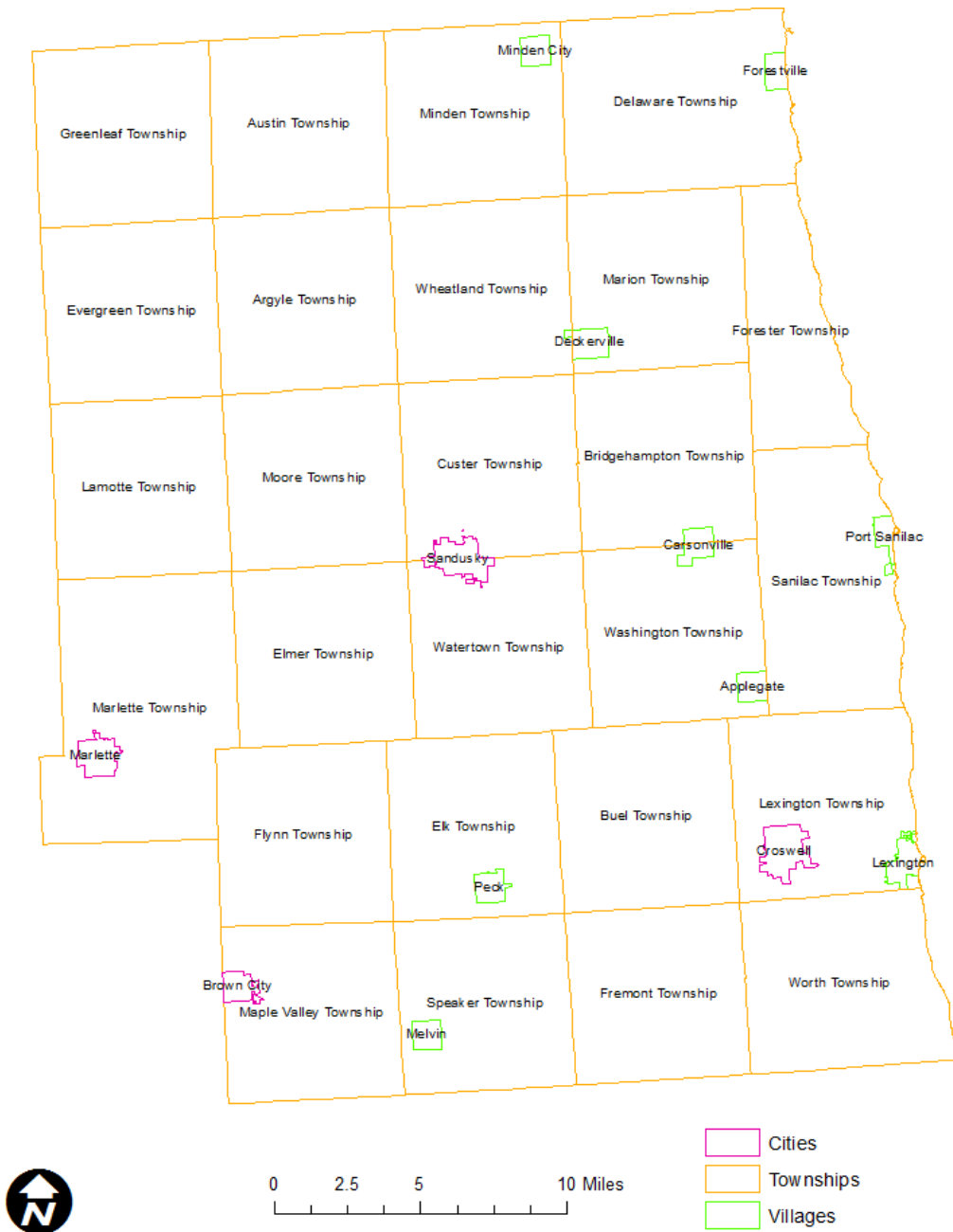
Sanilac County has over 1,000 acres in state game preserves: Sanilac, Minden, and Cass City. These areas provide a natural year-round habitat for wildlife and are a favorite with hikers and sportsmen. Although Sanilac County does not have a single natural inland lake, it is blessed with 40.5 miles of coastline and 1,007 miles of streams and rivers. An extremely flat area geographically, the streams and rivers are typically slow moving with shallow flow gradients.

Sanilac County contains thirty-nine (39) local units of government, including 26 townships, four (4) cities, and nine (9) villages. The City of Sandusky is the County seat. These communities are represented by a five (5) member County Board of Commissioners, which cover as many districts. The following table lists all 39 of the local units of government with their population data and trends from the last two United States decennial censuses. The 2010 census of the County was 43,114.

Sanilac County is covered by District 3 of the Emergency Management & Homeland Security Division of the Michigan State Police.

# Sanilac County

## Map 3.1



## Sanilac County Population

TABLE 3.1

Municipality	2010 population	2000 population	Change in population	Municipality	2010 population	2000 population	Change in population
<b>Cities</b>				<b>Townships</b>			
Brown City	1,316	1,328	-.90%	Argyle Township	759	770	-1.43%
Croswell	2,447	2,467	-.81%	Austin Township	665	673	-1.19%
Marlette	1,875	2,104	-10.88%	Bridgehampton Township	688	660	4.24%
Sandusky	2,679	2,745	-2.40%	Buel Township	1,265	1,237	2.26%
<b>Villages</b>				Custer Township	1,006	1,036	-2.98%
Applegate	248	287	-13.95%	Delaware Township	720	803	-10.34%
Carsonville	527	502	4.98%	Elk Township	894	985	-9.24%
Deckerville	830	944	-12.08%	Elmer Township	806	790	2.03%
Forestville	136	127	7.09%	Evergreen Township	924	995	-7.14%
Lexington	1,178	1,104	6.70%	Flynn Township	1,050	1,040	.96%
Melvin	180	160	12.5%	Forester Township	1,011	1,108	-8.75%
Minden City	197	242	-18.60%	Fremont Township	1,051	913	15.12%
Peck	632	599	5.51%	Greenleaf Township	781	804	-2.86%
Port Sanilac	623	658	-5.32%	Lamotte Township	919	981	-6.32%
				Lexington Township	2,480	2,584	-4.02%
				Maple Valley Township	1,221	1,114	9.61%
				Marion Township	829	859	-3.49%
				Marlette Township	1,763	2,051	-14.04%
				Minden Township	348	391	-11.00%
				Moore Township	1,203	1,262	-4.68%
				Sanilac Township	1,808	1,951	-7.33%
				Speaker Township	1,303	1,248	4.41%
				Washington Township	1,050	1,098	-4.37%
				Watertown Township	1,320	1,376	-4.07%
				Wheatland Township	488	530	-7.92%
				Worth Township	3,894	4,021	-3.16%
				<b>SANILAC COUNTY TOTAL</b>	<b>43,114</b>	<b>44,547</b>	<b>-3.22%</b>

Source: US Census

## Sanilac County Top Employers

**TABLE 3.2**

Company Name	Location	# of Employees
Huron Inc.	Lexington	460
Marlette Regional Hospital	Marlette	440
Vibracoustics	Sandusky	300
Grupo Antolin	Marlette	300
McKenzie Health Systems	Sandusky	258
Cotterman	Croswell	226
Sanilac County Medical Care	Sandusky	200
Asco	Sandusky	157
Sanilac County	Sandusky	157
Oetiker	Marlette	118
Sanilac County Mental Health	Sandusky	115
Michigan Sugar	Croswell	100

## LAND USE

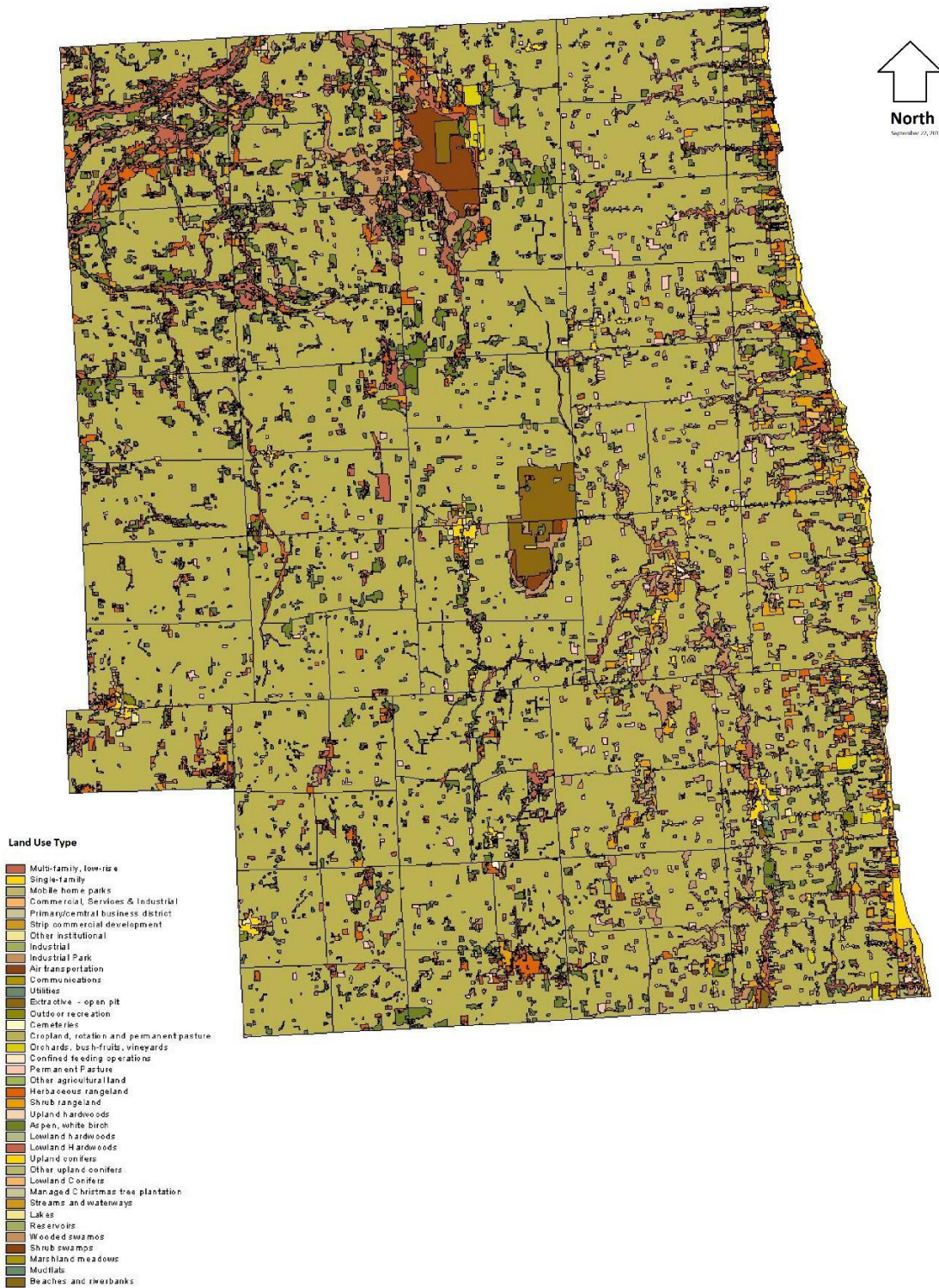
Sanilac County covers approximately 963 square miles or 616,320 acres. A combination of glacial action, topography, and vegetation has left the county with some of the richest farmland in the Midwest. Of this area, approximately 74% is devoted to agricultural production. Sanilac County is the state's top dairy products producer and ranks high in the output of sugar beets, corn, oats, hay, wheat, barley, soybeans, dry beans, and cattle.

The rich peat bogs of Minden and Watertown Townships are being mined to produce a rich and fertile peat product sought after by gardeners and growers for potted plants and sprouting seedlings. Michigan Peat Company of Sandusky ships its processed peat products throughout the Midwest.

In 2011, Sanilac County completed the development of a future land use guide. The County has been divided into three distinct land use districts, which can be summarized in the following three districts: Urban and General Service District – areas of higher density residential, commercial, and industrial development, reserved for established cities and villages and the Lake Huron shoreline; Rural Residential District – areas of rural, low density residential development that are concentrated around Urban and General Service Districts and serve as a buffer between these high density zones and agricultural zones; and Rural and Agricultural Conservation Districts – areas of extremely low density devoted primarily for agricultural and farming activities. In the past ten years there has been minimal development in the County. What little development that has occurred has not increased the vulnerability of the County to any of the hazards that have been identified by the Sanilac County Hazard Mitigation Advisory Committee.

# Sanilac County Land Use

## Map 3.2



## FUTURE LAND USE<sup>1</sup>

Utilizing the 2011 Sanilac County Master Plan, the Sanilac County Planning Commission has developed the following “Future Land Use Recommendations”. The overriding theme in developing these recommendations was the reality that the most appropriate place for future growth and development are areas that are already the locations of residential, commercial, and industrial activities. The overall intent was to limit sprawl, minimize future investments for infrastructure, and preserve open space for tourist and recreational purposes. The 2011 Sanilac County Recommended Land Use Map is found on page 27.

The County has been divided into three distinct land use districts, which are defined in detail below. They can be summarized as follows:

**Urban and General Service District**-areas of higher density residential, commercial, and industrial development reserved for established cities and villages and the Lake Huron shoreline.

**Rural Residential District**-areas of rural, low density residential development that are concentrated around Urban and General Service Districts and serve as a buffer between these high-density zones and agricultural zones.

**Rural and Agricultural Conservation District**-areas of extremely low density devoted primarily to agricultural and farming activities.

### Land Use Classifications

Below is a general description of the land use classifications that are included in the land use map.

#### **Blue: Urban and General Service District**

The areas of Sanilac County that are depicted in blue are generally located in and around two distinct areas: existing population and activity nodes such as Brown City, Croswell, Deckerville, Marlette, Sandusky, and the Lake Huron Shoreline. Sanilac County’s various population nodes and its shoreline are classified as Urban and General Service District for different reasons. Villages and cities are classified as such because they are areas of existing higher residential, commercial, and industrial land use densities. They also possess public infrastructure such as electricity, sewer, and water that can be extended and upgraded economically and efficiently.

The Lake Huron Shoreline is classified as Urban and General Service at varying degrees because it is already the location of extensive residential development, both seasonal and primary, and because it is critical to the County’s economy in terms of tourism and recreation. A concentration of development, especially residential and commercial, would allow the County to maximize the economic impact of these two activities as well as invest in the infrastructure necessary to provide for this growth and minimize its inevitable environmental impact.

Future growth and development should be concentrated in these two general areas to minimize infrastructure investments, limit sprawl, and preserve open space.

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<sup>1</sup> Source-Sanilac County Master Plan – Updated 2011

**Red: Rural Residential District**

A majority of the designated Rural Residential Districts is concentrated around Urban and General Service Districts. They serve as a transition zone between the Urban and General Service Districts, located around established cities and villages and the Lake Huron Shoreline, and Rural Agricultural Districts, which make up most of the County's interior land area.

The Rural Residential District provides for rural, low-density homes in areas of Sanilac County in which the soil will support on-site septic systems. Zoning in this district should be on the magnitude of 10 acres, and homes should be arranged in a clustered manner, which will minimize any required infrastructure extensions and maximize open space. The current pattern of development along Township borders and roads should be abandoned or at the very least discouraged in favor of clustering and infill development to limit further sprawl.

**Yellow: Rural and Agricultural Conservation District.**

A majority of the county is shaded yellow and classified as Rural and Agricultural Conservation District. The overall density would be very low under this classification; however, residences would be clustered together on a small parcel preserving large tracts of land for agricultural and farming uses.

While a majority of the County is designated as Rural and Agricultural there are many economic opportunities within the agriculture and farming industry. In addition to traditional agricultural activities such as raising crops and livestock, agri-businesses should be provided for and encouraged to help diversify Sanilac County's farming economy. Sanilac County has begun this process with sod, truck, nursery and orchard farms, with some qualifying for the Organic label. Further diversification into Agri- businesses has great potential to expand the farm economy, "create jobs, generate income, produce support industries, and contain sprawl".

Along with agri-businesses, community-farming operations like the ones that have sprung up in western Washtenaw County are encouraged and supported in Sanilac County. Community farms are an outgrowth of a 'return to the earth' movement in which people pay into a farm for a portion of the year's crop. In addition to the membership fee people agree to work the farm for an agreed upon number of hours.

**Green: Parks**

The light green indicates public parks at the state, county and local level. The most unique of such sites are the Minden State Game Area and the Petroglyphs. The Minden State Game Area contains a rare upland bog and is available to different groups to enjoy, such as tourists, researchers, preservationists, and hunters. Personal safety and private property issues should be identified and addressed on both the County and Township level, with increased communication with the State so that the Game Area may be safely and effectively utilized by Sanilac County residents and tourists alike. The Petroglyphs also present an extraordinary site for attracting tourism and should be considered, along with the other public parks, in the broad County context rather than just a Township site. Public attractions such as the Minden State Game Area and the Petroglyphs should be examined and promoted along with other tourist and recreational attractions that are concentrated along the Lake Huron Shoreline.

## **Features of Land Use Recommendations**

### **Open Space Corridor System**

A major feature of the recommended land use map is the Open Space Corridors System, which is outlined in green on the map. While these corridors strictly follow interior water features such as rivers, creeks, and lakes in the provided maps, they could and would most likely also include land that is sensitive in nature such as wetlands, floodplains, and forests. The Corridors would assist in linking the Townships, Villages, and Cities throughout Sanilac County together and could connect natural areas such as parks and historic areas. In addition, the Open Space Corridors would serve several related purposes. These include:

- Providing access to inland water features for public recreational uses such as fishing and hunting.
- Providing habitat connections for fish and wildlife.
- Protecting rivers, lakes, and forested areas from further development and environmental degradation such as pollution from runoff and erosion.

The most appropriate level at which to plan for such a system of greenways is at the county rather than the township, city, or village level because it ensures a measure of consistency and coordination that could not be provided for at the local level. Planning for greenways at the county ensures the integrity of such a system and defends the corridors from being implemented in a checkerboard fashion, which would render them as much less effective and valuable for the people of Sanilac County.

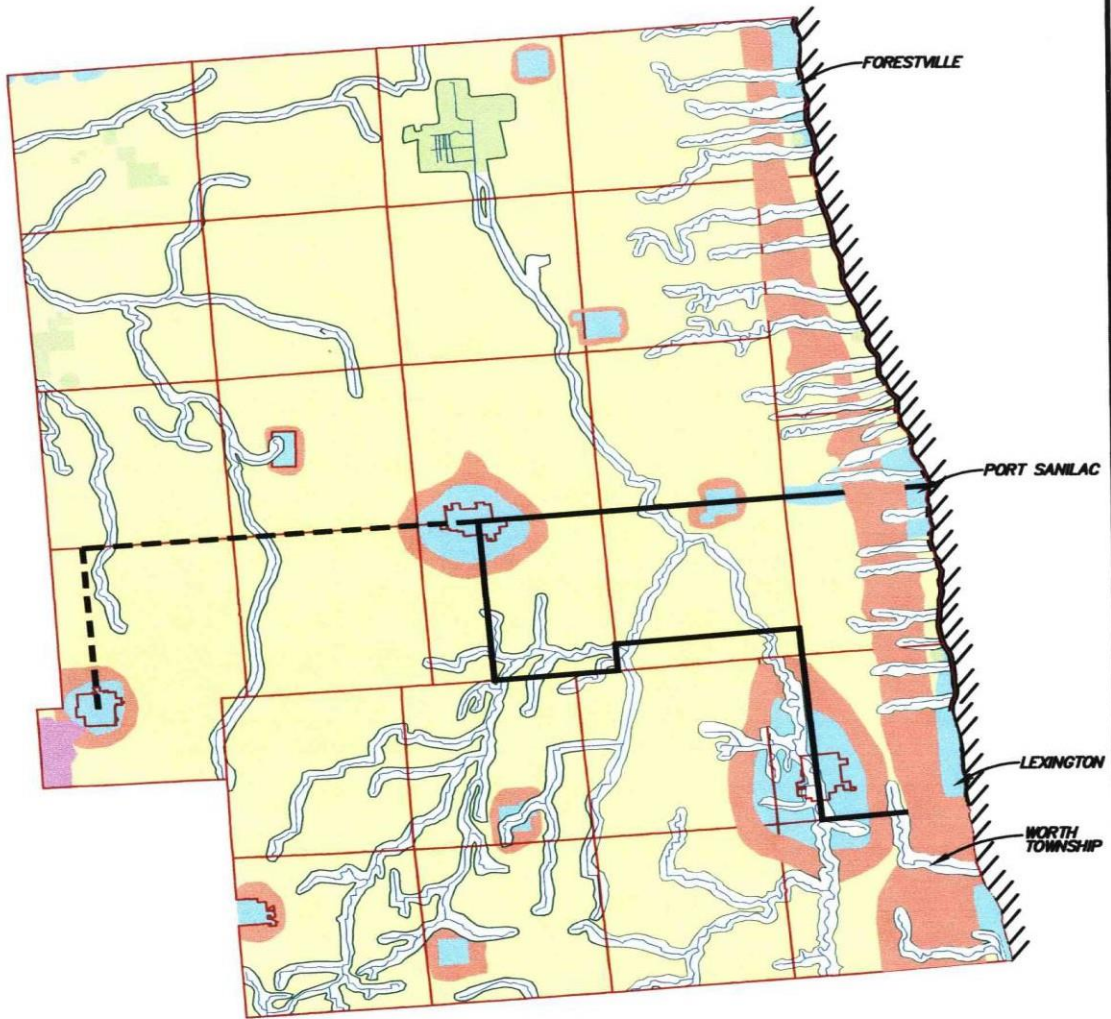
Additionally, on the land use map, the Lake Huron shoreline is marked with black dashes. These dashes indicate zones that are documented in the 1987 Sanilac County Environmental Features Report as areas that are at high risk for erosion. The report recommends that affected local communities, in accordance with the Shoreline Protection and Management Act of 1970, enact special zoning regulations or other types of land use control and restrict development in these areas. The report further recommended setback and minimum setback distances are included in the Environmental Features Report.









### **Mass Transit System**

The land use map also envisions a limited transit system indicated by the solid black line running from the city of Sandusky along M-46 to M-25 and then running north and south to tourist destinations along the Lake Huron Shoreline. Additionally, there are provisions for transit to run around to population centers such as Croswell and Applegate.

Possible inter-connection transit lines could also be extended along M-46 to Tuscola County, M-25 to both Huron and St. Clair Counties, and M-53 to Huron and Lapeer Counties. A transit line of this nature would be primarily for tourists who fly into the airport at Sandusky and would allow them to then access tourist destinations without necessitating the use of a personal automobile. Such a limited service could easily be funded and operated by businesses heavily reliant on tourism in the county such as the airport, hotels, golf courses, and restaurants and would require a very short start up period. In addition, the map features a dashed black line that indicates a possible transit extension that would link the City of Marlette to the proposed transit route.

### Map 3.3



-  URBAN AND GENERAL SERVICE DISTRICT  
 RURAL RESIDENTIAL DISTRICT  
 RURAL AND AGRICULTURAL CONSERVATION DISTRICT  
 PARKS AND RECREATION
-  OPEN SPACE CORRIDOR  
 PROPOSED TRANSIT SYSTEM  
 POSSIBLE TRANSIT SYSTEM  
 EROSION ZONE

\*COMMUNITIES ON COASTLINE ARE IDENTIFIED

***JUNE 8, 2004***

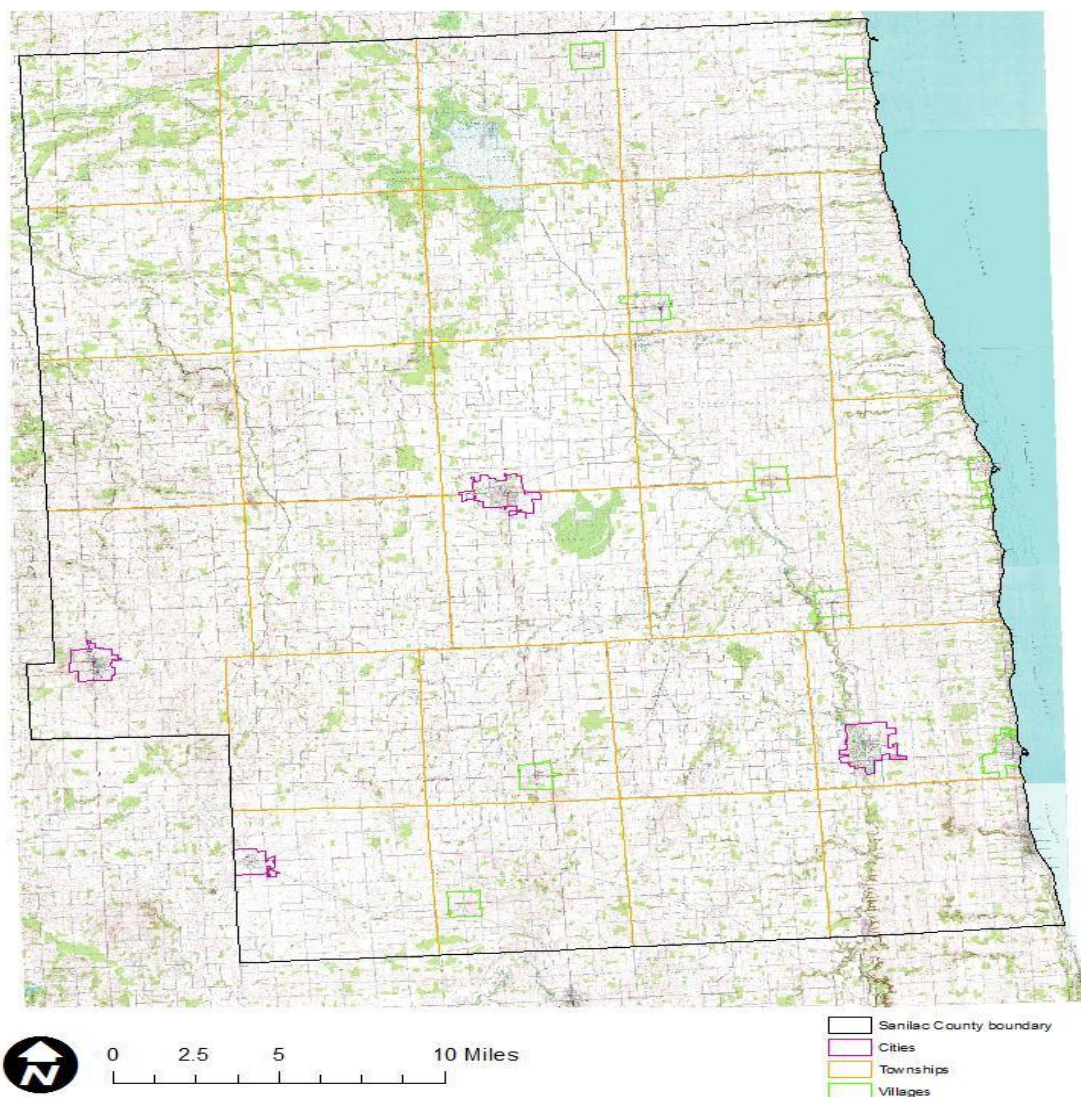
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## TOPOGRAPHY

Sanilac County's topography involves a total relief of about 280 feet, with the lowest points along the lakeshore. Elevations increase when moving towards the central portion of the county where the highest point is 860 feet above sea level. Generally speaking, the terrain in the county varies from flat areas to gently rolling or hilly areas. The most significant relief and topographic features can be seen in the eastern portion of the county along the Lake Huron shoreline.

### Sanilac County Topographic Map

MAP 3.4



## SOILS

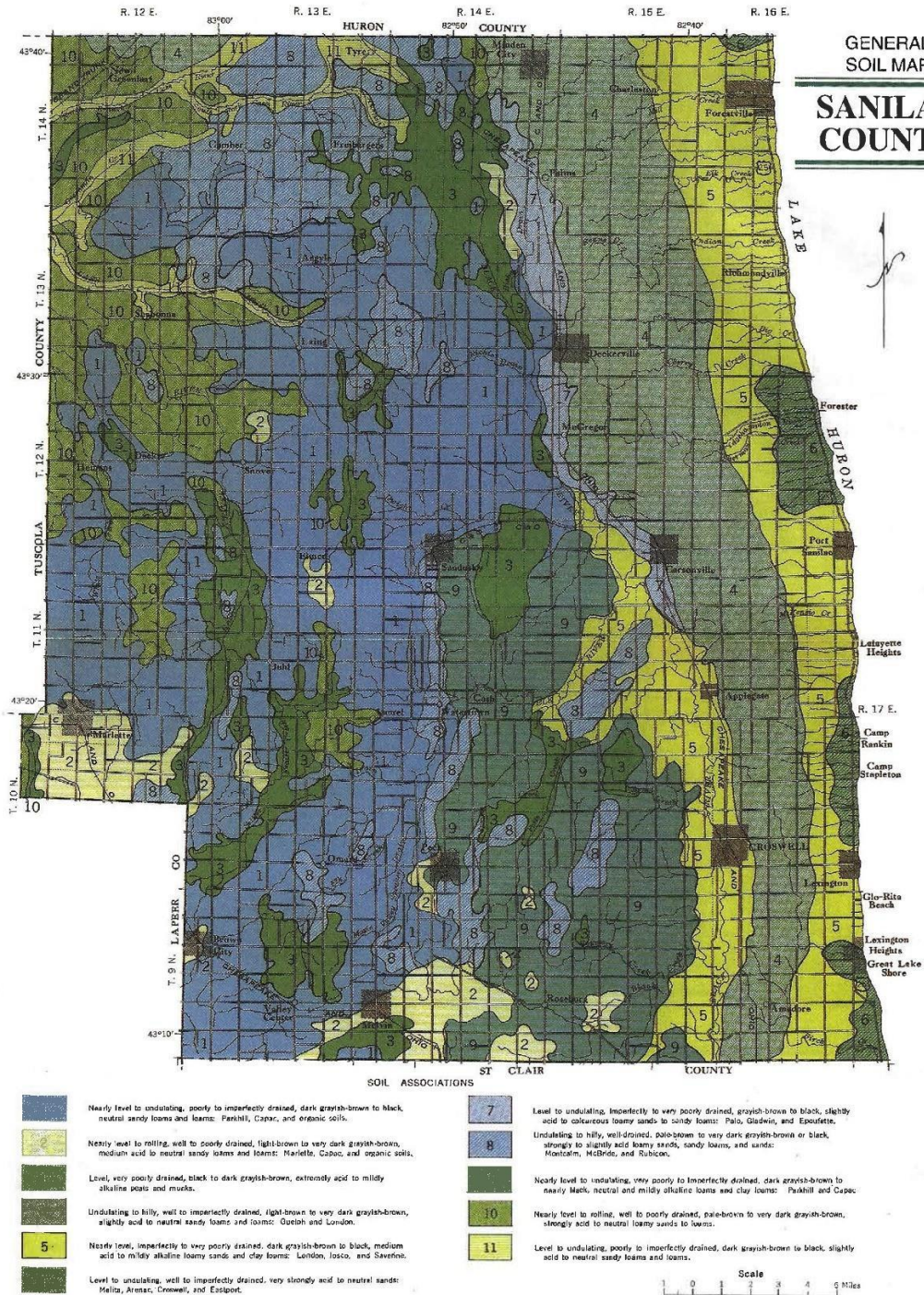
The Soil Survey of Sanilac County, Michigan identifies soils across the County. Map 3.5 identifies the locations of the soil associations, which are described as follows: Soil Associations are very general

collections of several different and unique soils and are provided in order to simplify the soil classifications. Since soil classification is site specific and varies with area, landscape, and the natural environment, these associations may not provide sufficient information on a particular soil. The Soil Survey Manual of Sanilac County can be referred to for further details.

1. Nearly level to undulating, poorly to imperfectly drained, dark grayish-brown to black, neutral sandy loams and loams: Parkhill, Capac, and organic soils.
2. Nearly level to rolling, well to poorly drained, light brown to very dark grayish-brown, medium acid to neutral sandy loams and loams: Marlette, Capac, and organic soils.
3. Level, very poorly drained, black to dark grayish-brown, extremely acid to mildly alkaline peat's and mucks.
4. Undulating to hilly, well to imperfectly drained, light brown to very dark grayish-brown, slightly acid to neutral sandy loams and loams: Guelph and London.
5. Nearly level, imperfectly to very poorly drained, dark grayish-brown to black, medium acid to mildly alkaline loamy sands and clay loams: London, Iosco, and Saverine.
6. Level to undulating, well to imperfectly drained, very strongly acid to neutral sands: Melita, Arenac, Croswell, and Eastport.
7. Level to undulating, imperfectly to very poorly drained, grayish-brown to black, slightly acid to calcareous loamy sands to sandy loams: Palo, Gladwin, and Epoufette.
8. Undulating to hilly, well-drained, pale brown to very dark grayish-brown or black, strongly to slightly acid loamy sands, sandy loams, and sands: Montcalm, McBride, and Rubicon.
9. Nearly level to undulating, very poorly to imperfectly drained, dark grayish-brown to nearly black, neutral and mildly alkaline loams and clay loams: Parkhill and Capac.
10. Nearly level to rolling, well to poorly drained, pale brown to very dark grayish-brown, strongly acid to neutral loamy sands to loams.
11. Level to undulating, poorly to imperfectly drained, dark grayish-brown to black, slightly acid to neutral sandy loams and loams.

# Sanilac County Soils Map

## MAP 3.5



## CLIMATE

Climate has a strong influence on the way of life and the activities of the people of Sanilac County. The climate is influenced by Lake Huron, which has a moderating effect on the temperatures. This effect cools off the hot summers, with cool lake breezes, and extends the growing season into late fall. Like the rest of the State, the County has four distinct seasons that allow for a wide variety of outdoor activities. In the table below is a breakdown of the average mean temperatures for each month (daily average), along with the monthly average precipitation and snowfalls.

### Sanilac County Climate

TABLE: 3.3

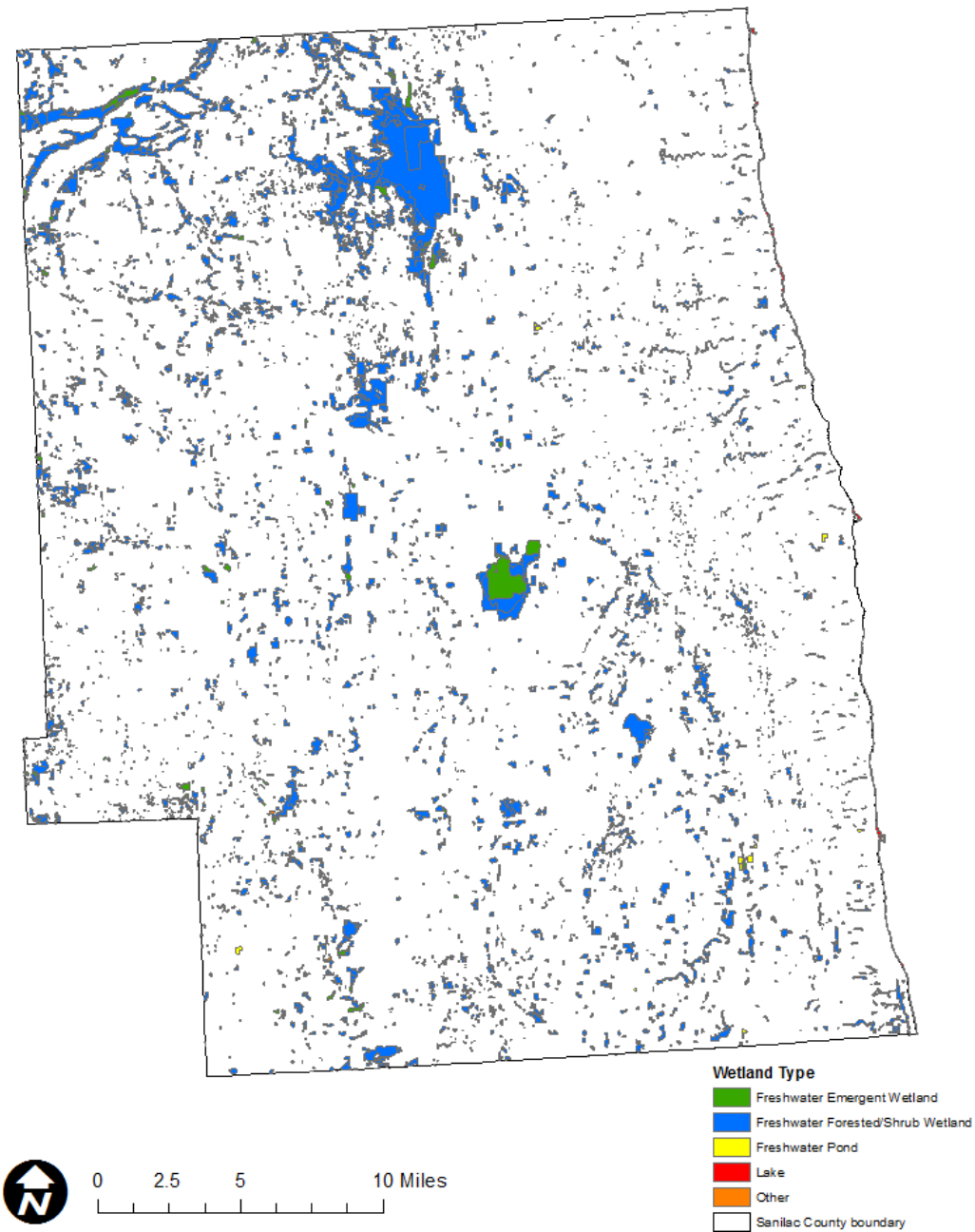
Month	Average Temperatures (in degrees)			Monthly Average Rainfall	Monthly Average Snowfall
	Daily Average	High Average	Low Average		
January	21.93	27.62	16.23	1.31"	10.10"
February	25.73	31.51	19.83	1.64"	17.51"
March	34.15	40.88	27.38	1.68"	5.46"
April	49.55	57.67	36.82	2.72"	1.01"
May	54.69	63.33	46.20	2.85"	.01"
June	63.90	71.54	56.70	3.50"	0
July	69.84	77.14	62.54	2.01"	0
August	69.72	77.05	62.33	2.85"	0
September	62.62	69.80	55.38	2.99"	0
October	49.52	55.38	43.65	3.61"	.11"
November	39.92	48.75	36.03	1.54"	2.97"
December	30.03	34.30	25.72	1.36"	10.55"
Annual Totals				28.06"	46.71"

Source: National Weather Service

## WATER FEATURES AND WETLANDS

Sanilac County has a multitude of water resources, with eleven distinct drainage basins or watersheds. The Black River with its largest tributary, the Elk River, is the most prominent watershed. It starts near Minden and flows south. The Black River empties into Lake Huron at Port Huron. Headwaters of the Cass River are also found in Sanilac County. The south, middle, and north branch of the Cass River, along with the north branch of White Creek, which also outlets into the Cass River, drain the northwestern portion of the County. This then outlets to the Saginaw River. A small portion of the northwest corner of Sanilac County drains northwest into the Pigeon River and a small area, south and west of Marlette drains into the Flint River. Several local governments also participate in the National Flood Insurance Program (NFIP), including the city of Brown City, City of Croswell, City of Marlette, Village of Port Sanilac, Evergreen Township, Flynn Township, Forester Township, Lexington Township, Maple Valley Township, Sanilac Township, and Worth Township.

Sanilac County Wetlands Inventory  
Map 3.6



## **GEOLOGY**

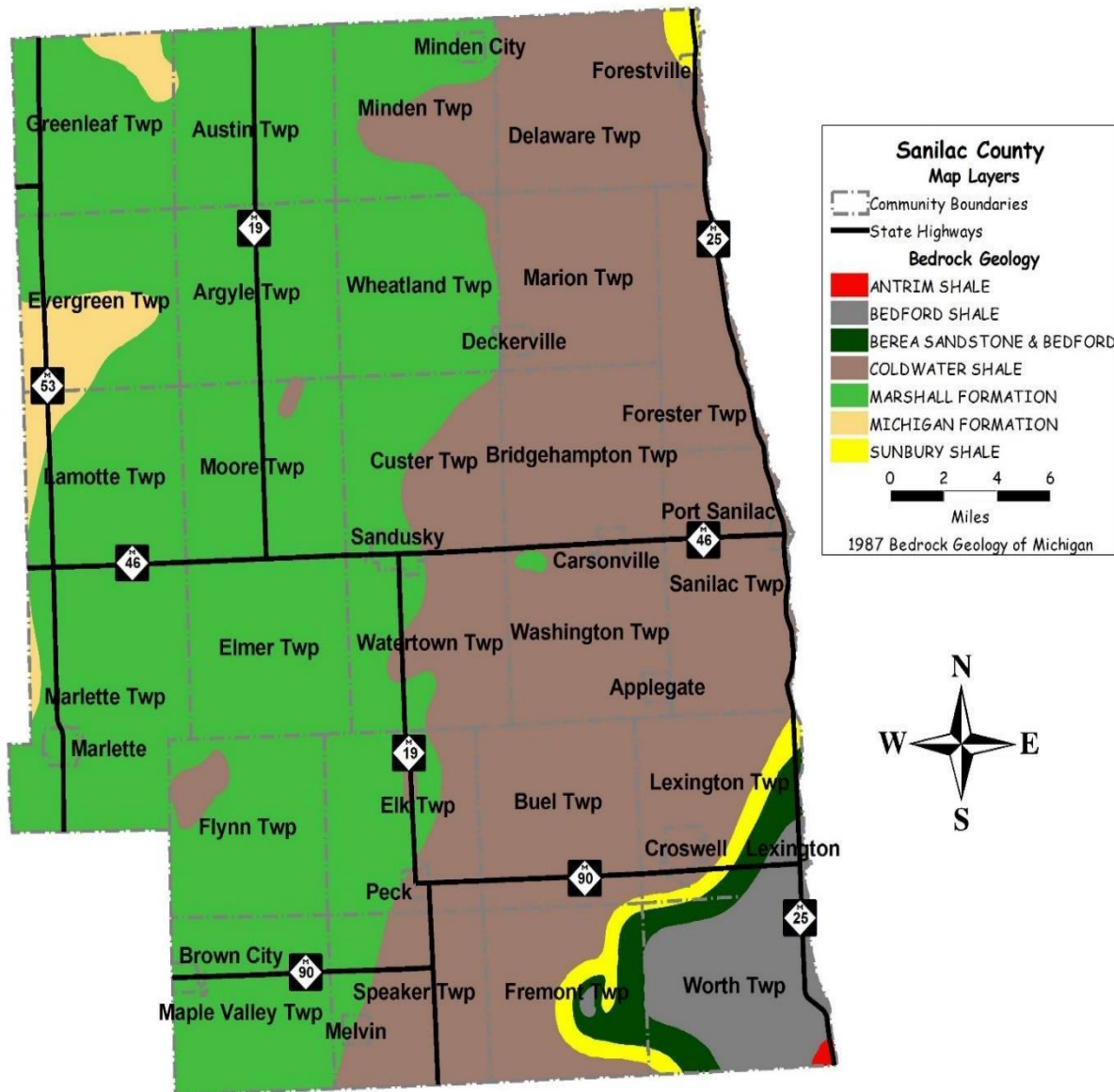
The rolling hills, river valleys, swamps and lakes were created by the retreating continental glacier some 12,000 years ago. Beneath this thick layer of the glacial deposits lays a foundation of layered sedimentary bedrock.

### **Surface Geology**

Starting some 2 million years ago, during the Pleistocene era, continental glaciers formed in the Hudson Bay area. Several times, over this two-million-year period, the massive sheets of ice built up and inched their way south across what is today Michigan. The massive ice sheets, more than one mile thick, advanced in a southerly direction, bulldozing their way across the landscape. The glacier pushed material in front of it, incorporated rocks and soil into the debris laden ice; and scraped, ground and broke apart the sedimentary bedrock of the Michigan Basin.

Each advance and retreat of the continental glaciers took tens of thousands of years. This reoccurring process shaped and reshaped the land; obliterating and then creating hills, valleys, rivers and lakes, swamps and marshes. The last glacial period, called the Wisconsin era, created the landscape we know today. The glacier left behind boulders, rocks, cobble, sand, gravel, silt, clay and loam. In some areas the material was deposited in unsorted masses called till plains, ground moraines and end moraines. Water flowing from the melting glaciers also sorted materials, creating outwash channels, sand deltas, kames and eskers. Fine materials, captured in the fast-moving glacial meltwater, settled to the bottom of expansive glacial lakes creating lacustrine clay and silt plains.

**Sanilac County Bedrock Map**  
Map 3.7



## FOREST COVER

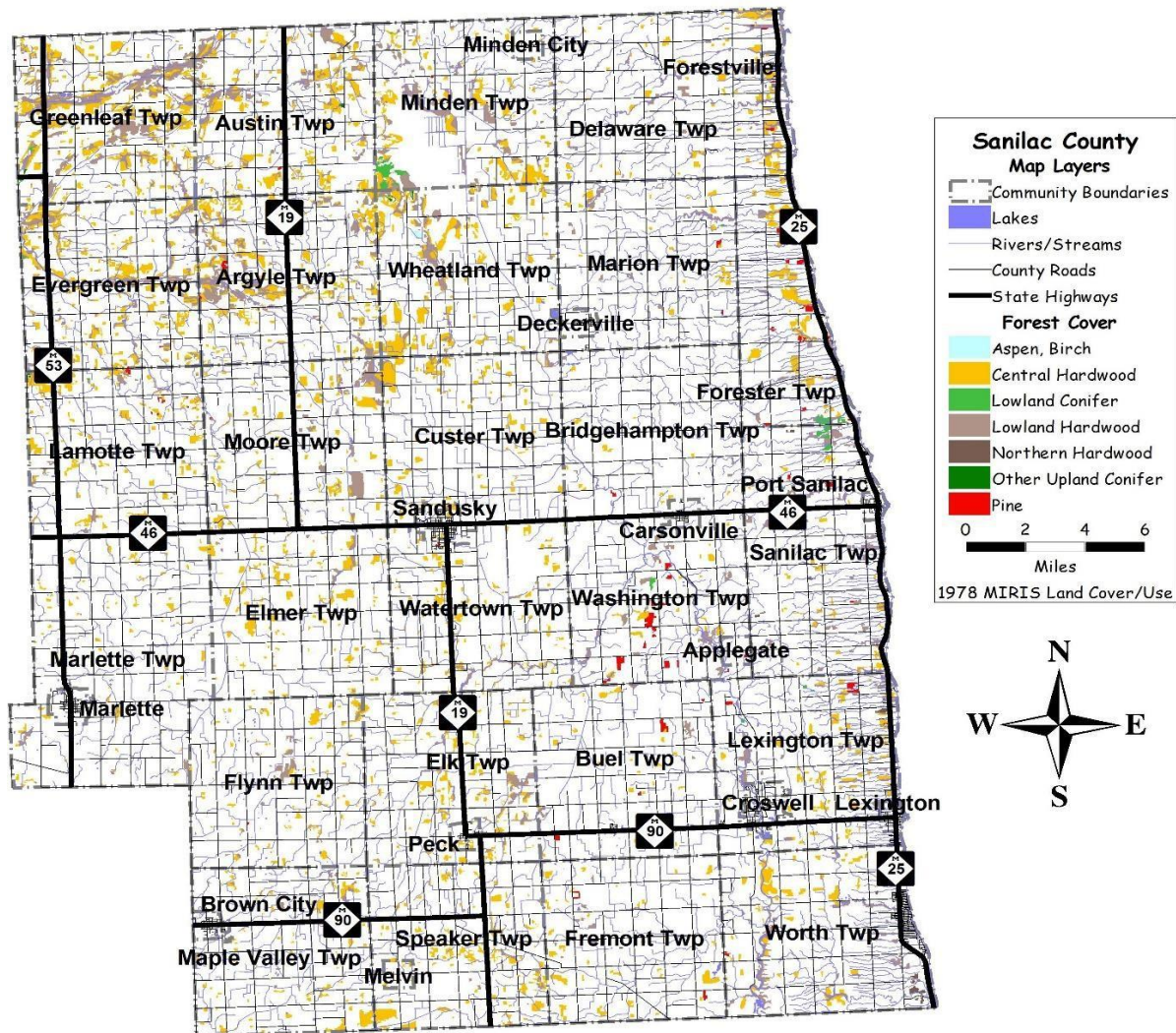
About 8.5 percent of the County is forested and an analysis will assist in defining vulnerable areas and populations. Tree species vary depending upon the soils, moisture and past activities such as logging, fires and land clearing. Aspen-Birch, central hardwoods, and pine are the most common forests. Under dry spring conditions forest fires can occur in any forest. However, some forests have higher risks. Jack and red pine forests have a high risk for wildfires. Oak and white pine forests have a moderate risk for wildfires. According to the MIRIS Land Cover/Use Inventory, jack pine and red pine forests cover approximately 2

percent of the forestland. Dry, low fertility sandy soils, found in outwash plains and channels, supported pre-settlement pine forests that for thousands of years were perpetuated by wildfires. Today, residential development has occurred within the same wildfire prone areas. There are small pockets of pine forest in Washington Township.

Red jack and white pine forest types are included in the pine forest category. Bigtooth aspen, quaking aspen, white birch, red maple and red oak are the primary tree species found in the aspen-birch type. Red oak, white oak, black oak and northern pin oak are the primary species growing in the oak forests. Northern hardwoods include species such as sugar maple, red maple, American beech, basswood and yellow birch.

Poorly drained, lowland areas support northern white cedar, tamarack, balsam fir, black spruce, eastern hemlock, white pine, balsam poplar, trembling aspen, paper birch, black ash, speckled alder and shrub willows. Northern white cedar dominates the wetland areas where there is good lateral water movement and the soils are high in organic content. Lowland forests are typically located adjacent to water features and function as riparian forests and water quality buffers. The network of lowland forests, associated with rivers and creeks, also function as wildlife corridors and are the backbone of large regional ecological corridors. Lowland forests adjacent to the Great Lakes are prone to flooding during periods of high lake levels. Lowland forests adjacent to rivers and streams are prone to flooding during the spring snow melt, particularly when combined with heavy spring rains. Extensive areas of lowland forests can be found in Greenleaf, Austin, Minden, Wheatland, Argyle, Evergreen, Moore Townships and a few scattered areas along the lakeshore.

**Sanilac County Forest Cover Map**  
**Map 3.8**



## **COMMUNITY ORGANIZATION AND RESOURCES FOR HAZARD MITIGATION including County and Local Community Agencies, Departments and organizations potentially relevant for Hazard Mitigation.**

### **Emergency Services**

Emergency services are very important for the Hazard Mitigation Process. These services help serve the public in times of natural disasters and other emergency situations. It is crucial for the public to know where these services exist and how to reach them in times of need.

### **Sanilac County Office of Emergency Management**

95 N. Dawson St.

Sandusky, MI 48471

Phone: (810) 648-8357

This office was established under the provisions of the Michigan Emergency Management Act, PA 390 of 1976, as amended, to ensure a coordinated public response in the event of a natural or man-made disaster. The Sanilac County Emergency management office assesses local capabilities to respond to emergency and disaster situations, advocates emergency preparedness in both the public and private sectors and works to assure a comprehensive approach is used involving a range of public and private agencies including local police, fire and EMS agencies, the Michigan State Police Emergency Management and Homeland Security Division, the Michigan Department of Environmental Quality, the Region 6 Homeland Security Board, and the National Weather Service. Other agencies coordinating with emergency management include the American Red Cross, local and state health departments, educators and amateur radio operators. This office tends to be central for all major threats and incidents within the County. This office also handles all Public Warning and Communications services, NOAA Weather alerts, Broadband, LEPC/LPT Boards, EOC Operations and Management, Training and Education programs, and all related Homeland Security matters.

### **Local Emergency Capability:**

Procedures in the Emergency Operations Plans address the unique types of problems associated with all hazards, including specific functions such as rescue and evacuation. Communities work closely with private sector and surrounding jurisdictions to ensure a fast, coordinated response. Mitigation possibilities include the use of community zoning regulations to provide suitable open, unoccupied “buffer” areas around pipelines, storage fields, refineries and compressor stations.

### **Warning Sirens or System**

Sanilac County has a system of 20 active Emergency Alert Sirens. The sirens have a one mile cover radius. These sirens are located in the following communities: Applegate (1), Argyle (1), Brown City (2), Carsonville (1), Croswell (4), Deckerville (1), Lexington (1), Marlette (1), Melvin (1), Minden City (1), Peck (1), Port Sanilac (1), and Sandusky (4).

### **Police**

Sanilac County has nine (9) police departments within the County outside the Sheriff’s Department. They are the Sandusky Police Department, Port Sanilac Department of Public Safety, Croswell Police Department, Lexington Police Department, Peck Police Department, Deckerville Police Department, Brown City Police Department, and Marlette Police Department. The Sanilac County Sheriff’s Department

is located in the City of Sandusky. In addition, the County is served by the Michigan State Police Post from Caro.

Sanilac County Sheriff's Department  
65 North Elk Street  
Sandusky, MI 48471  
Phone: 810 648-2000  
Fax: 810 648-5162

Brown City Police Department  
4205 Main Street  
Brown City, MI 48416  
Phone: 810 346-2000  
Fax: 810 346-3802

Croswell Police Department  
100 N. Howard Avenue  
Croswell, MI 48422  
Phone: 810 679-2200  
Fax: 810 679-2313

Lexington Police Department  
7227 Huron Avenue  
Lexington, MI 48450  
Phone: 810 359-8242  
Fax: 810 359-5622

Marlette Police Department  
3436 Morris Street  
Marlette, MI 48453  
Phone : 989 635-2008  
Fax: 989 635-3806

Port Sanilac Police Department  
56 N, Ridge Street  
Port Sanilac, MI 48469  
Phone: 810 622-9131  
Fax: 810 622-7801

Sandusky Police Department  
26 Speaker Street  
Sandusky, MI 48471  
Phone: 810 648-4016  
FAX: 810 648-3959

Deckerville Police Department  
2521 Black River Street  
Deckerville, MI 48427  
Phone: 810 376-9505  
FAX: 810 376-3445

Peck Police Department  
30 E. Lapeer Street  
Peck, MI 48466  
Phone: 810 378-5131

Minden City Police Department  
1585 First Street  
Minden City, MI 48456  
Phone: 989 864-3000

## **Fire**

There are sixteen (16) fire departments located in or serving portions of Sanilac County. The departments are located in the Applegate, Argyle, Brown City, Carsonville, Croswell, Deckerville, Lamotte Township, Lexington, Marlette, Minden City, Moore Township, Port Sanilac, Delaware Township, Elk Township, Sandusky, and Speaker Township. There is a County-wide Mutual Aid Agreement between all of the fire departments.

Applegate Fire Department  
245 Sherman Street  
Applegate, MI 48401  
Phone: 810 404-7844

Argyle Fire Department  
5018 N. Ugly Road  
Argyle, MI 48410  
Phone: 810 672-9635

Brown City Fire & Rescue  
4205 Main Street  
Brown City, MI 48416  
Phone: 810 346-2325

Croswell Fire Department  
7 S. Croswell Road  
Croswell, MI 48422  
Phone: 810 679-2346

Delaware Township Fire Department  
7979 Maple Grove Road  
Minden City, MI 48456  
Phone: 989 864-5563

Lamotte Township Fire Department  
6271 Snover Road  
Decker, MI 48472  
Phone: 989 635-7220

Marlette Fire Department  
6436 Morris St  
Marlette, MI 48453  
Phone: 989 635-5034

Moore Township Fire Department  
1536 Main Street  
Snover, MI 48472  
Phone: 810 672-9050

Sandusky Community Fire Department  
161 S. Elk Street  
Sandusky, MI 48471  
Phone: 810 648-3366

#### **Ambulance**

Medical Control Authority/Sanilac Medical Services, Inc.  
171 Dawson St  
Sandusky, MI 48471  
Phone: 810 648-3092

Carsonville Fire Department  
6506 Main Street  
Carsonville, MI 48419  
Phone: 810 648-2131

Deckerville Fire Department  
2521 Black River Street  
Deckerville, MI 48427  
Phone: 810 376-9505

Elk Township Fire Rescue  
29 E. Lapeer Street  
Pecky, MI 48466  
Phone: 810 378-5472

Lexington Fire Department  
7227 Huron Avenue  
Lexington, MI 48450  
Phone: 810 359-5221

Minden City Fire Department  
1585 1<sup>st</sup> Street  
Minden City, MI 48456  
Phone: 989 364-3000

Port Sanilac Fire Department  
56 N. Ridge Street  
Port Sanilac, MI 48469  
Phone: 810 648-2131

Speaker Township Fire Department  
7630 Brockway Road  
Melvin, MI 48454  
Phone: 810 348-2131

### **Health Care**

Sanilac Medical Care Facility  
137 N. Elk St  
Sandusky, MI 48471  
Phone: 810 648-3017

Deckerville Community Hospital  
3559 Pine ST  
Deckerville, MI 48427  
Phone: 810 376-2835

Deckerville Healthcare Services  
2433 Black River Street  
Deckerville, MI 48427  
Phone: 810 376-2885

Marlette Regional Hospital EMS  
2770 Main Street  
Marlette, MI 48453  
Phone: 989 635-4000

### **Government Facilities**

Government facilities have a large impact on how emergencies are handled. They provide services to the public such as shelter in times of natural disasters. They also serve as a way to distribute information on how to handle emergency circumstances. Each municipality within the County handles planning and zoning within their jurisdictional boundaries. Planning and zoning can be critical components of hazard mitigation.

### **Government Offices and Facilities (Main Office Locations) County**

Sanilac County  
60 W. Sanilac Street  
Sandusky, MI 48471  
Phone: 810 648-2933  
Fax: 810 648-2830

### **Cities**

City of Brown City  
4205 Main Street  
P.O. Box 99  
Brown City, MI 48416  
Phone: 810 346-2325

City of Croswell  
100 North Howard Avenue  
Croswell, MI 48422  
Phone: 810 679-2299

City of Marlette  
6436 Morris Street  
Marlette, MI 48453  
Phone: 989 635-7448

City of Sandusky  
26 West Speaker Street  
Sandusky, MI 48471  
Phone: 810 648-3330

### **Villages**

Village of Applegate  
2457 Sherman Street  
P.O. Box 89  
Applegate, MI 48401  
Phone: 810 633-9922

Village of Carsonville  
414 E. Chandler Street  
Carsonville, MI 48419  
Phone: 810 657-9400

Village of Deckerville  
2521 Black River  
P.O. Box 275  
Deckerville, MI 48427  
Phone: 810 376-9505

Village of Forestville  
5605 Cedar Street  
P.O. Box 36  
Forestville, MI 48434  
Phone: 989 864-3447

Village of Lexington  
7227 Huron Road – Suite 100  
Lexington, MI 48450  
Phone: 810 359-8631

Village of Melvin  
1247 Main Street  
Melvin, MI 48454  
Phone: 810 378-2582

Village of Minden City  
1585 First Street  
Minden City, MI 48456  
Phone: 989 864-3000  
989 864-3263

Village of Peck  
30 East Lapeer Street  
Peck, MI 48466  
Phone: 810 378-5131

Village of Port Sanilac  
56 N. Ridge Street  
P.O. Box 628  
Port Sanilac, MI 48469  
810-622-9963

### **Townships**

Argyle Township  
5018 Ubly Road  
Argyle, MI 48410

Austin Township  
8321 S. Ubly Road  
Ubly, MI 48475  
Phone: 989 658-2335

Bridgehampton Township  
Mailing Address: P.O. Box 83  
Carsonville, MI 48419  
Phone: 810 657- 9280  
810 334-4252

Buel Township  
2565 Hall Road  
Croswell, MI 48422

Custer Township  
613 E. Forester Road  
Sandusky, MI 48471

Delaware Township  
7979 Maple Grove Road  
Minden City, MI 48456  
Phone: 989 864-5563

Elk Township  
29 East Lapeer Street  
Peck, MI 48466  
Phone: 810 378-5900

Elmer Township  
2299 W. Sanilac Road  
Sandusky, MI 48471  
Phone: 810648-9903

Evergreen Township  
5514 Shabbona Road  
Decker, MI 48426

Forester Township  
Township Hall: 2470 North Lakeshore Road  
Mailing Address: 5860 E. Deckerville Road  
Deckerville, MI 48427  
Phone: 810 376-4393

Greenleaf Township  
6425 Bay City Forestville Road  
Cass City, MI 48726

Lexington Township  
7227 Huron Ave. – Suite 200  
Lexington, MI 48450  
Phone: 810 359-5500

Marion Township  
3451 Main Street  
P.O. Box 298  
Deckerville, MI 48427  
Phone: 810 376-9655

Minden Township  
1510 Main Street  
P.O. Box 54  
Minden City, MI 48456

Sanilac Township  
20 N. Ridge Road  
P.O. Box 631  
Port Sanilac, MI 48469  
Phone: 810 622-8178

Washington Township  
Township Hall: 2520 Hyde Road  
Mailing Address: 2700 Washington Road  
Carsonville, MI 48419

Wheatland Township  
Township Hall: 4493 Chevington Road  
Deckerville, MI 48427

Flynn Township  
5251 Shephard Road  
Brown City, MI 48416

Fremont Township  
2512 East Galbraith Line  
Yale, MI 48097

Lamotte Township  
6271 Snover Road  
Decker, MI 48426

Maple Valley Township  
8014 Shephard Road  
Brown City, MI 48416

Marlette Township  
6725 Airport Road  
Marlette, MI 48453  
Phone: 989 635-7772

Moore Township  
1536 Main Street  
P.O. Box 123  
Snover, MI 48472  
Phone: 810 672-9050

Speaker Township  
7630 North Brockway Road  
Melvin, MI 48454  
Phone: 810 387-3356

Watertown Township  
2630 South Sandusky Road  
Sandusky, MI 48471  
Phone: 810 648-3544

Worth Township  
6903 S. Lakeshore Road  
Lexington, MI 48450  
810 359-8852

## Schools

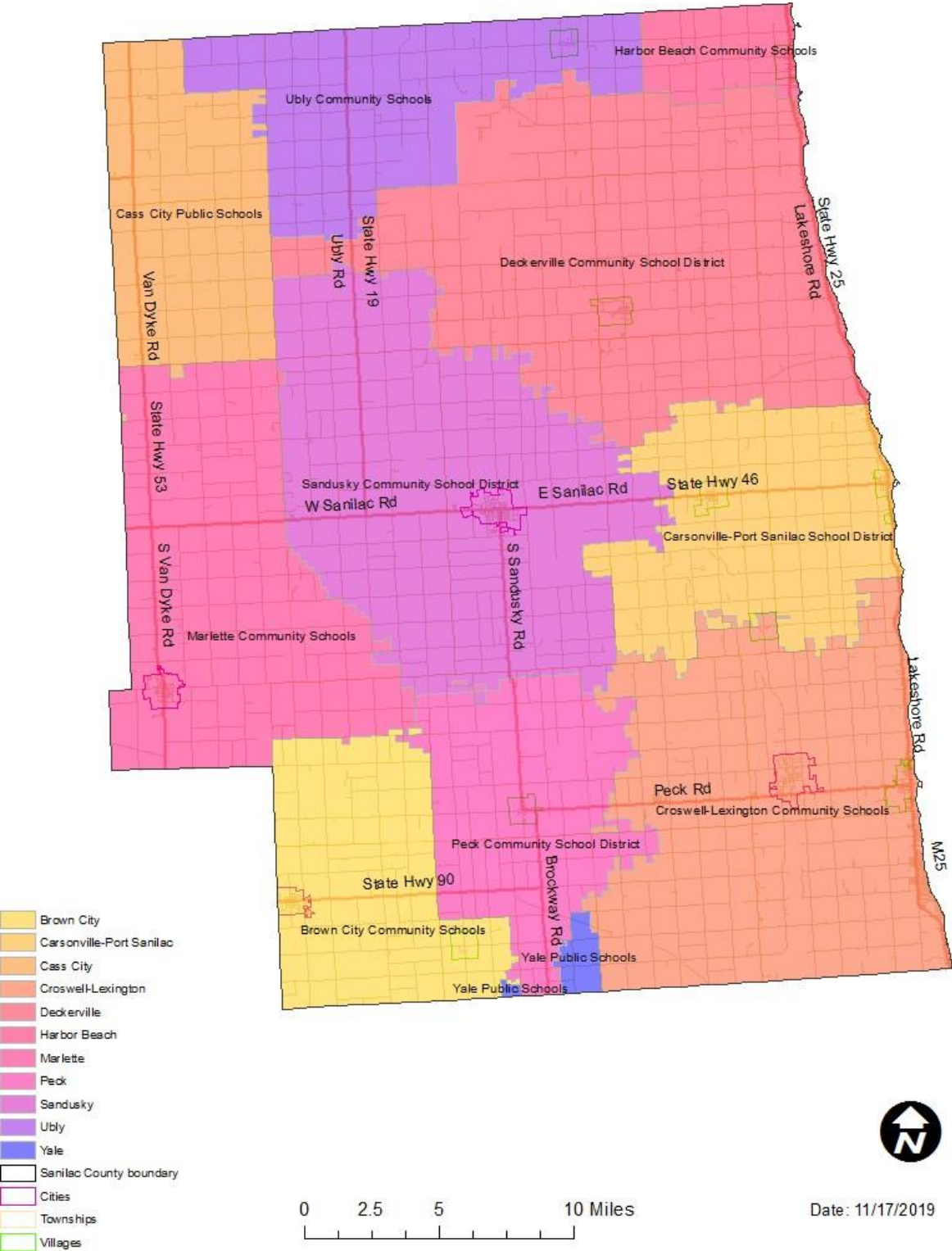
There are eleven (11) school districts that serve the residents of Sanilac County. There are also nine (9) private schools within the County. In addition, St. Clair Community College is also located within the County. Below is information on the 11 school districts.

### Sanilac County School Districts

**Table 3.4**

School District (address)	Number of Students (2016-17)	School District (address)	Number of Students (2016-17)
Brown City Community School District P.O. Box 160 Brown City, 48416 Phone: 810 346-4700	846	Carsonville-Port Sanilac School District 100 N. Goetze Rd Carsonville 48419 Phone: 810 657-9393	417
Cass City Public Schools 4868 N. Seeger St. Cass City. 48726 Phone: 989 872-2200	983	Croswell-Lexington Community Schools 5407 E. Peck Rd Croswell 48422 Phone: 810 679-1000	2134
Deckerville Community School District 2633 Black River St Deckerville 48427 Phone: 810 376-3615	604	Harbor Beach Community Schools 402 S. Fifth St. Harbor Beach, 48441 Phone: 989 479-3261	479
Marlette Community Schools 62630 Euclid ST Marlette 48453 Phone: 989 635-7425	883	Peck Community Schools 222 E. Lapeer St Peck 48466 Phone: 810 378-5200	355
Sandusky Community Schools 191 Pine Tree Lane Sandusky 48471 Phone: 810 648-3400	1016	Udly Community Schools 2020 Union St. Udly, 48475 Phone: 989 658-8202	701
Yale Public Schools 198 School Dr. Yale, 48097 Phone: 810 387-3231	1897		

Sanilac County School District Map  
MAP 3.9



## Utilities

Information on the utilities provided to communities within the County are essential to distribute information to the public in times of need. Also, certain locations that provide these services may be the source of emergency situations (transformer problems, gas leaks, etc.).

### Electricity

Detroit Edison

Thumb Electric Cooperative

### Natural Gas

Southeast Michigan Gas Company

#### **MPSC Pipeline Safety Inspections:**

Safety engineers from the MPSC are certified by the USDOT/OPS to conduct inspections on natural gas pipelines to ensure structural and operational integrity of the systems. If violations are found, the pipeline company can be ordered to take corrective actions; in addition, the pipeline operator may be fined. The MPSC safety engineers also respond to accidents involving natural gas pipelines (to ensure compliance with federal and state law and to offer technical assistance to emergency responders).

#### **Protection of Underground Facilities Act / MISS DIG/ 811 Programs:**

Michigan's first line of defense against pipeline and other utility line breaks from construction excavation is The "MISS DIG" / 811 Program established with the passage of Act 53 in 1974 – The Protection of Underground Facilities. MISS DIG/ 811 System, Inc., is a 24-hour utility communications system that helps contractors comply with the state law (Act 53) which requires notification of utilities at least three working (but not more than 21 calendar) days before commencing excavation, tunneling, demolishing, drilling or boring procedures, or discharging explosives for a project. When properly administered and followed, the MISS DIG/ 811 safety system does an excellent job of minimizing pipeline and utility line accidents.

#### **Programs and Initiatives:**

Pipeline jurisdiction and oversight in Michigan is complex, determined primarily by the type and function of a pipeline and its location. Agencies involved include 1) the MPSC Gas Safety Office; 2) the USDOT/OPS in Kansas City, Missouri; and 3) the Michigan Department of Environment, Great Lakes, and Energy, Geological Survey Division (EGLE/GSD). The table below is a breakdown of jurisdictional and inspection responsibilities for the various types of pipelines present in Michigan:

## Pipeline Safety Regulation in Michigan

**TABLE 3.5**

Pipeline Type	Jurisdiction	Applicable Code	Inspected by
Inter-state natural gas	USDOT/OPS	49 CFR Part 192	MPSC Gas Safety Intrastate
Intra-state natural gas	State of MI/MPSC	Michigan Gas Safety Standards	MPSC Gas Safety
Liquid Petroleum	USDOT/OPS	49 CFR Parts 193/195	USDOT/OPS
Gathering Lines*	EGLE/GSD	Oil/Gas Administrative rules under Part 165, 1994 P.A. 451	
*Note: Gathering lines are run from a production facility (i.e., well) to a pre-processing plant (i.e., dehydration facility, separator, compression station). Source: Michigan Public Service Commission, Gas Safety Office			

## Transportation

### Roads

Sanilac County has 1,466 miles of local roads, 347 miles of primary roads, and 152 miles of state trunklines. For total miles of public roads, Sanilac County ranks second in the State.

Sanilac County is served by five (5) all season State Trunkline Highways:

M-53 – North to south, western side of the county

M-25 – Shoreline of Lake Huron, north to south

M-19 – North to south, center of the county

M-46 – East to west, center of the county

M-90 – East to west, southern portion of the county

Sanilac County Road Commission

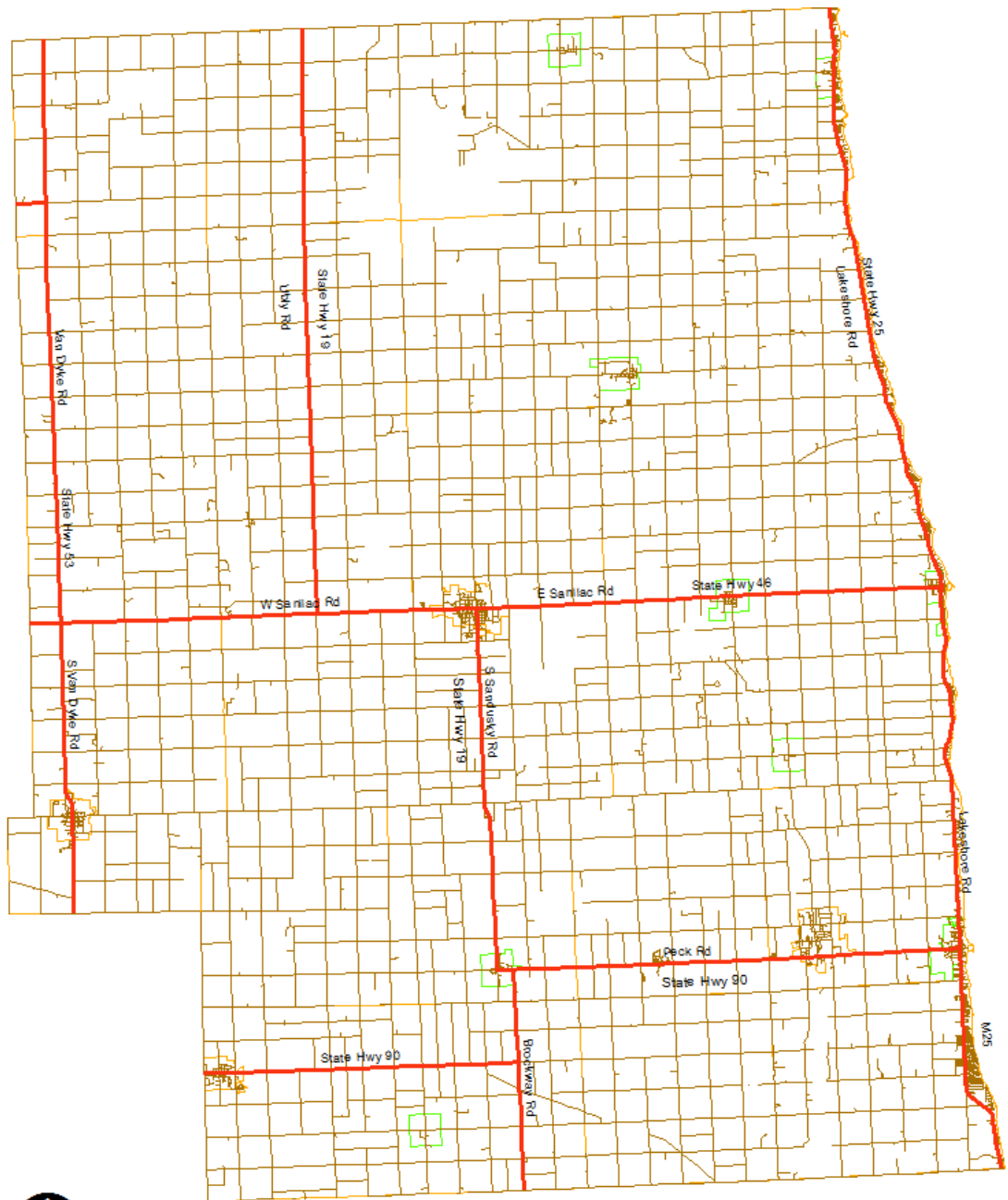
35 N. Flynn Street

Sandusky, 48471

Phone: 810 648-2185

# Sanilac County Transportation Map

## MAP 3.10



Date: 11/17/2019

0 3 6 12 Miles

- State Roads
- County Roads
- Sanilac County boundary

### Airports

Sanilac County has five public use airfields with improved runways at Sandusky and Marlette but has no commercial air service.

### Mass Transportation

Sanilac County is served by Sanilac Transportation Authority located at 110 Campbell Rd, Sandusky, MI 48471, 1-800-275-9311

### Harbors

Sanilac County has two harbors of refuge: Port Sanilac; Lexington. Both harbors are identified by navigation lights and are depicted in the Inland Waterways Lights and Markers.

Although both are too small to receive commercial vessels, they do provide protection, dockage, and services for fishing and recreational vessels.

### Railroads

Sanilac County is served by two rail lines: Chesapeake & Ohio; Huron & Eastern

## **SANILAC COUNTY (2010 population: 43,114)**

### **Sanilac County Drain Commissioner**

Sanilac County Courthouse

Room 201

60 West Sanilac Avenue

Sandusky, MI 48471

Phone: 810648-4900

FAX: 810 648-5460

The mission of this office is to provide for the health, safety and welfare of Sanilac County citizens, the protection of surface waters and the environment, and to promote the long-term environmental sustainability of Sanilac County by providing storm water management, flood control, soil erosion control and education. The office is particularly relevant for hydrological hazards.

### **Sanilac County Health Department**

171 Dawson Street

Suite 123

Sandusky, MI 48471

Phone: 810-648-4098

The mission of the Sanilac County Health Department exists is to promote health and physical well-being by providing preventive health care, education and environmental safety to all members of the community, and to become recognized by the public as the local advocate in promoting, assessing and safeguarding public health, and the environment. This will be done through coordinated planning, resource development, and service delivery. The human impacts of hazards may require their involvement. Public health emergencies threatening the area would certainly involve this department.

**Michigan State University Extension – Sanilac Office**

171 Dawson Street

Suite 323

Sandusky, MI 48471

Phone: 810 648-2515

Email: [msue.sanilac@county.msu.edu](mailto:msue.sanilac@county.msu.edu)

The office is involved in various educational and outreach activities involving agriculture and health. They should be valuable in events concerning such matters, such as droughts, pandemics, etc.

**Sanilac County Road Commission**

35 N. Flynn Street

Sandusky, MI 48471

Phone: 810 648-2185

Currently the Sanilac County Road Commission is responsible for 363 miles of primary road, 1447 miles of local roads and 144 county bridges. In addition to maintaining and preserving all county roads and bridges the Gratiot County Road Commission also maintains an additional 343 lane miles of US and State Trunklines through a partnership with the Michigan Department of Transportation.

**Sanilac County Sheriff's Office**

65 North Elk Street,

Sandusky, MI 48471

Phone: 810 648-2000

The Sheriff's Office provides law enforcement and services to protect the lives and property of Sanilac County citizens-enforcing State laws and local ordinances, investigating crimes, and detaining prisoners remanded to the county jail. This is accomplished in a manner that maintains the highest degree of professional excellence, integrity, and courtesy. Sheriff's Office personnel would be involved in protective actions during a serious community emergency.

**City of Brown City (2010 population: 1,316)**

4205 Main Street

Brown City, MI 48416

Phone: 810 346-2325

The City was established in 1879 and incorporated as a village in 1887 and a city in 1907. It is located both in Sanilac and Lapeer Counties with only a small portion located in Lapeer County.

**Brown City Public Works**

7065 Merrill Street

Brown City, MI 48416

Phone: 810 346-3060

Founded in 1881, the City of Brown City is a full-service community, offering a variety of businesses and professional services. The City has a population of 1,134 and covers a little over one square mile and located both in Sanilac and Lapeer Counties with only a small portion located in Lapeer County. Brown City Schools supports over 800 students. We host the annual Brown City Days Festival the second weekend in June - highlights include a carnival; classic car show; music and fireworks. Also provided are recreational

services at our 76+ acre Community Park, filled with ball diamonds; picnic facilities; playgrounds and soccer fields. We are located four miles east of M-53, on M-90 which travels through the City, and is also known as Main Street.

**City of Croswell (2010 population: 2,447)**

100 North Howard Avenue

Croswell, MI 48422

Phone: 810 679-2299

The City of Croswell has grown from its timber and sawmill in the 1800s to its farming and sugar factory of the 1900s to this day of Pioneer Sugar Corp. With the maintained city power plant, proximity to transportation and shipping corridors and continued city development for future growth, Croswell is ready for future diversification.

**Croswell Department of Public Works**

260 Mills Street

Croswell, MI 48422

Phone: 810 679-3158

The department oversees the provision of city services such as waste disposal, fresh water supply, storm drainage systems, road maintenance, and snow removal. They have important resources to help deal with disasters or emergencies involving debris removal, water, and drainage systems.

**City of Marlette (2010 population: 1,875)**

6346 Morris Street

Marlette, MI 48453

Phone: 989 635-7448

The City of Marlette was founded in the 1850s. In 1859, Marlette township was created from what was then Sanilac and Buel Townships. Recognition of Marlette as a village came in 1865, incorporated in 1881, and became a city in 1984.

**Marlette Department of Public Works**

6346 Morris Street

Marlette, MI 48453

Phone: 989 635-7471

The department oversees the provision of city services such as waste disposal, fresh water supply, storm drainage systems, road maintenance, and snow removal. They have important resources to help deal with disasters or emergencies involving debris removal, water, and drainage systems.

**City of Sandusky (2010 population: 2,679)**

26 West Speaker

Sandusky, MI 48471

Phone: 810 648-3330

Sandusky incorporated as a village in 1885, was named by Wildman Mills. Mills was a large landholder in the area, and a lumberman. He named the City after Sandusky, Ohio. Mills was a former resident of Sandusky, Ohio which was named by his father. In 1879, the city became the county seat after a squabble with the village of Lexington where it was originally located. In 1887, the name of Sandusky was changed

to Sanilac Centre. The name was changed because of its location in the exact center of Sanilac County. On July 24, 1905 the village was incorporated as a city and the name reverted to Sandusky.

#### **Sandusky Department of Public Works**

26 West Speaker

Sandusky, MI 48471

Phone: 810 648-4641

Phone: 810 648-4641

The department oversees the provision of city services such as waste disposal, fresh water supply, storm drainage systems, road maintenance, and snow removal. They have important resources to help deal with disasters or emergencies involving debris removal, water, and drainage systems.

#### **Village of Applegate (2010 population: 248)**

2457 Sherman

Applegate, MI 48401

Phone: 810 633-9922

#### **Village of Carsonville (2010 population: 527)**

4140 E. Chandler Street

Carsonville, MI 48419

Phone: 810 657-9400

The village began with a store built in 1853 operated by Silas C. Hall, who also became the first postmaster in 1857. The place was initially called Hall's Corners. It was renamed in 1884 after local store-owner and businessman Arthur Carson, who built his first store there in 1864. The village incorporated in 1887.

#### **Carsonville Department of Public Works**

4140 E. Chandler Street

Carsonville, MI 48419

Phone: 810 657-9400

The department oversees the provision of city services such as waste disposal, fresh water supply, storm drainage systems, road maintenance, and snow removal. They have important resources to help deal with disasters or emergencies involving debris removal, water, and drainage systems.

#### **Village of Deckerville (2010 population: 830)**

2521 Black River

Deckerville, MI 48427

Phone: 810 376-9505

Deckerville was named after Charles Decker who started his lumber business here in 1870. Mr. Decker built a sawmill and a grist-mill which helped to populate the area. Deckerville was incorporated as a village in 1893. Charles Decker's son, Martin, became the first postmaster in 1870. Decker became a station on the Pere Marquette Railroad. Over the years, Deckerville has had many industries such as lumbering, fur-trading, woolen mills, flax mills, brick making, a sauerkraut factory, and at one time cheese making was a thriving industry.

**Deckerville Department of Public Works**

3350 Rangeline Road

Deckerville, MI 48427

Phone 810 376-8591

The department oversees the provision of city services such as waste disposal, fresh water supply, storm drainage systems, road maintenance, and snow removal. They have important resources to help deal with disasters or emergencies involving debris removal, water, and drainage systems.

**Village of Forestville (2010 population: 136)**

5605 Cedar Street

Forestville, MI 48434

Phone: 989 864-3447

Forestville began with the building of a sawmill here in 1854. Its post office first opened in 1856. It was incorporated as a village in 1895.

**Village of Lexington (2010 population: 1,178)**

7227 Huron Avenue

Lexington, MI 48450

Phone: 810 359-8631

**Lexington Department of Public Works**

7200 Lester Street

Lexington, MI 48450

Phone: 810 359-8536

The department oversees the provision of city services such as waste disposal, fresh water supply, storm drainage systems, road maintenance, and snow removal. They have important resources to help deal with disasters or emergencies involving debris removal, water, and drainage systems.

**Village of Melvin (2010 population: 180)**

1247 Main Street

Melvin, MI 48454

Phone: 810 378-2582

**Village of Minden City (2010 population: 197)**

1585 First Street

Minden City, MI 48456

Phone: 989 864-3000

**Village of Peck (2010 population: 632)**

30 E. Lapeer Street

Peck, MI 48466

Phone: 810 378-5131

**Peck Department of Public Works**

30 E. Lapeer Street

Peck, MI 48466

Phone: 810 378-5131

The department oversees the provision of city services such as waste disposal, fresh water supply, storm drainage systems, road maintenance, and snow removal. They have important resources to help deal with disasters or emergencies involving debris removal, water, and drainage systems.

**Village of Port Sanilac (2010 population: 623)**

56 N. Ridge Street

Peck, MI 48469

Phone: 810 622-9963

This village was originally a lumberjack settlement on the shore of Lake Huron named "Bark Shanty." In the late 1840s and 1850s, the settlement gained its first sawmill, schoolhouse, and general store. In 1854, Bark Shanty's first post office opened. In 1857 the village was renamed to Port Sanilac, as it is in Sanilac Township in Sanilac County. Local legend attributes the name to a Wyandotte Indian Chief named Sanilac. Local landmarks include the Port Sanilac lighthouse (burning kerosene from its opening in 1886 until its electrification in 1924) and a twenty-room Victorian mansion (now the Sanilac County Museum) built in 1872 by a horse-and-buggy doctor, Dr. Joseph Loop. The Sanilac Shores Underwater Preserve is a designated ship wreck preserve that is very popular with scuba divers.

**Port Sanilac Department of Public Works**

56 N. Ridge Street

Peck, MI 48469

Phone: 810 622-9963

The department oversees the provision of city services such as waste disposal, fresh water supply, storm drainage systems, road maintenance, and snow removal. They have important resources to help deal with disasters or emergencies involving debris removal, water, and drainage systems.

**Participating Municipal Resources**

On the following page is a complete listing of the participating municipalities' resources available to utilize in their mitigation efforts. These resources are different for each municipality and are based on their individual circumstances.

**Participating Municipality's Resources**  
**TABLE 3.6**

Municipality	Resources Available											
	A	B	C	D	E	F	G	H	I	J	K	L
Sanilac County	X	X	X	X	X	X		X	X	X	X	X
Brown City	X	X		X	X		X	X	X			X
City of Croswell	X	X		X	X		X	X	X			X
City of Marlette	X	X		X	X		X	X	X	X	X	X
City of Sandusky	X	X		X	X		X	X	X	X	X	X
Village of Applegate	X			X	X		X		X			X
Village of Deckerville	X	X		X	X		X	X	X	X	X	X
Village of Lexington	X	X		X	X		X	X	X			X
Village of Peck	X	X		X	X		X	X				X
Village of Port Sanilac	X	X		X	X		X		X			X
Argyle Township	X			X	X		X		X			X
Custer Township	X			X	X		X					X
Delaware Township	X			X	X		X		X			X
Elk Township	X			X	X		X		X			X
Elmer Township	X			X	X		X					X
Flynn Township	X			X	X		X					X
Forester Township	X	X		X	X		X					X
Fremont Township	X			X	X		X					X
Lamotte Township	X			X	X		X		X			X
Maple Valley Township	X			X	X		X					X
Marion Township	X			X	X		X					X
Marlette Township	X			X	X		X					X
Minden Township	X	X		X	X		X	X	X			X
Moore Township	X			X	X		X		X			X
Sanilac Township	X			X	X		X					X
Speaker Township	X			X	X		X		X			X
Washington Township	X			X	X		X					X
Watertown Township	X			X	X		X					X
Wheatland Township	X			X	X		X					X
Worth Township	X	X		X	X		X					X

A-Planning staff

B-Public Works Department

C-Emergency Management Staff

D-Taxing Authority/Annual Budget

E-Land Use Regulatory Capability (Zoning Ordinance/Comprehensive Land Use Plan)

F-Building Codes

G-Ordinance

H-Local Police Department

I-Fire Department/Equipment

J-Emergency Medical Services

K-Hospital/Medical Facilities

L-County Sheriff

## **AUTHORITIES, CENTERS, PROGRAMS, ETC. THAT ADDRESS VARIOUS HAZARDS**

### **Sabotage/Terrorism/Weapons of Mass Destruction (WMD)**

The federal Office of Homeland Security coordinates the many counter-terrorism functions scattered across numerous federal agencies and organizations and works closely with state and local police and fire agencies, emergency response teams, and emergency management agencies in formulating and carrying out the National Homeland Security Strategy.

### **51<sup>st</sup> (WMD)/Civil Support Team**

The Michigan National Guard, 51st Western Military District (WMD)/Civil Support Team, provides additional support for the Regional Response Team Network (RRTN). Stationed at Fort Custer (Battle Creek), the 51st WMD/Civil Support Team deploys to a Weapon of Mass Destruction or suspected Weapon of Mass Destruction incident in support of the local incident commander to assess a suspected nuclear, chemical, biological or radiological event; advise the Incident Commander on appropriate courses of action to protect the local population; assist with appropriate requests for state additional support. They also provide informational briefings, exercises, and cross training activities with state and local first responders.

### **The Strategic National Stockpile (SNS) Program:**

Presidential Decision Directive (PDD) 62, issued by President Clinton in May 1998 ordered federal agencies to take significantly expanded and better-coordinated steps to protect against the consequences of biological and other unconventional attacks, especially potential bio-terrorism directed at civilian populations. One of the major bio-terrorism initiatives of the U.S. Department of Health and Human Services (HHS) in response to this PDD is the development of the Strategic National Stockpile – a national repository of lifesaving pharmaceuticals and medical materials that will be delivered to the site of a major medical emergency in order to reduce morbidity and mortality in civilian populations. The decision to send the SNS is a collaborative effort between local, state, and federal officials in a process whereby local health departments and emergency management officials contact the Michigan State Police Emergency Management Division, and state health officials who recommend to the Governor that a formal request for the SNS be made to the CDC.

The stockpile is activated to support a local and or state response to an emergency within the US or its territories. The two major components of the stockpile are the 12 Hour Push Pack and the Vendor Managed Inventory (VMI). Push Packs contain 50 tons of medical materiel that will treat a variety of illnesses. The VMI will re-supply the Push Pack or supplies will be sent immediately to the emergency site if the biological agent is known.

### **Region 3 Homeland Security Governing Board:**

The United States Department of Homeland Security (DHS) has identified a number of national priorities to strengthen the preparedness of the United States to prevent and respond to threatened or actual domestic terrorist attacks, major disasters, and other emergencies, including expanded regional collaboration. Major events have a regional impact; therefore, the benefit of regionalism will be most evident at the community level, when a community, as a whole, can prepare for and provide an integrated response to an incident.

The State of Michigan has been divided into eight Homeland Security Regions. Iosco County is currently the designated fiduciary and is responsible for management and administration of the Region 3 Homeland Security Program. Iosco County volunteered to be the facilitator and are in their fourth and final grant cycle. Each grant cycle last approximately 30 months. The current cycle will expire in May 2020. The Region 3 Homeland Security Planning Board consists of voting representation from the fourteen East-Central counties of Alcona, Arenac, Bay, Gladwin, Genesee, Huron, Iosco, Lapeer, Midland, Ogemaw, Oscoda, Saginaw, Sanilac, and Tuscola. It also consists of voting representation in the area of public health from the region's Health Care Coalition. Non-voting representation includes membership from Citizen Corps, the State of Michigan, and Regional Response Team #31.

The Region 3 Board works to achieve the following goals with funds from the Department of Homeland Security through the State Homeland Security Program and the Law Enforcement Terrorism Prevention Program.

#### Overarching Goals

- Maximize effectiveness and achieve collaboration in planning, training, equipment purchase, and exercises.
- Effectively manage and administer State and Federal funds, guidelines, and resources.
- Promote communications and information sharing in the Region.
- Achieve collaboration in professional and volunteer response and recovery.

#### **Homeland Security Presidential Directive/ HSPD-8 Subject: National Preparedness Purpose**

This directive establishes policies to strengthen the preparedness of the United States to prevent and respond to threatened or actual domestic terrorist attacks, major disasters, and other emergencies by requiring a national domestic all-hazards preparedness goal, establishing mechanisms for improved responses. The National Preparedness Guidelines are contained within four documents that correlate to establish a vision for national preparedness and provide a systematic approach for prioritizing preparedness efforts across the nation for local, state, and federal governments. These four documents address capabilities-based preparedness for the full range of homeland security missions, from mitigation through recovery, and include: *The National Preparedness Vision, the National Planning Scenarios, the Universal Task List, and Core Capabilities*.

The purposes of the *Guidelines* are to:

- Organize and synchronize national (including Federal, State, local, tribal, and territorial) efforts to strengthen national preparedness;
- Guide national investments in national preparedness;
- Incorporate lessons learned from past disasters into national preparedness priorities;
- Facilitate a capability-based and risk-based investment planning process; and
- Establish readiness metrics to measure progress and a system for assessing the Nation's overall preparedness capability to respond to major events, especially those involving acts of terrorism.

Using the Core Capabilities List, local jurisdictions measure their capabilities against the list, identifying shortfalls and making corrective actions. In addition, local exercises are designed around using the national planning scenarios which allow for local jurisdictions to determine required capabilities already

identified using pre-developed scenarios.

**School Safety Information Act: 102 P.A. 1999:**

In response to the rash of school shootings that occurred in the late 1990s, the Michigan Legislature passed Act 102 in July 1999 – The Michigan School Safety Information Act – which requires local school districts to meet with law enforcement officials to develop emergency plans to handle violent situations. School superintendents are then required to educate local communities about the plans. The plans spell out, among other things, how to evacuate schools, bring first aid and emergency resources to the scene, and handle parents that want to pick up their children. The law also requires the development and implementation of a statewide school safety information policy, the reporting and compiling of certain school safety information, and the expulsion of pupils for certain assaults.

**H.B. 4713 – Act 12 of Public Acts of 2014 February 2014:**

The bill amends the Fire Prevention Code to modify school drill requirements. The bill also requires the governing body of a school to adopt and implement a school cardiac emergency response plan. The bill took effect on July 1, 2014. Currently, a school that operates any of grades kindergarten through 12 must hold at least six fire drills and two "lockdown" drills during each school year. The bill requires a K-12 school to hold a minimum of five fire drills and three lockdown drills, according to a schedule prescribed in the bill. The Code requires a K-12 school to hold at least two tornado safety drills for each school year. Under the bill, at least one tornado safety drill would have to be held in March.

The bill would require the governing body of a K-12 school to ensure that documentation of a completed school safety drill was posted on its website (or on its intermediate school district's website) within 30 days of completing the drill and maintained for at least three years. By September 15, the chief administrator of a K-12 school would have to give a list of scheduled drill days to the county emergency management coordinator, who would have to provide the information to the local emergency management coordinator, if any, and certain local officials. This information would be exempt from disclosure under the Freedom of Information Act. If a drill were not conducted as scheduled, it would have to be rescheduled and the chief administrator would have to notify the county emergency management coordinator of the rescheduled date. The governing body of a school that operates any of grades kindergarten through 12 would have to adopt and implement a cardiac emergency response plan for the school. The plan would have to address all of the following: use and maintenance of automated external defibrillators (AEDs), if available; activation of a cardiac emergency response team during an identified emergency; effective and efficient communication throughout the school campus; a training plan for the use of an AED and CPR techniques, in a school with grades 9 to 12; integration of the local emergency response system and emergency response agencies with the school's plan; and an annual review and evaluation of the cardiac emergency response plan.

**Michigan Office of Safe Schools:**

In 1998 the Michigan Legislature established the Michigan Office of Safe Schools within the Michigan Department of Education. The Office of Safe Schools began operating in October of 1999. Its mission is to collect and distribute information about school safety. The Office of Safe Schools maintains a web site that serves as a one-stop clearinghouse for information on school safety, school bus safety, food safety and current and proposed school safety legislation. In March 2001, the Michigan Office of Safe Schools established a toll-free School Violence Hotline to provide a means for students to anonymously report specific threats of imminent school violence or other suspicious or criminal conduct. The toll-free hotline

is operational 24-hours per day, 365 days a year, at 1-800-815-TIPS.

**Michigan State Agencies:**

Sabotage/terrorism is being addressed on a variety of other fronts within Michigan State Government. The Michigan Department of State Police oversees, and coordinates state agency actions related to homeland security and terrorism response – including the investigation of suspected or potential criminal enterprises and activities that might involve sabotage or terrorism. In addition, the State Police (in conjunction with other state agencies as well as federal and local counterparts) continuously prepares for terrorist incidents through emergency planning, training, information sharing and exercising efforts.

**Weather Hazards (General)****National Weather Service Doppler Radar:**

The National Weather Service (NWS) has completed a major modernization program designed to improve the quality and reliability of weather forecasting. The keystone of this improvement is Doppler Weather Surveillance Radar, which can more easily detect severe weather events that threaten life and property. The lead-time and specificity of warnings for severe weather have improved significantly. Doppler technology calculates both the speed and the direction of motion of severe storms. By providing data on the wind patterns within developing storms, the new system allows forecasters to better identify the conditions leading to severe weather such as tornadoes, severe straight-line winds, lightning and damaging hail. This means early detection of the precursors to severe storms, as well as information on the direction and speed of storms once they form.

**National Weather Service Watches/Warnings:**

The National Weather Service issues severe thunderstorm watches for areas when the meteorological conditions are conducive to the development of severe thunderstorms. People in the watch area are instructed to stay tuned to National Oceanic and Atmospheric Administration (NOAA) weather radio and local radio or television stations for weather updates and watch for developing storms. Once radar or a trained Skywarn spotter detects the existence of a severe thunderstorm, the National Weather Service will issue a severe thunderstorm warning. The warning will identify where the storm is located, the direction in which it is moving and the time frame during which the storm is expected to be in the area. Persons in the warning area are instructed to seek shelter immediately. State and local government agencies are warned via the Law Enforcement Information Network (LEIN), NOAA weather radio and the Emergency Managers Weather Information Network (EMWIN), EMNET. Public warning is provided through the Emergency Alert System (EAS), (IPAWS) Integrated Public Alert Warning System. The National Weather Service stations in Michigan transmit information directly to radio and television stations, which in turn pass the warning on to the public. The National Weather Service also provides detailed warning information on the Internet through the Interactive Weather Information Network (IWIN).

**National Weather Service Education:**

The National Weather Service issues severe thunderstorm watches and warnings when there is a threat of severe thunderstorms. However, lightning, by itself, is not sufficient criteria for the issuance of a watch or warning (every storm would require a watch or warning). The National Weather Service has an extensive public information program aimed at educating citizens about the dangers of lightning and ways to prevent lightning-related deaths and injuries, which is facilitated by local Emergency Management

Programs.

**Severe Weather Awareness Week:**

Each spring, the Emergency Management Division, Michigan Department of State Police, in conjunction with the Michigan Committee for Severe Weather Awareness, sponsors Severe Weather Awareness Week. This annual public information and education campaign focuses on such severe weather events as tornadoes, thunderstorms, hail, high winds, flooding and lightning. Informational materials on lightning hazards are disseminated to schools, hospitals, nursing homes, other interested community groups, facilities, and the public and internet.

**Tornado National Weather Service Watches/Warnings:**

The National Weather Service issues tornado watches for areas when the meteorological conditions are conducive to the development of a tornado. People in the watch area are instructed to stay tuned to NOAA weather radio and local radio or television stations for weather updates and watch for developing storms. Once a tornado has been sighted and its existence is confirmed and reported, or Doppler Radar shows strong probability of the development or occurrence of a tornado, the National Weather Service will issue a tornado warning. The warning will identify where the tornado was sighted, the direction in which it is moving and the time frame during which the tornado is expected to be in the area. Persons in the warning area are instructed to seek shelter immediately.

State and local government agencies are warned via the Law Enforcement Information Network (LEIN), National Oceanic and Atmospheric Administration (NOAA) weather radio and the Emergency Managers Weather Information Network (EMWIN), and EMNET. Public warning is provided through the Emergency Alert System (EAS), (IPAWS), and (CMAS) Commercial Mobile Alert System Using wireless towers. The National Weather Service stations in Michigan transmit information directly to radio and television stations, which in turn pass the warning on to the public. The National Weather Service also provides detailed warning information on the Internet, through the Interactive Weather Information Network (IWIN).

**Warning Systems:**

Outdoor warning siren systems warn the public about impending tornadoes and other hazards. Most of these systems were originally purchased to warn residents of a nuclear attack, but that purpose was expanded to include severe weather hazards as well. These systems can be very effective at saving lives in densely populated areas where the siren warning tone is most audible. In more sparsely populated areas where warning sirens are not as effective, communities are turning to NOAA weather alert warning systems IPAWS and Nixle to supplement or supplant outdoor warning siren systems.

**Michigan Office of Fire Safety:**

The Michigan Department of Licensing and Regulatory Affairs' Office of Fire Safety is responsible for conducting fire safety and prevention inspections in state-regulated facilities and certain other facilities. Specific services provided include: 1) fire safety inspections of adult foster care, correctional and health care facilities, and hotels/motels; 2) plan review and construction inspections of the regulated facilities in item (1), as well as schools, colleges, universities, and school dormitories; 3) coordination of fire inspector training programs; and 4) coordination of fire alarm and fire suppression system installation in regulated facilities. These activities are important mitigation activities designed to save lives and protect property

from structural fire hazards. The State Fire Safety Board, also housed within the Michigan Department of Licensing and Regulatory Affairs, Bureau of Construction Codes and Fire Safety, promulgates rules covering the construction, operation and maintenance of schools, dormitories, health care facilities, and correctional facilities. These rules are designed to protect life and property at these facilities from fire, smoke, hazardous materials and fire-related panic.

### **Wild Fires**

Because the vast majority of wildfires are caused by human activity, the Michigan Department of Natural Resources established, in 1981, the Michigan Interagency Wildfire Prevention Group. It was the first such group in the nation (promoting wildfire prevention and awareness) that had the full involvement of the state's fire agencies. In 1993, the Michigan Interagency Wildfire Prevention Group was expanded to form the Michigan Interagency Wildland Fire Protection Association (MIWFPA). The MIWFPA promotes interagency cooperation in fire prevention, training, fire technology, and firefighting operations. Members of the MIWFPA include the: 1) MDNR Forest Management Division; 2) USDA Forest Service - Huron Manistee, Hiawatha, and Ottawa National Forests; 3) USDI National Park Service - Pictured Rocks and Sleeping Bear Dunes National Lakeshores; 4) USDI Fish and Wildlife Service – Seney National Wildlife Refuge; 5) USDI Bureau of Indian Affairs; 6) Michigan Department of State Police – fire investigation; 7) Michigan State Firemen's Association; and the 8) Michigan Fire Chief's Association. The risk of wildfires is moderate. Sanilac County can reduce its vulnerability to wildfires by: 1) participating in multi-state and interagency mitigation efforts.

### **Riverine and Urban Flooding**

#### **National Flood Insurance Program**

For many years, the response to reducing flood damages followed a structural approach of building dams, levees and making channel modifications. However, this approach did not slow the rising cost of flood damage, plus individuals could not purchase insurance to protect themselves from flood damage. It became apparent that a different approach was needed. The National Flood Insurance Program (NFIP) was instituted in 1968 to make flood insurance available in those communities agreeing to regulate future floodplain development. As a participant in the NFIP, a community must adopt regulations that: 1) require any new residential construction within the 100-year floodplain to have the lowest floor, including the basement, elevated above the 100-year flood elevation; 2) allow non-residential structures to be elevated or dry flood proofed (the flood proofing must be certified by a registered professional engineer or architect); and 3) require anchoring of manufactured homes in flood prone areas. The community must also maintain a record of all lowest floor elevations or the elevations to which buildings in flood hazard areas have been flood proofed. In return for adopting floodplain management regulations, the federal government makes flood insurance available to the citizens of the community. In 1973, the NFIP was amended to mandate the purchase of flood insurance as a condition of any federally regulated, supervised or insured loan on any construction or building within the 100-year floodplain.

The following communities within Sanilac County are recognized by FEMA as participants in the National Flood Insurance Program: **City of Brown City, City of Croswell, Evergreen Twp., Flynn Twp., Forester Twp., Lexington Twp., Maple Valley Twp., City of Marlette, Marlette Twp., Village of Port Sanilac, Sanilac Twp. and Worth Twp.** These communities have all had their floodplain areas officially mapped and are in compliance with the NFIP. The remaining cities, villages, and townships are not participating in the NFIP.

### **Community Rating System**

The Community Rating System (CRS) recognizes and encourages community floodplain management activities that exceed the minimum NFIP standards. Depending upon the level of participation, flood insurance premium rates for policyholders can be reduced up to 45%. Besides the benefit of reduced insurance rates, CRS floodplain management activities enhance public safety, reduce damages to property and public infrastructure, avoid economic disruption and losses, reduce human suffering, and protect the environment. Technical assistance on designing and implementing some activities is available at no charge. Participating in the CRS provides an incentive to maintaining and improving a community's floodplain management program over the years. Implementing some CRS activities can help projects qualify for certain other Federal assistance programs.

### **U.S. Geological Survey:**

The U.S. Geological Survey (USGS) is the primary federal agency that collects and analyzes stream flow data. The agency provides an application that provides access to an assortment of Geographic Information Systems (GIS) analytical tools that are useful for water-resources planning and management, and for engineering and design purposes. The website can be found at <https://water.usgs.gov/osw/streamstats/>.

### **Michigan Flood Hazard Regulatory Authorities:**

#### **Land Division Act, 591 P.A. 1996, as amended by 87 P.A. 1997:**

The Land Division Act governs the subdivision of land in Michigan. The Act requires review at the local, County and state levels to ensure the land being subdivided is suitable for development. From a flood hazards viewpoint, a proposed subdivision is reviewed by the County Drain Commissioner for proper drainage, and for floodplain impacts by the Department of Environmental Quality, Land and Water Management Division.

Provisions of the Act and its Administrative Rules require that the floodplain limits be defined and prescribe minimum standards for developments for residential purposes and occupancy, within or affected by the floodplain. Restrictive deed covenants are filed with the final plat which stipulates that any building used, or capable of being used, for residential purposes and occupancy within or affected by the floodplain shall meet the following conditions:

- Be located on a lot having a buildable site of 3,000 square feet of area at its natural grade above the floodplain limit. (Lots with less than 3,000 square feet of buildable area may be filled to achieve that area.)
- Be served by streets within the proposed subdivision having surfaces not lower than one foot below the elevation defining the floodplain limits. Have lower floors, excluding basements, not lower than the elevation defining the floodplain limits. Have openings into the basement not lower than the elevation defining the floodplain limits.
- Have basement walls and floors below the elevation defining the floodplain limits, watertight and designed to withstand hydrostatic pressures. Be equipped with a positive means of preventing sewer

backup from sewer lines and drains serving the building. Be properly anchored to prevent flotation. Floodplain Regulatory Authority, found in Water Resources, Part 31 of the Natural Resources and Environmental Act, 451 P.A. 1994, as amended.

The floodplain regulatory portion of Act 451 restricts residential occupation of high-risk flood hazard areas and ensures that other occupations do not obstruct flood flows. A permit is required from the Department of Environmental Quality for any occupation or alteration of the 100-year floodplain. In general, construction and fill may be permitted in the portions of the floodplain that are not floodway, provided local ordinances and building standards are met. (Floodways are the channel of a river or stream and those portions of the floodplain adjoining the channel which are reasonably required to carry and discharge the 100-year flood. These are areas of moving water during floods.) New residential construction is specifically prohibited in the floodway. Non-residential construction may be permitted in the floodway, although a hydraulic analysis may be required to demonstrate that the proposed construction will not harmfully affect the stage-discharge characteristics of the watercourse. The Act does not apply to watersheds that have a drainage area of less than two square miles. Those small watersheds are considered to be local drainage systems, and do not fall under the Floodplain Regulatory Authority.

**Soil Erosion and Sedimentation Control, Part 91 of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended:**

This portion of the Act seeks to control soil erosion and protect the waters of the state from sedimentation. A permit is required for all earth changes that disturb one or more acres of land, as well as those earth changes that are within 500 feet of a lake or stream. The Act itself does not address flood hazards, per se. However, if sedimentation is not controlled, it can clog streams, block culverts, and result in continual flooding and drain maintenance problems.

**Inland Lakes and Streams, Part 301 of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended:**

This portion of the Act regulates all construction, excavation and commercial marina operations on the State's inland waters. It ensures that proposed actions do not adversely affect inland lakes, streams, connecting waters and the uses of all such waters. Structures are prohibited that interfere with the navigation and/or natural flow of an inland lake or stream. Though reduction of flooding is not a specific goal of this Act, minimizing restrictions on a stream can help to reduce flooding conditions.

**Wetlands Protection, Part 303 of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended:**

This portion of the Act requires a permit from the Department of Environmental Quality for any dredging, filling, draining or alteration of a wetland. This permitting process helps preserve, manage, and protect wetlands and the public functions they provide – including flood and storm water runoff control. The hydrologic absorption and storage capacity of the wetland allows wetlands to serve as natural floodwater and sedimentation storage areas. The Act recognizes that the elimination of wetland areas can result in increased downstream flood discharges and an increase in flood damage. Permits for wetland alterations are generally not issued unless there is no feasible alternative and the applicant can demonstrate that the proposal would not have a detrimental impact upon the wetland functions.

**Natural Rivers Program, Part 305 of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended:**

The Natural Rivers Act was originally passed in 1970, and has been incorporated as Part 305 of the Natural Resources and Environmental Protection Act. The purpose of this program is to establish and maintain a system of outstanding rivers in Michigan, and to preserve, protect, and enhance their multi-faceted values. Through the natural rivers designation process, a Natural River District is established (typically 400 feet either side of the riverbank) and a zoning ordinance is adopted. Within the Natural River District, permits are required for building construction, land alteration, platting of lots, cutting of vegetation, and bridge construction. Not all of the zoning ordinances on the natural rivers have the same requirements, but they all have building setback and vegetative strip requirements. Although the purpose is not specifically to reduce flood losses, by requiring building setbacks (in many cases prohibiting construction in the 100-year floodplain), flood hazard mitigation benefits can be realized.

**Dam Safety, Part 315 of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended:**

The Dam Safety Unit within the Land and Water Management Division, Department of Environmental Quality, has the primary responsibility to ensure dam safety within the state. Following the September, 1986 flood in central Lower Michigan, the current Dam Safety Act was passed to ensure that dams are built and maintained with necessary engineering and inspections for safety of the public and the environment. The Department of Environmental Quality is required to review applications involving construction, reconstruction, enlargement, alteration, abandonment and removal for dams that impound more than five acres of water and have a height of six feet or more.

**Manufactured Housing Commission Act, 96 P.A. 1987, as amended:**

The Michigan Manufactured Housing Commission Act and its implementing Administrative Rules provide regulation on the placement of manufactured homes and establishes construction criteria. Manufactured homes are prohibited from being placed within a floodway, as determined by the Department of Environmental Quality. In addition, manufactured homes sited within a floodplain must install an approved anchoring system to prevent the home from being moved from the site by floodwaters (or high winds) and be elevated above the 100-year flood elevation.

**Local River Management Act, 253 P.A. 1964:**

Enacted in 1964, the Local River Management Act provides for the coordination of planning between local units of government in order to carry out a coordinated water management program. Implementation of the water management program occurs via the establishment of watershed councils. These councils conduct studies on watershed problems, water quality, and the types of land uses occurring within the watershed. Watershed councils have the authority to develop River Management Districts for the purpose of acquisition, construction, operation and the financing of water storage and other river control facilities necessary for river management. The provision to allow acquisition of land adjacent to the river for the purpose of management aids in regulating development of land prone to flooding.

**Floodplain Service Program:**

The need to identify a flood hazard area before construction is essential to the goal of flood hazard mitigation. The Department of Environmental Quality regularly provides floodplain information to public and private interests as part of its Floodplain Service Program under the Land and Water Management Division. The goal of the program is to provide 100-year floodplain information to interested parties so that informed purchase or development decisions can be made. In addition to providing floodplain information, the EGLE will provide information on land and water “interface” permit requirements and

on building requirements relating to construction in flood hazard areas.

### **Shoreline Flooding and Erosion**

Flooding and erosion along Michigan's 3,200-mile-long Great Lakes shoreline is typically caused by high Great Lakes water levels, storm surges, or high winds. Shoreline flooding and erosion are natural processes that occur at normal and even low Great Lakes water levels. During periods of high water, however, flooding and erosion are more frequent and serious causing damage to homes, businesses, roads, water distribution and wastewater treatment facilities, and other structures in coastal communities. Windstorms and differences in barometric pressure can temporarily tilt the surface of a lake up at one end as much as eight feet. This phenomena is called a storm surge and can drive lake water inland over large areas.

There is a 10% or higher chance of shoreline flooding in a year. In nearly every decade, high water levels on the Great Lakes have caused significant damage and impact to Michigan coastal communities. In some decades high water levels last longer than one year. The most recent high-water period began in 1997 and resulted in the Great Lakes being at or near record levels set in the mid-1980s'. In response to the threat of severe shoreline flooding and erosion, the U.S. Army Corps of Engineers (USACE), at the request of the Governor, implemented its Advance Measures Program to assist Michigan shoreline communities in their flood and erosion mitigation efforts. (See Programs and Initiatives section for more details.) To date, over 20 Michigan jurisdictions have taken advantage of this program.

Prior to that, the record-high lake levels in 1985-86 culminated in a Governor's disaster declaration for 17 shoreline counties. The USACE implemented its Advance Measures Program, and the State of Michigan implemented three shoreline flooding and erosion mitigation programs aimed at reducing future flood impacts on shoreline communities and homeowners. During 1972-73, high water levels caused flooding in over 30 counties, resulting in an excess of \$50 million in public and private damage. Thousands of people were forced to evacuate their homes. Similar high-water level flooding occurred in the early 1950s and late 1960s, also resulting in millions of dollars' worth of damage to shoreline communities. Many of the same events that influence Riverine Flooding occur simultaneously as Shoreline Flooding.

### **Drought**

#### **U.S. Geological Survey:**

The U.S. Geological Survey (USGS) is the primary federal agency that collects and analyzes stream flow data, another good index of the relative severity of drought. The agency provides a handy "Drought Watch" web site at <http://waterwatch.usgs.gov/>.

The site presents a map that is continually updated through an automated analysis of USGS stream gauging stations. Additional drought-related links can be accessed through the Michigan-specific web page: <http://waterwatch.usgs.gov/new/index.php?m=dryw&r=mi> ) by clicking on the map (or proceeding directly to the specific web page at <http://mi.water.usgs.gov/midroughtwatch.php>).

**Fixed Site Hazardous Material Incidents** (including explosions and industrial accidents)

### **Resource Conservation and Recovery Act - 42 U.S.C. s/s 6901 et seq. (1976)**

RCRA (pronounced "rick-rah") gave EPA the authority to control hazardous waste from the "cradle to

grave”. This includes the generation, transportation, treatment, storage and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future. The Federal Hazardous and Solid Waste Amendments are the 1984 amendments to RCRA that required phasing out land disposal of hazardous waste. Some of the other mandates of this strict law include increased enforcement authority for EPA, more stringent hazardous waste management standards and a comprehensive underground storage tank program.

Within Sanilac County, efforts are ongoing to enhance general awareness and specialized training for HAZMAT emergencies.

### **Hazardous Material Transportation Incidents**

#### **Superfund Amendments and Reauthorization Act (SARA), Title III:**

As explained earlier, the Bhopal, India tragedy initiated a chain of events aimed at enhancing preparedness activities to minimize the potential for a similar event to occur in the United States. On October 17, 1986 the Superfund Amendments and Reauthorization Act (SARA) was signed into law. A major SARA provision is Title III (the Emergency Planning and Community Right-To-Know Act, also known as SARA Title III), which establishes hazardous material emergency planning, reporting, and training requirements for federal, state and local governments, and private industry. In Michigan, the SARA Title III program is jointly administered and implemented by two state departments—the Michigan State Police and the Michigan Department of Environmental Quality.

#### **Local Emergency Planning Committees (LEPC) – LPT Local Planning Team**

One of the major provisions of SARA Title III is the establishment of Local Emergency Planning Committees (LEPCs) for designated planning districts. The LEPCs are responsible for developing emergency response plans for communities that have facilities in their jurisdiction subject to SARA Title III emergency planning requirements. The LEPC is the primary mechanism through which local SARA Title III planning, training and exercising activities are implemented. Michigan has 88 designated LEPCs – one for each of the 83 counties and 5 in major cities. Nearly 2,800 facilities across the state have been identified as being subject to Title III emergency planning provisions. A facility is subject to SARA Title III provisions if extremely hazardous substances (as determined by the U.S. Environmental Protection Agency) are present at the facility in quantities at or above the minimum threshold quantities established in Section 302 of the Act.

Note: Many of the programs and initiatives designed to mitigate, prepare for, respond to, and recover from fixed- site hazardous material incidents have the dual purpose of also protecting against hazardous material transportation incidents.

#### **Federal Hazardous Material Transportation Regulations:**

The transportation, manufacturing, storage and disposal processes for hazardous materials are highly regulated by federal and state agencies in order to reduce risk to the public. At the federal level, the U.S. Department of Transportation, Office of Hazardous Materials Safety (USDOT/OHMS), is the regulating agency for all modes of hazardous material transportation. In addition to enforcing federal hazardous material transportation regulations, the USDOT/OHMS is also involved in a number of other areas aimed

at improving the safety of hazardous material shipping. Those areas include: 1) research and development of improved containment/packaging and other technological aspects of hazardous material shipping; 2) interagency coordination efforts in hazardous material transportation planning and standards setting; 3) management of data information systems pertaining to hazardous material transportation; and 4) development of hazardous material safety training policies and programs.

In Michigan, the Motor Carrier Division, Department of State Police, oversees, coordinates and implements the commercial truck safety aspects of the USDOT regulations. The Michigan Department of Transportation oversees programs aimed at enhancing railroad safety and improving the rail infrastructure (which helps reduce the likelihood of a hazardous material rail transportation accident).

#### **Hazardous Materials Transportation Uniform Safety Act:**

The federal Hazardous Materials Transportation Uniform Safety Act (HMTUSA), enacted in 1990, provides funding for the training of emergency responders and the development of emergency response plans for both fixed site facilities and transportation-related incidents. (This funding mechanism under the HMTUSA is referred to as Hazardous Material Emergency Preparedness [HMEP] grants.) In Michigan, the HMTUSA/HMEP program is coordinated and implemented by the Emergency Management Division, Department of State Police. Since the program's inception, over \$326,000 in grants have been allocated to 80 Michigan communities for hazardous material planning and training activities.

#### **Federal/State Hazardous Material Response Resources:**

There are numerous groups at the federal, state and local levels and in private industry that are trained to deal with hazardous material fixed-site and transportation incidents. These groups include the National Response Team (NRT), Regional Response Teams (RRTs), and state and local hazardous material response teams. The Chemical Manufacturers Association established the Chemical Transportation Emergency Center (CHEMTREC) to provide 24-hour technical advice to emergency responders. The National Response Center (NRC), which operates much like CHEMTREC, was established to provide technical advice and coordinate federal response to a hazardous material incident.

In Michigan, a 24-hour statewide notification system called the Pollution Emergency Alerting System (PEAS) was established for reporting chemical spills to the Department of Environmental Quality. As a companion to the PEAS, the Michigan Department of Agriculture (MDA) has established a 24-hour Agriculture Pollution Emergency Hotline for use by agrichemical users to report fertilizer and pesticide spills. Callers to the MDA hotline gain immediate access to appropriate technical assistance, regulatory guidance for remediation, and common-sense approaches for addressing the problem.

#### **Oil and Natural Gas Well Accidents**

##### **Local Emergency Capability:**

Communities that may be affected by oil or natural gas well accidents should have adequate procedures in their Emergency Operations Plans to address the unique types of problems associated with this hazard, including rescue and evacuation. Affected communities must work closely with company officials and surrounding jurisdictions to ensure compatibility of procedures for a fast, coordinated response. Mitigation possibilities include the use of community zoning regulations to provide suitable open, unoccupied "buffer" areas around refineries and compressor stations. Michigan Department of

Environmental Quality regulations provide for buffer zones around wells and treatment and storage facilities.

## **Pipeline Accidents (Petroleum and Natural Gas)**

### **MPSC Pipeline Safety Inspections:**

Safety engineers from the MPSC are certified by the USDOT/OPS to conduct inspections on natural gas pipelines to ensure structural and operational integrity of the systems. If violations are found, the pipeline company can be ordered to take corrective actions; in addition, the pipeline operator may be fined. The MPSC safety engineers also respond to accidents involving natural gas pipelines (to ensure compliance with federal and state law and to offer technical assistance to emergency responders).

### **Protection of Underground Facilities Act / MISS DIG/ 811 Programs:**

Michigan's first line of defense against pipeline and other utility line breaks from construction excavation is The "MISS DIG" / 811 Program established with the passage of Act 53 in 1974 – The Protection of Underground Facilities. MISS DIG/ 811 System, Inc., is a 24-hour utility communications system that helps contractors comply with the state law (Act 53) which requires notification of utilities at least three working (but not more than 21 calendar) days before commencing excavation, tunneling, demolishing, drilling or boring procedures, or discharging explosives for a project. When properly administered and followed, the MISS DIG/ 811 safety system does an excellent job of minimizing pipeline and utility line accidents.

### **Programs and Initiatives:**

Pipeline jurisdiction and oversight in Michigan is complex, determined primarily by the type and function of a pipeline and its location. Agencies involved include 1) the MPSC Gas Safety Office; 2) the USDOT/OPS in Kansas City, Missouri; and 3) the Michigan Department of Environmental Quality, Geological Survey Division (EGLE/GSD). The table below is a breakdown of jurisdictional and inspection responsibilities for the various types of pipelines present in Michigan:

### **Nuclear Power Plant Accidents**

Sanilac County is not located within the Emergency Planning Zones. The two zones are: the Plume Exposure Pathway Zone, which has a radius of approximately 10 miles, and the Ingestion Exposure Pathway Zone, which has a radius of approximately 50 miles. Mitigation of nuclear power plant hazards on the local County level is primarily limited to the detection of radiation, alerting the public, and providing directions for evacuation and/or housing – the latter three issues are addressed in other sections of this mitigation action item section of the mitigation plan.

## **Infrastructure Failures**

### **Infrastructure Failures in Sanilac County**

There have been no significant infrastructure failures in Sanilac County. Typically, the infrastructure failures occur when there are thunderstorms, ice storms, or windstorms and power lines are downed. In most cases the power is restored in a matter of hours but in some cases, power has been out for a week at a time in parts of the County.

Most of Sanilac County's infrastructure failures are secondary hazards caused by other major events such as floods, windstorms, snow and ice storms. The main infrastructure failures are power outages, which are normally restored in a matter of hours. Sanilac County's EMD maintains short term shelter agreements for multiple sites. However, if the power were out for a longer period of time, the local chapter of the American Red Cross would be called to set up temporary shelters.

### **Water/Electrical Infrastructure Failure**

The Federal Clean Water Act regulates the discharge from community wastewater collection and treatment systems. The regulatory aspects of the Act that pertain to municipalities have been delegated to the EGLE Surface Water Quality Division for surface water discharge facilities, and the EGLE Waste Management Division for groundwater discharge facilities. Authority for the oversight of planning, facility design review, and construction permitting of sewerage systems collection, transportation and treatment facilities, is derived from Part 41 of the Michigan Natural Resources and Environmental Protection Act (451 P.A. 1994) and Administrative Rules promulgated under authority of Part 41. The two EGLE divisions assist communities with the development and maintenance of their wastewater collection and treatment systems. In addition, they monitor and regulate these systems to ensure pollution abatement and health conditions are met. Although the regulatory authority vested in the EGLE is primarily aimed at preventing pollution of waters of the state, there are requirements in place under 451 P.A. 1994 regarding the design, construction, and operational integrity and reliability of wastewater collection and treatment systems. A collaboration between Clare County EMD and ITC Power Transmission Corporation continues, and materials are updated annually and share with responders.

### **Electrical system**

Disaster-related damage to electric power facilities and systems is a concern that is being actively addressed by utility companies across the state. Detroit Edison, Consumers Energy and other major electric utility companies have active, ongoing programs to improve system reliability and protect facilities from damage by wind, snow and ice, and other hazards. Typically, these programs focus on trimming trees to prevent encroachment of overhead lines, strengthening vulnerable system components, protecting equipment from lightning strikes, and placing new distribution systems underground. The Michigan Public Service Commission (MPSC) monitors power system reliability to help minimize the scope and duration of power outages.

On August 14, 2003 a major electrical failure occurred resulting in a blackout to 50 million people in Canada and Northeast US. While Sanilac County did not lose power as a result of this blackout, the County was impacted when southeast Michigan residents fled their homes to regions of the State not experiencing the blackout. The influx of visitors resulted in food shortages throughout the County.

### **Telecommunications System**

Like electric utility companies, telecommunications companies are concerned with the issue of protecting facilities and systems from disaster-related damage. Major telecommunications companies have programs to improve system reliability and physically protect facilities and system components from wind, snow and ice, and other hazards, utilizing many of the same techniques as the electric utility companies.

### **Surface Drainage Systems:**

Michigan's first drain laws appeared on the books as Territorial laws – years before Michigan achieved

statehood. After attaining statehood in 1837, the State passed its first drain law in 1839. Since that time, there have been 45 separate acts passed regarding drainage, up to the most recent re-codification of drain law in 1956. Since 1956, the present drain code has been amended over 200 times – an indication of how important and dynamic the issue of drainage continues to be in Michigan. The Michigan Drain Code provides for the maintenance and improvement of the vast system of intra-County (County) and inter-County drainage facilities. Each drain has a corresponding special assessment district (watershed), a defined route and course, an established length, and is conferred the status of a public corporation with powers of taxation, condemnation, ability to contract, hold, manage and dispose of property, and to sue and be sued. Drainage districts and drains are established by petition of the affected landowners and/or municipalities. County drains, with a special assessment district entirely within the County, are administered by the locally elected County Drain Commissioner. Inter-County drains, with a special assessment district in more than one County, are administered by a drainage board that consists of the drain commissioners of the affected counties and is chaired by the Director of the Michigan Department of Agriculture (MDA) or an MDA Deputy Director.

#### **Water Distribution Systems:**

Michigan's public water supplies are regulated under the Federal Safe Drinking Water Act. The Michigan Department of Environmental Quality (EGLE), as a primary agency for the Federal government, provides supervision and control of Michigan's public water supplies (including their operation and physical improvements) under the Michigan Safe Drinking Water Act (399 P.A. 1976).

The EGLE Drinking Water and Radiological Protection Division regulates, through a permit process, the design, construction and alteration of public water supply systems. Water supply construction must be conducted within the framework of the Michigan Safe Drinking Water Act, as well as the Architecture, Professional Engineering and Land Surveying Act (240 P.A. 1937, which requires professional engineering preparation of construction documents for water works construction costing over \$15,000). Most communities in Michigan have, in conjunction with the EGLE, developed water system master plans that conform to the requirements of the Michigan Safe Drinking Water Act. From a hazard mitigation standpoint, that is important because it helps ensure that all new water system construction and alterations to existing systems will conform to the minimum standards set in the Act. While not making water infrastructure "disaster-proof", the standards provide at least a basic level of design, structural and operational integrity to new or renovated portions of a community's water supply system.

#### **Public Health Emergencies**

##### **Michigan Department of Community Health:**

The Director of the Department of Community Health, and local public health officers, have the authority (under the Michigan Public Health Code—1978 PA 368, as amended) to take those steps determined necessary and prudent to prevent epidemics and the spread of hazardous communicable diseases, or to effectively mitigate other conditions or practices that constitute a menace to public health. The Director and local public health officers can issue written orders to implement the required preventive steps and/or responses, and those orders can be enforced through the imposition of civil and criminal penalties for failure to comply. State and local health departments have detailed, written emergency operations plan that address public health emergencies.

##### **U.S. Centers for Disease Control and Prevention:**

At the national level, the U.S. Centers for Disease Control and Prevention (CDC), a branch of the Department of Health and Human Services, has the responsibility and authority to investigate public health emergencies to determine their cause, probable extent of impact, and appropriate mitigation measures. The CDC can also assist state and local public health officials in establishing health surveillance and monitoring systems/programs, and in disseminating information on prevention and treatment to the general public. The CDC announced dedicated funding for bioterrorism response, and Michigan has been strengthening its surveillance and intervention infrastructures with these funds. Since 2001, the CDC has also provided dedicated funding for public health emergency preparedness programs. In 2002, the MDCH Office of Public Health Preparedness was established to oversee these cooperative agreements. In the 2009 Influenza A (H1N1) event, CDC coordinated with numerous health departments across the country, tracked influenza cases, and provided information about outbreak trends. Tests were also performed, to verify whether flu cases were indeed of the correct type.

#### **Michigan Pandemic Influenza Plan:**

In October 2009, the Michigan Department of Community Health updated the “Michigan Pandemic Influenza Plan,” to provide response guidelines for an influenza pandemic affecting Michigan. Although the plan cannot eliminate the disease, it will aid in reducing the impact by enabling state and local agencies to anticipate, prepare for, and respond efficiently and effectively to the disease. The plan, which is divided into pre-pandemic, pandemic, and post-pandemic phases, details necessary activities at the state and local level related to:

- command and management,
- crisis communications,
- surveillance,
- laboratory testing,
- community containment,
- infection control in health care facilities,
- vaccines and antivirals/medical management,
- data management,
- border/travel issues
- recovery

The Michigan Pandemic Influenza Plan is available for review and downloading at [www.michigan.gov/flu](http://www.michigan.gov/flu).

#### **Transportation Accidents**

##### **Air Transportation:**

The Michigan Aeronautics Commission of the MDOT administers several programs aimed at improving aviation safety and promoting airport development. The Commission's safety programs include: 1) registering aircraft dealers, aircraft, and engine manufacturers; 2) licensing airports and flight schools; 3) inspecting surfaces and markings on airport runways; and 4) assisting in removal of airspace hazards at airports. The Commission's airport development program includes providing state funds for airport development and airport capital improvements – many of which contribute to overall air transportation safety. The Federal Aviation Administration (FAA) contracts with the MDOT for the inspection of the state's 238 public-use airports on an annual basis. The FAA has regulatory jurisdiction over operational

safety and aircraft worthiness. The National Transportation Safety Board (NTSB) investigates all aircraft crashes that involve a fatality and publishes reports on its findings (see the NTSB section below).

**Bus Safety:**

School bus safety programs and initiatives generally fall into two categories: 1) driver skill enhancement, competency training and 2) physical inspections of bus mechanical and safety equipment. The Motor Carrier Division, Michigan Department of State Police, inspects all school buses and other school transportation vehicles (21,000 units) on an annual basis. In addition, all school bus drivers in Michigan must take and pass a bus driver education and training program, and then take regular refresher courses to maintain their certification to operate a school bus. School bus drivers must also pass an annual medical examination.

## CHAPTER 4: HAZARD ANALYSIS

### Natural Hazards-Summer Weather

#### HAIL

Hail: a condition where atmospheric water particles from thunderstorms form into rounded or irregular lumps of ice that falls to the earth.

#### Hazard Description

Hail is a product of strong thunderstorms. Hail is formed when strong updrafts within the storm carry water droplets above the freezing level, where they remain suspended and continue to grow larger until their weight can no longer be supported by the winds. They finally fall to the ground, battering crops, denting autos, and injuring wildlife and people. As one of these thunderstorms passes over, hail usually falls near the center of the storm, along with the heaviest rain. Most hailstones range in size from a pea to a golf ball, but hailstones larger than baseballs have been reported. Large hail is a characteristic of severe thunderstorms, and it may precede the occurrence of a tornado.

#### Hailstorms in Sanilac County

According to the National Centers for Environmental Information (NCEI) and the 2019 Michigan Hazard Mitigation Plan, Sanilac County, Michigan had 50 hail events on 34 days between 1996 and 2017. There were three reported events that resulted in damages, with a total of \$155,000 in property damages, and \$20,000 in crop damages. No injuries or deaths were reported from these events.

### Hail Events in Sanilac County from 1996 to 2017

Table 4.1

Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Decker	09/11/1996	3:36 pm	2.0 inches	0	0	\$150,000	0
Tyre	09/11/1996	5:45 pm	1.75 inches	0	0	\$5,000	0
Deckerville	07/27/2000	4:05 pm	.88 inches	0	0	0	\$10,000

Source: National Centers for Environmental Information

On 09/11/1996 Decker, an unincorporated community located in Lamotte Township in the western portion of the County, experienced a hailstorm that had hail of about 2 inches in diameter. The event took place at 4:10 pm. There were no reported deaths or injuries. The damages were approximately \$150,000.

On 09/11/1996 Tyre, an unincorporated community located in Austin Township in the northern portion of the County, also experienced hail. At 5:45 pm hail hit that was approximately 1.75 inches in diameter. As a result of the hail, approximately \$5,000 in damages were reported.

On 07/27/2000 the Village of Deckerville, located in north central Sanilac County, was hit with a storm at approximately 4 pm. Hail was reported to be .75 inches in diameter. Thunderstorms developed along

the lakefront as they moved inland off of Lake Huron. A couple of storms produced wind gusts approaching 60 mph, downing large tree limbs in Macomb County and near Deckerville. The storms were also slow moving, producing locally heavy rain. Six roads were washed out in northern Sanilac County and water was two feet deep over M-53. Crop damages of \$10,000 were reported as a result of the storm and hail.

#### Hail Overview

From 1996 to 2017, Sanilac County had 50 hail-producing events on 34 day or about 2.3 events per year. Based on the above information, there is a 100% probability that a hail event would occur annually. NCEI received no news on the personal property damages resulting from the hail events, while the crop damages in Deckerville were limited to \$5,000. Similarly, the neighboring counties of Huron, Tuscola, and St. Clair all reported similar damages resulting from these events, ranging from \$0 reported damages to \$125,000 in reported damages. Sanilac County is a moderate risk county for these events to be impactful; however, hailstorms are associated with thunderstorms and severe summer weather which were given a high priority to address. Sanilac County does utilize warning sirens and other storm alerts programs to provide warning for the residents of the County as the County is vulnerable to these events.

### LIGHTNING

Lightning: the discharge of electricity from within a thunderstorm.

#### Hazard Description

Most direct impacts from lightning are relatively site-specific in scope, and therefore do not have a tremendous impact on the community as a whole. With the temperature of a bolt of lightning approaching 50,000 degrees Fahrenheit in a split second, the most common direct damage from lightning is fire. The most common indirect effect of lightning is power outages. This indirect effect can have an impact on a much larger segment of the community, leaving hundreds and sometimes thousands of homes without electricity.

Globally, there are about 2,000 thunderstorms occurring at any given time, and those thunderstorms cause approximately 100 lightning strikes to earth each second. In the United States, approximately 100,000 thunderstorms occur each year, and every one of those storms generates lightning. It is commonplace for a single thunderstorm to produce hundreds or even thousands of lightning strikes. However, to the majority of the public, lightning is perceived as a minor hazard. That perception lingers despite the fact that lightning damages many structures and kills and injures more people in the United States per year, on average, than tornadoes or hurricanes. Many lightning deaths and injuries could be avoided if people would have more respect for the threat lightning presents to their safety.

Statistics compiled by the NCEI and the National Lightning Safety Institute (NLSI) for the period 1959-1994 revealed the following about lightning fatalities, injuries and damage in the United States:

#### Location of Lightning Strikes:

- 40% are at unspecified locations
- 27% occur in open fields and recreation areas (not golf courses)
- 14% occur to someone under a tree (not on golf course)
- 8% are water-related (boating, fishing, swimming, etc.)

- 5% are golf related
- 3% are related to heavy equipment and machinery
- 2.4% are telephone-related
- 0.7% are radio, transmitter and antenna-related

The NLSI estimates that 85% of lightning victims are children and young men (ages 10-35) engaged in recreation or work-related activities. Approximately 20% of lightning strike victims die, and 70% of survivors suffer serious long-term after-effects such as memory and attention deficits, sleep disturbance, fatigue, dizziness and numbness.

#### Lightning Events in Sanilac County

Historically, the State of Michigan is near the top among U.S. states in both deaths and injuries resulting from lightning. A major cause for this is that Michigan is a destination location for outdoor, summer activities, the prime season for lightning strikes. However, while the State has experienced large reported property damages and multiple deaths and injuries in recent years (According to NCEI, 309 events were reported in Michigan from 1996 through 2017, resulting in 18 deaths and 113 injuries, and over \$18 million in personal property damages.<sup>2</sup>), Sanilac county has had five reported events during this timeframe, with \$145,00 in property damages and no deaths or injuries. The estimated damages included the loss of three barns and tractor.

### **Lightning Events in Sanilac County from 1996 to 2017**

**Table 4.2**

Location	Date	Time	Deaths	Injuries	Property Damage	Crop Damage
New Greenleaf	07/28/1999	5:40 pm	0	0	\$45,000	\$0
Sandusky	07/27/2000	10:45 pm	0	0	\$15,000	\$0
Sandusky	06/22/2002	5:39 am	0	0	\$30,000	\$0
Sandusky	06/22/2002	5:40 am	0	0	\$5,000	\$0
Brown City	05/14/2011	9:45 am	0	0	\$50,000	\$0

Source: National Centers for Environmental Information

On 07/28/1999 a weak cold front moved into a warm and humid airmass over southeast Michigan during the afternoon. A number of severe storms developed with the strongest and most concentrated area of activity in the Saginaw Bay and Thumb regions. Wind damage occurred throughout the region with most of the damage involving trees and power lines going down. In New Greenleaf, an unincorporated community in Greenleaf Township, several lightning-induced fires caused two barns to burn to the ground. No injuries or deaths were reported.

On 07/27/2000 Thunderstorms developed along the lakefront as they moved inland off of Lake Huron. A couple of storms produced wind gusts approaching 60 mph, downing large tree limbs in Macomb County

<sup>2</sup> National Centers for Environmental Information-Storm Events Database

and near Deckerville. The storms were also slow moving, producing locally heavy rain. Six roads were washed out in northern Sanilac County and water was two feet deep over M-53. A lightning strike near the City of Sandusky ignited a fire that partially destroyed a barn with no deaths or injuries were reported.

On 06/22/2002 Thunderstorms developed early in the morning across the Thumb. The strongest storms during the morning occurred in Sanilac County. Although the front exited the region later in the morning, a warm and humid airmass led to additional thunderstorm development during the afternoon across Eastern Michigan. During the event, near the City of Sandusky lightning struck a barn and caused minor damage (\$30,000) with no injuries or deaths being reported.

On 05/11/2014 in late morning a thunderstorm developed in the City of Brown City area. A lightning strike caused a barn to catch fire, destroying the barn. A tractor was in the barn and was also destroyed. Damages were estimated to be \$50,000. No deaths or injuries resulted from the lightning strike.

#### Lightning Overview

According to the NCEI, only five (5) lightning events have been recorded in Sanilac County over the past 20 years, or about one damaging strike every four years. The probability of an event occurring annually is about 25%. Moderate damages totaling \$145,000, and no injuries or deaths resulted from the lightning strikes. Sanilac County is a moderate risk area for lightning events even though Statewide Michigan is considered to be a high-risk area for these events. To reduce the vulnerability of the residents, all-purpose warning sirens have been installed at various points in the County. Additionally, many of the municipalities have installed lightning protection devices at various municipal facilities to further minimize the impact of lightning strikes. However, even with those measures the County is still vulnerable to damages resulting from lightning strikes, as individual homes/barns are still susceptible to lightning. Even though Sanilac County has not experienced many lightning strike events, it is possible that future events could still occur. Lightning strikes are considered to be a severe weather activity, which was given a high priority to address.

#### **SEVERE WINDS**

Severe winds: non-tornadic winds 58 miles per hour (mph) or 50.4 knots per hour (kph) or greater.

#### Hazard Description

Severe winds, or straight-line winds sometimes occur during thunderstorms and other weather systems and can be very damaging to communities. Often, when straight-line winds occur, the presence of the forceful winds, with velocities over 58 mph (50.4 kph) may be confused with a tornado occurrence. Severe winds have the potential to cause loss of life, property damage, and flying debris, but tend not to cause as many deaths as tornadoes do. However, the property damage from straight-line winds can be more widespread than a tornado, usually affecting multiple counties at a time. In addition to property damage to buildings, there is a risk for infrastructure damage from downed power lines due to falling limbs and trees. Large scale power failures are common during straight-line wind events.

Severe winds spawned by thunderstorms and other weather events can have devastating effects in terms of loss of life, injuries, and property damage. According to data compiled by the National Weather Service Michigan has experienced over 9,000 severe wind events (not including tornadoes) that resulted in 122 deaths and millions of dollars in damage since 1970. Severe wind events are characterized by wind velocities of 58 mph or greater, with gusts sometimes exceeding 74 mph (hurricane velocity), but do not include tornadoes.

### Wind Events in Sanilac County

There have been 106 non-tornado wind events recorded and events impacting Sanilac County. Events with over \$5,000 in property damage or resulted in a death or injury are included in the table below.

### **Severe Wind Events in Sanilac County from 1996 to 2017**

**Table 4.3**

Location	Date	Time	Deaths	Injuries	Property Damage	Crop Damage
Countywide	04/06/1997	70 knots	0	0	\$50,000	\$0
Countywide	05/31/1998	55 knots	0	0	\$120,000	\$0
Marlette	12/06/1998	60 knots	0	0	\$40,000	\$0
Countywide	05/17/1999	55 knots	0	0	\$90,000	\$0
Peck	07/28/1999	55knots	0	0	\$8,000	\$0
Amadore	07/28/1999	52 knots	0	0	\$26,000	\$0
Countywide	03/09/2002	55 knots E	0	0	\$100,000	\$0
Deckerville	10/01/2002	50 knots E	0	1	\$0	\$0
Countywide	11/12/2003	51 knots EG	0	0	\$700,000	\$0
Countywide	10/30/2004	54 knots EG	0	0	\$200,000	\$0
Countywide	11/15/2005	48 knots EG	0	0	\$450,000	\$0
Sandusky	07/17/2006	55 knots EG	0	0	\$15,000	\$0
New Greenleaf	07/29/2006	56 knots EG	0	0	\$8,000	\$0
Countywide	04/16/2007	43 knots EG	0	0	\$10,000	\$0
Sandusky	06/08/2008	52 knots EG	0	0	\$50,000	\$0
Snover	08/16/2009	54 knots EG	0	0	\$15,000	\$0
Croswell	07/02/2011	61 knots EG	0	0	\$20,000	\$0
Countywide	10/29/2012	52 knots EG	0	0	\$10,000	\$0
Countywide	01/19/2013	53 knots EG	0	0	\$750,000	\$0
Deckerville	05/31/2013	52 knots EG	0	0	\$10,000	\$0
Countywide	11/17/2013	50 knots EG	0	0	\$1,000,000	\$0
Countywide	03/08/2017	56 knots EG	0	0	\$7,000,000	\$0
Countywide	05/04/2018	61 knots EG	0	0	\$850,000	\$0
Countywide	02/24/2019	52 knots EG	0	0	\$500,000	\$0

Source: National Centers for Environmental Information

NA-Information not available on the storm specifics

E-Estimated

EG-Estimated Gusts

On 10/01/2002, winds blew down a number of trees in the entire thumb area. A motorcyclist was seriously injured when he drove into one of the trees.

On 11/17/2013, southerly winds out ahead of the cold front resulted in temperatures to rise to the middle 60's F during the afternoon. A line of thunderstorms developed with the cold front that came through the

region in the evening. Winds gusted from 55 to 65 miles per hour causing damages throughout southeast Michigan. Trees and power lines were brought down due to the heavy winds, resulting in over 400,000 homes and businesses to lose power.

On 03/08/2017, wind gusts in excess of 60 mph took out power lines and trees throughout the lower peninsula. This resulted in over one million customers losing power, with many of the customers being without power for several days.

#### Severe Winds Overview

There was a total of 120 non-tornado wind events from 1996 through 2017 or about 5.5 events per year. The probability of an event occurring in future years is 100 percent. Figures from the National Weather Service indicate that severe winds occur more frequently in the southern half of the Lower Peninsula than any other area in the State. These figures refer to winds from thunderstorms and other forms of severe weather not tornadoes. Damages have been extensive due to the winds, but include only one injury and no deaths being reported. Damages from these events often result in down trees and/or power lines leading to loss of electricity in large areas. The recent trend in weather conditions has been an increase in annual severe winds in Sanilac County. Severe winds are considered to be a severe weather activity, which was given a high priority to address.

### TORNADOS

Tornado: a violently whirling column of air extending downward to the ground from a cumulonimbus cloud.

#### Hazard Description

Tornadoes in Michigan are most frequent in spring and early summer when warm, moist air from the Gulf of Mexico collides with cold air from the Polar Regions to generate severe thunderstorms. These thunderstorms often produce tornadoes. A tornado may have winds up to 300 miles per hour and an interior air pressure that is 10 to 20 percent below that of the surrounding atmosphere. The typical length of a tornado path is approximately 16 miles but tracks up to 200 miles have been reported. Tornado path widths are generally less than one-quarter mile wide. Historically, tornadoes have resulted in tremendous loss of life, with a national average of 111 deaths per year. Property damage from tornadoes is in the hundreds of millions of dollars every year in the United States.

#### Tornado Intensity

Tornado intensity is measured on the Fujita Scale, which examines the damage caused by a tornado on homes, commercial buildings, and other man-made structures. The Fujita Scale rates the intensity of a tornado based on damage caused, not by its size. It is important to remember that the size of a tornado is not necessarily an indication of its intensity. Large tornadoes can be weak, and small tornadoes can be extremely strong. It is very difficult to judge the intensity and power of a tornado while it is occurring. Generally, that can only be done after the tornado has passed (see following page for scale.)

## The Enhanced Fujita Scale of Tornado Intensity

TABLE 4.4

F-Scale Number	Intensity Description	Wind Speed (mph)	Type/Intensity of Damage
EF-0	Gale tornado	65-85 mph	<b>Light damage.</b> Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF-1	Moderate Tornado	86-110 mph	<b>Moderate damage.</b> The lower limit is the beginning of hurricane wind speed; roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF-2	Strong Tornado	111-135 mph	<b>Considerable damage.</b> Roofs torn off well-constructed houses; foundation of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF-3	Severe Tornado	136-165 mph	<b>Severe damage.</b> Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; foundations blown away some distance.
EF-4	Devastating tornado	166-200 mph	<b>Devastating damage.</b> Whole frame houses, well-constructed houses and whole frame houses completely leveled; cars thrown, and small missiles generated.
EF-5	Incredible Tornado	200 mph+	<b>Incredible damage.</b> Strong frame houses lifted off foundations and carried considerable distances; automobile sized missiles fly through the air in excess of 100 meters; high-rise buildings have significant structural deformation; incredible phenomena will occur

Source: Storm Prediction Center

## Tornado Events in Sanilac County from 1996 to 2017

Table 4.5

Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Village of Carsonville	04/16/1998	3:57 pm	F1	0	0	\$350,000	\$0
Village of Deckerville	05/22/2004	4:10 pm	F0	0	0	\$20,000	\$0
City of Marlette	06/27/2010	7:32 pm	EF0	0	0	\$75,000	\$0
Lamotte Township	06/22/2015	9:08 pm	EF1	0	0	\$500,000	\$0
Village of Applegate	11/06/2015	9:00 am	EF1	0	0	\$40,000	\$0

Source: National Centers for Environmental Information

### Tornado Events in Sanilac County

Seven (7) were reported in Sanilac County, Michigan between 1996 and 2017. Of these events, five (5) events resulted in \$10,000 or more in damages. No deaths or injuries were reported during this time period. Of these seven tornadoes, three had an F1 or EF1 rating, and the remaining four had an F0 or EF0 rating.

Prior to the reporting period, on 09/02/1984 a tornado moved from Fremont Township to St Clair County in midafternoon destroying one house and damaging eight other homes and numerous outbuildings. One boy was slightly injured from falling debris. Damages were estimated to be over \$2 million. This tornado had an F3 rating. This is the only major tornado event in the County that had a F3 or EF3 rating and that resulted in an injury to a person.

On 04/16/1998 a tornado carved a path from Carsonville to Port Sanilac. Four homes, ten barns, five silos and a grain bin were destroyed. 200 people were without power overnight. No injuries were reported, but a horse had to be euthanized due to serious injuries.

On 06/22/2015 a tornado tracked down mostly west to east just south of Deckerville Road. The path of destruction was close to 23 miles, with all but one mile being in Sanilac County. Most of the damage was to Devor Dairy Farm. Most of the tornado had an EF0 rating, but damages on the north side of Decker resulted from a pocket of EF1 intensity.

### Tornadoes Overview

Sanilac County has experienced seven tornadoes from 1996 to 2017 or about one event every 3 years. The probability of a tornado event occurring would be 33% in any given year. Tornadoes are considered to be a severe weather activity, which was given a high priority to address. To reduce the vulnerability of tornados, multiple warning systems in use in Sanilac County. While this may decrease death/injuries, the County is still vulnerable to the physical damages that result from tornadoes.

### FOG

Fog: condensed water vapor in cloudlike masses lying close to the ground and limiting visibility.

### Hazard Description

Fog forms near the ground when water vapor condenses into tiny liquid water droplets that remain suspended in the air. Many different processes can lead to the formation of fog, but the main factor is saturated air. Two ways that air can become saturated are by cooling it to its dew point temperature or by evaporating moisture into it to increase its water vapor content. Although most fog, by itself, is not a hazard because it does not actually apply destructive forces, the interaction between humans and fog can be a dangerous situation, sometimes resulting in disastrous consequences.

### Hazard Analysis

In considering severe and high-impact meteorological events, attention can easily become focused on the more dramatic storms. Tornadoes and hurricanes for example, are readily recognized by the general public and the meteorological community alike for their devastating consequences. Fog, on the other hand, does not lend itself as readily to this categorization.

Fog can be very dangerous because it reduces visibility. Although some forms of transport can penetrate fog using radar, road vehicles have to travel slowly and use more lights. Localized fog is especially dangerous, as drivers can be caught by surprise. Fog is particularly hazardous at airports, where some attempts have been made to develop methods (such as using heating or spraying salt particles) to aid fog dispersal. These methods have seen some success at temperatures below freezing.

#### Fog Events in Sanilac County

There has been only one dense fog in Sanilac County from 1996 to 2017, as reported by the NCEI. The event occurred on 08/31/2000 as it contributed to a fatal car accident at M-90 and Melvin Road in Speaker Township. One person was killed when two vehicles crashed at the intersection.

#### Fog Overview

One major event occurred in Sanilac County in the 22-year reporting period, that one occurring in 2000. The probability of a future event occurring is approximately 4% in any given year. According to the Michigan State Hazard Mitigation Plan, one major fog event is estimated to occur in Michigan approximately every two years. Property damage can be significant for vehicles, although real property and structures are usually unaffected. Thus, while there has not been a number of fog events impacting the residents of Sanilac County in recent years, it is not unforeseeable that fog could become more prevalent in Sanilac County in the future. While fog is not considered to be a severe weather event and was not given a high priority to address, residents and visitors are vulnerable to dense fog, as it limits visibility and precautions must be made accordingly.

### **EXTREME TEMPERATURES (HEAT)**

Extreme warm temperatures: prolonged periods of very high temperatures often accompanied by exacerbating conditions such as high humidity and lack of rain.

#### Hazard Description

Extreme temperatures – whether it be extreme heat or extreme cold – share a commonality in that they both primarily affect the most vulnerable segments of society such as the elderly, children, impoverished individuals, and people in poor health. The major threats of extreme heat are heatstroke (a major medical emergency), and heat exhaustion. Extreme heat is a more serious problem in urban areas, where the combined effects of high temperature and high humidity are more intense.

Sanilac County is susceptible to extreme heat. The temperate climate of southern Michigan, combined with the unsettling effect of Lake Huron, make for extreme deviations in temperature. 50-degree swings in the temperature in a 24-hour period are not uncommon. These events occur regularly depending on the year.

Prolonged periods of extreme heat can pose severe and often life-threatening problems for Sanilac County's citizens. Extreme summer weather is characterized by a combination of very high temperatures and humid conditions. When persisting over a long period of time, this phenomenon is commonly called a heat wave. The major threats of extreme summer heat are heatstroke (a major medical emergency), and heat exhaustion. Heatstroke often results in high body temperatures, and the victim may be delirious, or comatose. Rapid cooling is critical to preventing permanent neurological damage or death. Heat exhaustion is a less severe condition than heatstroke, although it can still cause problems involving dizziness, weakness and fatigue. Heat exhaustion is often the result of fluid imbalance due to increased

perspiration in response to the intense heat. Treatment generally consists of restoring fluids and staying indoors in a cooler environment until the body returns to normal. Other, less serious risks associated with extreme heat are often exercise-related and include heat syncope (a loss of consciousness by persons not acclimated to hot weather), and heat cramps (an imbalance of fluids that occurs when people unaccustomed to heat exercise outdoors).

#### Extreme Heat Events in Sanilac County

Two extreme heat events were reported by the NCEI for Sanilac County, Michigan from 1996 to 2017.

On 05/29/2006 a major heat wave struck lower Michigan resulting in one person suffering heat exhaustion in the County. This was a major event throughout lower Michigan and dozens of people were treated for heat exhaustion throughout the region.

On 07/17/2011 through 07/22/2011 another major heat wave hit lower Michigan resulting in three deaths being reported in Lower Michigan. Heat indices over 100 were reported on multiple days during this time period. No injuries or deaths were reported in Sanilac County.

#### Extreme Heat Overview

Ten (10) extreme heat events were reported by the NCEI for Sanilac County, Michigan between 1996 and 2017 or about one every two years. These events have 50% chance occurring in any year. While there have been several excessive heat conditions, high heat events occur annually in Sanilac County and are a risk to the resident and visitors. Air conditioning is probably the most effective measure for mitigating the effects of extreme summer heat on people. Unfortunately, many of those most vulnerable to this hazard (children, elderly, and homeless individuals, and the critically ill) do not have access to air-conditioned environments. Excessive heat is considered to be a severe weather event, which was given a high priority to address.

### **Natural Hazards-Winter Weather**

#### **ICE/SLEET STORMS**

Ice/sleet storm: a storm that generates sufficient quantities of ice or sleet to result in hazardous conditions and/or property damage.

#### Hazard Description

Ice storms are sometimes incorrectly referred to as sleet storms. Sleet is similar to hail only smaller and can be easily identified as frozen rain drops (ice pellets) which bounce when hitting the ground or other objects. Sleet does not stick to trees and wires, but sleet in sufficient depth does cause hazardous driving conditions. Ice storms are the result of cold rain that freezes on contact with the surface, coating the ground, trees, buildings, overhead wires and other exposed objects with ice, sometimes causing extensive damage. When electric lines are downed, households may be without power for several days, resulting in significant economic loss and disruption of essential services in affected communities.

#### Ice and Sleet Storms in Sanilac County

Four ice/sleet events were reported by NCEI in Sanilac County from 1996 to 2017. Of these storms two had reported death/injuries/damages while two did not.

## Ice/Sleet Storm Events in Sanilac County from 1996 to 2017

Table 4.6

Location	Date	Time	Deaths	Injuries	Property Damage	Crop Damage
Sanilac County	03/13/1997	9:00 pm	0	0	\$0	\$0
Sanilac County	04/03/2003	10:00 pm	0	0	\$30,000	\$0
Sanilac County	02/14/2005	6:00 pm	0	0	\$0	\$0
Sanilac County	12/21/2013	5:00 pm	0	0	\$3,000,000	\$0

Source: National Centers for Environmental Information

On 04/03/2003 a series of storms with freezing rain hit throughout Sanilac County. There were no reported deaths or injuries; however, property damages of \$30,000 were reported. Most of the damages were the result of fallen trees due to ice accumulation.

On 12/21/2013 a winter storm hit Central Michigan of freezing rain resulted in ice accumulations of ½ to ¾ inches of ice. The heavy ice cause tree branches, and in some case trees, to collapse and bring down power lines. This resulted in power outages throughout the region. Because of the extensive coverage of the storm and the hazardous traveling conditions, many homes in the region did not gain their power back for several days. Damages were estimated to be near \$3 million.

### Ice and Sleet Storms Overview

Four ice storms were reported by the NCEI from 1996 to 2017 or about one every 5 years. There is a probability of 20% that an ice/sleet storm could occur in any year. One of the biggest problems resulting from ice and sleet storms is loss of power. The weight of the ice causes power lines to snap and break. Sometimes it can take days to restore power. If this happens temporary shelters may need to be set up. The local chapter of the American Red Cross would be called. Also, with the power loss would come loss of heat, which could cause death from hypothermia especially with the elderly population. Another problem caused by ice and sleet storms would be debris cleanup. The weight of the ice could cause tree limbs to snap and break.

Approximately 87% of ice storms occur during the months of January, February, March and April, when conditions are most conducive for the development of ice and sleet. Ice/sleet storms are considered to be severe weather events, which were given a high priority to address. Sanilac County remains vulnerable to ice storms and their impact on damages trees, leading to power outages. One way to reduce vulnerability is to trim tree limbs away from power lines to minimize or possibly eliminate power outages due to fallen tree limbs. However, this is a very expensive undertaking due to the number of power lines located throughout the County.

### **SNOWSTORMS**

Snowstorm: a period of rapid accumulation of snow often accompanied by high winds, cold temperatures, and low visibility.

### Hazard Description

As a result of being surrounded by the Great Lakes, Michigan experiences large differences in snowfall in

relatively short distances. The annual mean accumulation ranges from 30 to 170 inches of snow. The highest accumulations are in the northern and western parts of the Upper Peninsula. In Lower Michigan, the highest snowfall accumulations occur near Lake Michigan and in the higher elevations of northern Lower Michigan. However, as Sanilac County as frontage on Lake Huron, lake effect snow is also prevalent. Sanilac County averages approximately 41 inches of snow per year.

Blizzards are the most dramatic and perilous of all snowstorms, characterized by low temperatures and strong winds (35+ miles per hour) bearing enormous amounts of snow. Most of the snow accompanying a blizzard is in the form of fine, powdery particles that are wind-blown in such great quantities that, at times, visibility is reduced to only a few feet. Blizzards have the potential to result in property damage and loss of life. Just the cost of clearing the snow can be enormous. Snowstorms can also be dangerous, as heavy snows can shut down roads for a period of time, thereby limited access to many essential needs. If the snowfall is large enough it can also damage roofs of homes and other buildings.

#### Snowstorms in Sanilac County

There was a total of 68 storms that were identified in the NCEI database, with all storms being identified from 1996 to 2017. All the storms were found in one of four snowstorm categories: blizzards, winter storms, winter weather, and heavy snows. Of these events, only one had damages, and no events had human-related injuries/deaths reported as a result of these storms. However, the data from these events may be incomplete as not all damages that may have occurred were reported. Below is a table that identifies the major storms impacting Sanilac County.

### **Snowstorms in Sanilac County from 1996 to 2017**

**Table 4.7**

<b>Location</b>	<b>Date</b>	<b>Time</b>	<b>Death</b>	<b>Injuries</b>	<b>Property Damage</b>	<b>Crop Damage</b>
Sanilac County	03/19/96	10:00 pm	0	0	\$0	\$0
Sanilac County	01/09/97	8:00 am	0	0	\$0	\$0
Sanilac County	11/15/97	11:00 am	0	0	\$0	\$0
Sanilac County	03/20/98	10:00 pm	0	0	\$0	\$0
Sanilac County	12/17/98	10:00 pm	0	0	\$0	\$0
Sanilac County	01/12/99	5:00 pm	0	0	\$0	\$0
Sanilac County	11/30/99	4:00 am	0	0	\$0	\$0
Sanilac County	01/12/00	5:00 pm	0	0	\$0	\$0
Sanilac County	01/25/00	4:00 pm	0	0	\$0	\$0
Sanilac County	02/13/00	7:00 am	0	0	\$0	\$0
Sanilac County	10/07/00	1:00 am	0	0	\$0	\$0
Sanilac County	12/05/00	1:00 am	0	0	\$0	\$0
Sanilac County	12-11/00	12:00 pm	0	0	\$0	\$0
Sanilac County	12/12/00	12:30 am	0	0	\$0	\$0
Sanilac County	12/13/00	4:00 pm	0	0	\$0	\$0

Location	Date	Time	Death	Injuries	Property Damage	Crop Damage
Sanilac County	03/05/01	12:00 pm	0	0	\$0	\$0
Sanilac County	01/31/02	2:00 am	0	0	\$0	\$0
Sanilac County	11/26/02	1:00 pm	0	0	\$0	\$0
Sanilac County	02/22/03	12:00 pm	0	0	\$0	\$0
Sanilac County	03/04/03	4:00 pm	0	0	\$0	\$0
Sanilac County	01/26/04	7:00 pm	0	0	\$0	\$0
Sanilac County	12/19/04	12:00 am	0	0	\$0	\$0
Sanilac County	12/23/04	5:00 am	0	0	\$0	\$0
Sanilac County	01/21/05	5:00 pm	0	0	\$0	\$0
Sanilac County	01/22/05	6:00 pm	0	0	\$0	\$0
Sanilac County	01/26/05	10:00 pm	0	0	\$0	\$0
Sanilac County	02/20/05	12:00 am	0	0	\$0	\$0
Sanilac County	04/23/05	4:00 pm	0	0	\$0	\$0
Sanilac County	12/15/05	6:00 pm	0	0	\$0	\$0
Sanilac County	01/21/06	5:00 am	0	0	\$0	\$0
Sanilac County	02/05/06	12:00 am	0	0	\$0	\$0
Sanilac County	03/01/07	8:00 am	0	0	\$0	\$0
Sanilac County	12/01/07	7:00 pm	0	0	\$0	\$0
Sanilac County	12/11/07	9:00 am	0	0	\$0	\$0
Sanilac County	12/16/07	12:00 am	0	0	\$0	\$0
Sanilac County	01/01/08	12:00 am	0	0	\$0	\$0
Sanilac County	02/06/08	11:00 am	0	0	\$0	\$0
Sanilac County	12/01/08	12:00 am	0	0	\$0	\$0
Sanilac County	12/19/08	4:00 am	0	0	\$0	\$0
Sanilac County	04/05/09	10:00 am	0	0	\$0	\$0
Sanilac County	02/09/10	4:00 pm	0	0	\$0	\$0
Sanilac County	12/12/10	2:00 pm	0	0	\$0	\$0
Sanilac County	01/08/11	7:00 am	0	0	\$0	\$0
Sanilac County	02/02/11	12:00 am	0	0	\$0	\$0
Sanilac County	02/20/11	1:30 pm	0	0	\$0	\$0
Sanilac County	03/10/11	7:00 pm	0	0	\$0	\$0
Sanilac County	03/22/11	6:00 pm	0	0	\$5,000	\$0
Sanilac County	12/26/12	12:00 pm	0	0	\$0	\$0
Sanilac County	01/24/13	2:00 am	0	0	\$0	\$0
Sanilac County	02/08/13	1:00 am	0	0	\$0	\$0
Sanilac County	01/05/14	12:00 am	0	0	\$0	\$0
Sanilac County	03/12/14	12:00 am	0	0	\$0	\$0
Sanilac County	02/01/15	1:00 am	0	0	\$0	\$0
Sanilac County	03/31/15	12:00 am	0	0	\$0	\$0
Sanilac County	11/21/15	6:00 am	0	0	\$0	\$0
Sanilac County	02/09/16	1:00 am	0	0	\$0	\$0

Location	Date	Time	Death	Injuries	Property Damage	Crop Damage
Sanilac County	02/24/16	8:00 am	0	0	\$0	\$0
Sanilac County	03/01/16	7:00 am	0	0	\$0	\$0
Sanilac County	12/11/16	2:00 am	0	0	\$0	\$0
Sanilac County	12/13/17	10:00 am	0	0	\$0	\$0

Source: National Centers for Environmental Information

Following are examples of the four different types of storms (blizzard, heavy snow, winter storm, and winter weather) that have affected Sanilac County.

**Blizzard**-On 12/16/07 a storm center moved northeast to the lower Great Lakes and brought heavy amounts of snow. Winds followed gusting 35 to 45 miles per hour (mph) creating drifts of 1 to 3 feet. Blizzard-like conditions continued through the day, especially along the Lake Huron shoreline. Numerous accidents were reported due to the snowfall and schools were closed the next day (Monday).

**Blizzard**-On 02/01/11 a major storm hit southeast Michigan, with snow accumulations generally ranging from 6-12 inches. Northeast winds gusting between 25 and 35 mph caused blowing and drifting. Winds off of Lake Huron led to blizzard-like conditions north of the I-69 corridor. The Village of Lexington in southeast Sanilac County received 13.5 inches of snow.

**Heavy snow**-On 01/27/1978 a major storm hit Michigan. While this storm was not identified in the NCEI database it is significant in that a Presidential Declaration (EM-3057) was announced due to the severity of the event. Record snowfalls were recorded throughout the state along with winds gusts of 50 to 70 mph created snow drifts in excess of 10 to 15 feet in height.

**Heavy snow**-On 01/02 to 01/03/1999 a strong low-pressure system moved in from the west on January 2<sup>nd</sup> and heavy snow developed through January 3<sup>rd</sup>. Steady winds combined with the heavy snow created blizzard-like conditions. Snow accumulations ranged from 9" to 11" in Marlette to 7" in Brown City.

**Winter storm**-On 03/22/2011 a low pressure system traveled through the Western Great Lakes bringing mixed precipitation of snow, rain, and Ice throughout the state. Power outages resulted when ice downed trees and power lines. The City of Marlette received over 6 inches of snow and a glazing of ice.

**Winter Storm**-More recently (and outside our reporting period, but a storm worthy of note) from 04/13 to 04/15/2018 a large low pressures system hit the Great Lakes region. Southeast Michigan saw heavy rain, snow, sleet, and freezing rain during this event. Widespread tree damage and power outages occurred as a result of the storm. DTE and Consumers Energy reported power outages for 500,000 customers in the region. Property damages/losses for the County were estimated at \$1 million.

**Winter weather**-On 01/12 to 01/14/1999 in addition to the snowstorm on January 2<sup>nd</sup> and 3<sup>rd</sup> (see above) another big snowstorm hit beginning on the 12<sup>th</sup>. With the snowfalls ranging from 14" in Croswell to 10" in Sandusky and Marlette, the total accumulations on the roofs were causing concerns. Ice dams were forming, and roofs were collapsing throughout the region.

#### Snowstorms Overview

There has been a total of 68 events in the snowstorm category (blizzards, winter storms, winter weather, and heavy snows) from 1/1/1996 to 11/30/2017. This is approximately three snowstorms per year. Based

on the number of storms, there is a 100% probability that a winter storm event will occur in any given year. Severe snowstorms affect every Michigan community. While the number of events has not resulted in any reported deaths/injuries in Sanilac County, due to the nature of these events snowstorms are considered to be severe weather events, which were given a high priority to address. With the advancement of weather predicting programs, the residents can be given notice ahead of these storms allowing adequate time to take shelter. However, due to the nature of these events, the County is still vulnerable to the impacts of these events (power outages, road closures, school/business closings).

### **EXTREME TEMPERATURES (COLD)**

Extreme cold temperatures-prolonged periods of very low temperatures often accompanied by exacerbating conditions such as heavy snowfall and high winds.

#### **Hazard Description**

Extreme temperatures – whether it be extreme heat or extreme cold – share a commonality in that they both primarily affect the most vulnerable segments of society such as the elderly, children, impoverished individuals, and people in poor health. The major threats of extreme cold are hypothermia (also a major medical emergency) and frostbite.

Sanilac County is susceptible to extreme cold. The temperate climate of southern Michigan, combined with the unsettling effect of Lake Huron, make for extreme deviations in temperature. 50-degree swings in the temperature in a 24-hour period are not uncommon. These events occur regularly depending on the year.

Prolonged periods of extreme cold can pose severe and often life-threatening problems for Sanilac County's citizens. Like heat waves, periods of prolonged, unusually cold weather can result in a significant number of temperature-related deaths. Each year in the United States, approximately 700 people die as a result of severe cold temperature-related causes. This is substantially higher than the average of 170 heat-related deaths each year. It should be noted that a significant number of cold-related deaths are not the direct result of "freezing" conditions. Rather, many deaths are the result of illnesses and diseases that are negatively impacted by severe cold weather, such as stroke, heart disease and pneumonia. It could be convincingly argued that, were it not for the extreme cold temperatures, death in many cases would not have occurred at the time it did from the illness or disease alone.

Hypothermia (the unintentional lowering of core body temperature), and frostbite (damage from tissue being frozen) are probably the two conditions most closely associated with cold temperature-related injury and death. Hypothermia is usually the result of over-exposure to the cold and is generally thought to be clinically significant when core body temperature reaches 95 degrees or less. As body temperature drops, the victim may slip in and out of consciousness, and appear confused or disoriented. Treatment normally involves re-warming the victim, although there is some controversy in the medical community as to exactly how that should be done. Frostbite rarely results in death, but in extreme cases it can result in amputation of the affected body tissue.

#### **Extreme Cold Events in Sanilac County**

There have been six (6) extreme cold events reported by the NCEI for Sanilac County from 1996 through 2017. These events are widespread and not site specific. Each of these events would have impacted large areas of the entire County if not the entire County. There was one reported death due to these events; however, no reported damages to personal property were reported. Below are descriptions of several events that occurred.

On 01/19/2001 in Moore Township, in the western area of the County, a gentleman lost control of his car and landed in a ditch. He tried walking home and died of hypothermia, about a half mile from the accident site. He did not have a coat-only a flannel shirt for protection.

From 01/28/19 to 02/02/19 the entire State of Michigan was hit by a heavy snowfall, which was followed by several days of low temperatures and high winds. Wind chills below -30 and even -40 were recorded throughout the state.

#### Extreme Cold Overview

Six (6) extreme cold events were reported by the NCEI for Sanilac County, Michigan between 1/1/1996 11/30/2017, or about one event every 2.75 years. The probability of a cold event occurring in a given year is about 36%. While there have been minimal conditions with excessive cold, cold events occur annually in Sanilac County and are a risk to the residents. Unfortunately, many of those most vulnerable to this hazard (children, elderly, and homeless individuals, and the critically ill) may not have access to sufficiently heated environments. Excessive cold is considered to be a severe weather event, which was given a high priority to address.

#### **Climate Change Overview**

Definition-A change in global or regional climate patterns, in particular a change apparent from the late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.

As identified in the weather-related hazards, a majority, if not all, of multiple events have occurred in the past 20 years. Not only has the number increased, but the intensity of the events has also increased. Thunderstorms causing flooding has resulted in “100-year floods” occurring annually if not more often. These events can be attributed to Climate Change and are anticipated to continue, if not worsen, in the near future. Subsequently, communities should prepare for more events and as well as more intense weather-related events.

### **Hydrological Hazards**

#### **DAM FAILURES**

The collapse or failure of an impoundment (water held back by a dam) resulting in downstream flooding.

#### Hazard Description

A dam failure can result in loss of life and extensive property or natural resource damage for miles downstream from the dam. Dam failures occur not only during flood events, which may cause overtopping of a dam, but also as a result of misoperation, lack of maintenance and repair, or vandalism.

A common form of dam failure occurs when tree roots disrupt the integrity of an earthen dam. Water can pass through the dam where the soil has been broken apart by the roots. Such failures can be catastrophic because they occur unexpectedly, with no time for evacuation.

In Michigan, all dams over 6 feet high that create an impoundment with a surface area of more than 5 acres are regulated by Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act (451 P.A. 1994), as amended. This statute requires the Michigan Department of Environmental Quality (DEQ) to rate each dam as either a low, significant, or high hazard potential this rating system is based solely on the potential downstream impact if the dam were to fail and not according to the physical

condition of the dam. The National Inventory of Dams lists zero (0) dams within Sanilac County.

### **Dam Failure Flooding Overview**

According to the National Inventory of Dams Sanilac County has no dams in the County, Therefore, there are no dams rated as High Hazard Potential Dams, and as a result, this hazard has been given a low priority.

### **FLOODING**

For the purposes of this document, flooding will include both fluvial flooding (riverine) and pluvial flooding. Fluvial flooding-the overflow of rivers, streams, drains and lakes due to excessive rainfall, rapid snowmelt or ice jams and dam failures. Pluvial flooding-flooding events caused by extreme rainfall.

### **Hazard Description**

Flooding of land adjoining the normal course of a stream or river has been a natural occurrence since the beginning of time. If these floodplain areas were left in their natural state, floods would not cause significant damage. Development has increased the potential for serious flooding because rainfall that used to soak into the ground or take several days to reach a river or stream via a natural drainage basin now quickly runs off streets, parking lots, and rooftops, and through man-made channels and pipes.

Pluvial flooding is the result of heavy rains. Flooding from heavy rains can be the result of multiple causes, several of which, include: an extremely heavy rainfall where the ground becomes saturated and can no longer absorb the water; urban drainage systems are overloaded by excessive water flow; or lowlands that are inadequately drained.

Floods can damage or destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services, and result in fatalities. People may be stranded in their homes for several days without power or heat, or they may be unable to reach their homes at all. Long-term collateral dangers include the outbreak of disease, widespread animal death, broken sewer lines causing water supply pollution, downed power lines, broken gas lines, fires, and the release of hazardous materials.

Most riverine flooding occurs in early spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Ice jams also cause flooding in winter and early spring. Severe thunderstorms may cause flooding during the summer or fall, although these are normally localized and have more impact on watercourses with smaller drainage areas. Oftentimes, flooding may not necessarily be directly attributable to a river, stream or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall and/or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. That type of flooding is becoming increasingly prevalent in Michigan, as development outstrips the ability of the drainage infrastructure to properly carry and disburse the water flow. Flooding also occurs due to combined storm and sanitary sewers that cannot handle the tremendous flow of water that often accompanies storm events. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns.

### **Ice Jams**

Cold winters like those we experience in Sanilac County can produce thick river ice and the potential for ice jams. An ice jam develops when pieces of snow and ice build up along a river. As the ice buildup increases, water passes slowly, and flooding develops behind the dam of ice. Water levels can also rise

rapidly when temperatures rise and result in snowmelt runoff or rain, thus adding more water to the river behind an ice jam.

In the spring, or when temperatures rise, the ice buildup will thaw and break up, and may unleash all of the dammed-up water in a short period of time. When this occurs, flooding can rapidly result downstream from the ice jam. The combination of ice, debris, and water released from the ice jam can cause tremendous physical damage to homes, docks, and other structures.

### **Monthly Mean Precipitation (liquid equivalent in inches) in Sanilac County, 1929-2015**

**TABLE 4.8**

<b>Month</b>	<b>Sanilac County</b>	
	<b>1929-2000</b>	<b>2001-2015</b>
<b>January</b>	1.86	1.88
<b>February</b>	1.33	1.64
<b>March</b>	2.21	1.82
<b>April</b>	2.76	3.82
<b>May</b>	3.00	3.98
<b>June</b>	3.38	3.58
<b>July</b>	2.95	3.12
<b>August</b>	3.38	3.06
<b>September</b>	3.53	2.80
<b>October</b>	2.88	3.18
<b>November</b>	2.67	2.46
<b>December</b>	1.97	2.21
<b>Annual Average</b>	31.90	33.55

Source: National Weather Service

Citing the information above, there is a slight increase in precipitation from the last fifteen years over the previous 70 years. Again, citing climate change, this increase could be a sign of future trend regarding precipitation.

#### Riverine Flooding in Sanilac County

The NCEI has reported that seven (7) floods have occurred in Sanilac County from 1996 to 2017. According to the information provided by the NCEI no deaths or injuries were reported as a result of these floods, and the damages reported were in excess of \$2 million. In addition to these events, several major floods that were declared as national disasters occurred prior to the reporting period. The major flood events are identified below.

Beginning on 9/10/86 a slow-moving low-pressure system moved across the middle of the Lower Peninsula. In a 24-hour period, the storm dropped anywhere from 8" to 17" over the 60-mile band that extended 180 miles. While there were numerous deaths and injuries throughout the state, none were reported in Sanilac County. Due to the impact of the storm a presidential declaration was granted for 30 counties in Michigan, which included Sanilac County.

On 07/07 and 07/08/94 heavy rains caused flash flooding in three counties, including Sanilac County. The rains caused severe damage to roads, drainage systems, and multiple houses in the three counties. Public damages were over \$1 million, while 93 homes also were damaged. As a result, a Governors declaration was granted, which provided assistance to aid in the recovery.

On 06/22/1996 a flash flood occurred in Sanilac County resulted in \$800,000 in damages, when nearly five inches of rain fell in a five-hour period. Roads were washed out and numerous homes received some damage. A presidential disaster was declared for seven counties, including Sanilac County.

On 07/28-2000 several slow-moving storms produced locally heavy rain. Winds approached 60 mph downed large tree limbs near Deckerville. Six roads were also washed out in northern Sanilac County and water was two feet deep over M-53.

On 8/2/2006 a thunderstorm hit southeast Michigan and extensive damage resulting in the Brown City area. Over eight inches fell in less than 24 hours resulting in over 230 claims of flood damage throughout the City. Damages were estimated at \$1.25 million, no injuries or deaths occurred as a result of the storm.

#### Riverine and Urban Flooding Overview

Seven (7) flood incidents were reported by the NCEI for Sanilac County, Michigan between 1/1/1996 and 11/30/2017, or approximately one every three years. The probability of a major flood event is about 33% in a given year. Currently there are eight townships, three cities, and one village in Sanilac County that are participating in the National Flood Insurance Program (NFIP). The municipalities participating in the NFIP are: Brown City, Croswell, Marlette, the Village of Port Sanilac, Evergreen Township, Flynn Township, Forester Township, Lexington Township, Maple Valley Township, Marlette Township, Sanilac Township, and Worth Township. Marlette, Flynn Township, and Marlette Township have Non-Special Flood Hazard Areas, all others have a map date of January 6, 2012.

The County is vulnerable to flooding and as a result they have identified several measures to reduce their vulnerability to these events. However, there have been no properties that have reported repetitive losses resulting from floods, nor are there any properties on the FEMA list of properties that have repeated flooding problems.

### **GREAT LAKES SHORELINE HAZARDS**

Shoreline Hazards: water-level fluctuations, current and wave actions and other conditions in the Great Lakes that cause flooding or erosion or otherwise threaten life, health, and property in shoreline areas, including harmful algal blooms, ice surges, storms surges, meteotsunamis, rip currents, shoreline erosion and recession.

#### Hazard Description

Flooding and erosion along Michigan's 3,200-mile-long Great Lakes shoreline is typically caused by high Great Lakes water levels, storm surges, or high winds. Shoreline flooding and erosion are natural processes that occur at normal and even low Great Lakes water levels. During periods of high water, however, flooding and erosion are more frequent and serious causing damage to homes, businesses, roads, water distribution and wastewater treatment facilities, and other structures in coastal communities. Windstorms and differences in barometric pressure can temporarily tilt the surface of a lake up at one end as much as 8 feet. This phenomenon is called a storm surge and can drive lake water inland

over large areas. In recent years, the water level has been higher, which has resulted in more erosion and flooding along the shores of Lake Huron.

#### Shoreline Hazards in Sanilac County

In nearly every decade, high water levels on the Great Lakes have caused significant damage and impact to Michigan coastal communities. The most recent high-water period began in 1997 and resulted in the Great Lakes being at or near record levels set in the mid-1980's. In response to the threat of severe shoreline flooding and erosion, the U. S. Army Corps of Engineers (USACE), at the request of the Governor, implemented its Advance Measures Program to assist Michigan shoreline communities in their flood and erosion mitigation efforts. The USACE implemented its Advance Measures Program and the State of Michigan implemented three shoreline flooding and erosion mitigation programs aimed at reducing future flood impacts on shoreline communities and homeowners. To date, over 20 Michigan Jurisdictions have taken advantage of this program.

Many structures are built on or near the shoreline in Sanilac County. Shoreline residents in the townships of Delaware, Forester, Lexington, Sanilac and Worth and the communities of Forester, Forrestville, Port Sanilac and the Village of Lexington all have the potential of being affected by shoreline flooding. As new structures are built close to the shoreline, the potential risk for damage will always remain probable.

On 01/11/2020 a winter storm in southeast Michigan brought heavy rain and freezing rain (1/4"). In addition, strong northeast winds lead to high water levels and large waves causing significant lakeshore flooding and erosion. Damages were estimated at \$500,000 according to NCEI.

#### Shoreline Hazards Overview

From 1996 to 2017 no events occurred in Sanilac County. However, since 2017 two events occurred. Based on the above data, there would be an eight percent chance of an event occurring, but due to Lake Huron having a high water, level and two events in the past two years the probability of a future event occurring is much greater. To date, a Presidential or Governor's disaster declaration has not occurred in the county, however, the risk remains due to the existence of Lake Huron and its history of water level fluctuations. Should this happen, even though the potential for loss of life is low, the potential for economic loss is high which makes this hazard a low to medium vulnerability.

### **DROUGHTS**

Drought: a water shortage caused by a deficiency of rainfall, generally lasting for an extended period of time.

#### Hazard Description

Drought is the consequence of a reduction in the amount of precipitation that was expected over an extended period of time, usually a season or more in length. The severity of a drought depends not only on its location, duration, and geographical extent, but also on the water supply demands made by human activities and vegetation.

A drought can cause many severe hardships for communities and regions. Probably one of the most common and severe impacts to a community like Sanilac County would be the threat of a drop in the quantity and quality of agricultural crops. Other negative impacts that can be attributed to a drought include water shortages for human consumption, industrial, business and agricultural uses, recreation and navigation, declines in water quality in lakes, streams and other natural bodies of water, malnourishment of wildlife and livestock, increases in fires and wildfire related losses to timber, homes, and other property,

increases in wind erosion, and declines in tourism in areas dependent on water-related activities.

These direct impacts can further result in indirect impacts to a community, such as reduced revenue due to income losses in agriculture, retail, tourism and other economic sectors; declines in land values due to physical damage from the drought conditions and decreased functional use of the property, and possible loss of human life due to extreme heat, fire, and other heat-related problems.

Two common measurement tools of dry weather conditions are the Palmer Drought Indices (including the Palmer Drought Severity Index and the Palmer Hydrological Drought Index) and the Crop Moisture Index (CMI). The Palmer Drought Severity Index is a good long-term drought monitoring tool. It is a monthly index that indicates the severity of a wet or dry spell. This index is based on average temperature and rainfall information for a particular location in a formula to determine dryness. The CMI evaluates short-term moisture conditions across crop producing regions. It measures how much moisture is in the plant root zone of the soil. This index is based on the mean temperature and total precipitation that occurs each week, as well as the CMI from the previous week. The CMI changes as quickly as the weather changes. A heavy rainstorm can dramatically change the CMI for a region. Since this index changes so quickly and in response to a single weather event, the CMI is not considered a good long-term drought measurement tool.

The Palmer Drought Severity Index uses a value of 0 for the normal amount of rainfall in a particular location, and drought is shown in terms of negative numbers, for example, minus 2 is moderate drought, minus 3 is severe drought, and minus 4 is extreme drought. Any value above 0 demonstrates that there have been above normal amounts of precipitation. This index can be used for indicating lake levels and surface water supply abnormalities but is not all that good for monitoring climatic impacts on vegetation, especially crops.

#### Droughts/Drought Related Events in Sanilac County

The State of Michigan has been divided into ten (10) climate divisions for drought monitoring and analyses. Sanilac County is located in Division 7, which includes the counties along southern Saginaw Bay and the three counties that make up the Thumb Region. According to the State of Michigan Hazard Analysis Appendix of the 2019 State of Michigan Hazard Mitigation Plan, Division 7 experienced six lengthy droughts ranging from eight (8) months to 18 months in duration.<sup>3</sup> In addition, the NCEI has identified two additional droughts occurring from 1996 to 2017.

In 1930-31 the most extreme drought occurred when the Palmer Index reached a record low of -6.22. The drought was 17 months in duration. While drought occurs periodically, in Sanilac County, the Palmer Drought Index indicated drought conditions reached extreme severity only 2% of the time. No crop damages or other property damages, or injuries/deaths resulted from the drought events.

From 07/01 to 07/31/2001 weather patterns across southeast Michigan prevented the development of widespread thunderstorms moving into the region from the west, and as a result less than ½ inch of rain fell during this stretch. Combined with a wetter than normal spring, thereby delaying the planting of crops, this drought impacted many of the crops. Even though the rains returned in August, many of the crops were not salvageable. Final tabulations were not reported to the NCEI and an estimated loss was not available.<sup>4</sup>

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<sup>3</sup> Michigan Hazard Analysis, April 2019, Michigan Department of State Police.

<sup>4</sup> National Centers for Environmental Information

From 09/01 to 09/30/2002 the weather was hot and dry. Record low rainfalls were reported throughout the region and was worsened by the heat. Many of the communities were under water restrictions and numerous counties in the region were declared agricultural disaster areas. September crop yields were estimated to be less than fifty percent; however, final estimates were not available.<sup>5</sup>

### Drought Overview

There were two drought events reported in Sanilac County between 1/1/2001 and 11/30/2017, or about one every eight years. As 74 percent of Sanilac County is land devoted to agricultural use, the biggest problem drought presents is the increased threat of loss of crops/livestock. Any prolonged drought could alter the quantity and quality of crops, livestock and other agricultural activities, resulting in severe economic and social hardships throughout the County. Even though there have been few droughts in recent years, because of their potential impact to the County, droughts were given a medium priority to address. The county has access to lake water for irrigation purposes, to limit the vulnerability due to drought.

## **Transportation Hazards**

### **TRANSPORTATION ACCIDENTS: AIR, LAND, AND WATER**

Transportation accident: a crash or accident involving an air, land or water-based commercial passenger carrier resulting in death or serious injury.

#### Hazard Description-Air Transportation Accidents

There are four circumstances that can result in an air transportation accident:

1. An airliner colliding with another aircraft in the air.
2. An airliner crashing while in the cruise phase of a flight due to mechanical problems, sabotage, or other cause.
3. An airliner crashing while in the takeoff or landing phases of a flight.
4. Two or more airliners colliding with one another on the ground during staging or taxi operations.

The Michigan Aeronautics Commission of the Michigan Department of Transportation administers several programs aimed at improving aviation safety and promoting airport development. The Commission's safety programs include:

1. Registering aircraft dealers, aircraft, and engine manufacturers.
2. Licensing airports and flight schools.
3. Inspecting surfaces and markings on airport runways.
4. Assisting in removal of airspace hazards at airports.

The Commission's airport development program includes providing state funds for airport development and airport capital improvements – many of which contribute to overall air transportation safety.

The Federal Aviation Administration (FAA) contracts with the Michigan Department of Transportation for the inspection of the state's 238 public-use airports on an annual basis. The FAA has regulatory jurisdiction over operational safety and aircraft worthiness. The National Transportation Safety Board (NTSB)

<sup>5</sup> National Centers for Environmental Information

investigates all aircraft crashes that involve a fatality and publishes reports on its findings. (See the NTSB section below).

When responding to any of these types of air transportation accidents, emergency personnel may be confronted with a number of problems, including:

1. Suppressing fires.
2. Rescuing and providing emergency first aid for survivors.
3. Establishing mortuary facilities for victims.
4. Detecting the presence of explosive or radioactive materials.
5. Providing crash site security, crowd and traffic control, and protection of evidence.

#### Hazard Description-Land Transportation Accidents

A land transportation accident in Michigan could involve a commercial intercity passenger bus, a local public transit bus, a school bus, passenger vehicles, or an intercity passenger train. Although these modes of land transportation have a good safety record, accidents do occur. Typically, the bus slipping off a roadway in inclement weather, or colliding with another vehicle causes bus accidents. Intercity passenger train accidents usually involve a collision with a vehicle attempting to cross the railroad tracks before the train arrives at the crossing. Unless the train accident results in a major derailment, serious injuries are usually kept to a minimum. Bus accidents, on the other hand, can be quite serious – especially if the bus has tipped over. Numerous injuries are a very real possibility in those types of situations.

School bus safety programs and initiatives generally fall into two categories:

1. Driver skill enhancement and competency training.
2. Physical inspections of bus mechanical and safety equipment.

The Motor Carrier Division, Michigan Department of State Police, inspects all school buses and other school transportation vehicles (21,000 units) on an annual basis. In addition, all school bus drivers in Michigan must take and pass a bus driver education and training program, and then take regular refresher courses to maintain their certification to operate a school bus. School bus drivers must also pass an annual medical examination.

Local transit and intercity bus safety falls under the purview of the Michigan Department of Transportation's Bureau of Urban and Public Transportation. Generally, the issue of intercity and transit bus safety is handled on a partnership basis with the service providers, with MDOT providing oversight of the initiatives undertaken by the providers to ensure mechanical and operational safety.

The Michigan Department of Transportation is the state regulatory agency for railroad-highway grade crossing safety issues. In this role, MDOT conducts biennial, on-site crossing reviews for Michigan's 5,535 public crossings, and reports observed crossing maintenance deficiencies to the responsible railroad or roadway authority. In addition, MDOT conducts diagnostic study team reviews at selected crossings to determine whether the current level of warning device requires enhancement. At the present time, 42% of Michigan's public crossings have at least automatic side-of-street flashing light signals, and 16% have automatic gates.

In January 2001 an amendment (367 P.A. 2000) to the Michigan Vehicle Code went into effect allowing the MSP, MDOT, or specified local officials to install video cameras at railroad crossings to serve as a

deterrent to motorists who might attempt to go around or through activated railroad crossing lights and gates. Although the ultimate purpose of this law is to reduce pedestrian and vehicular deaths and injuries at railroad crossings, the law will also likely reduce passenger train accidents caused by collisions with vehicles on the tracks – a major cause of many passenger train derailments.

Michigan's "Operation Lifesaver" Coalition – part of a national, non-profit education and awareness program dedicated to ending tragic collisions, fatalities and injuries at highway-rail grade crossings and on railroad rights of way- has helped reduce the number of serious crashes at railroad crossing in the state. The Operation Lifesaver Coalition in Michigan is spearheaded by the MSP and MDOT and is comprised of state and local government officials, law enforcement, and employees of the railroad companies operating in Michigan. The Operation Lifesaver program emphasizes education and enforcement and its efforts appear to be working. Since 1996, the number of crashes, injuries, and fatalities at railroad crossing in Michigan has shown a steady decline. Any reduction in vehicle-train crashes at railroad crossings helps reduce the likelihood of a passenger transportation accident involving a train, school bus, local transit bus, or commercial intercity passenger bus.

Another MDOT program that can help improve rail safety is the Michigan Rail Loan Assistance Program. Established under Act 117, P.A. 1997, this program was initiated to help finance capital improvements on Michigan's rail infrastructure. Although the program is designed primarily to help preserve and improve rail freight service, any improvements made to the rail infrastructure that serves passenger rail service can only help improve passenger rail safety. Track rehabilitation is one of the eligible projects that can be funded under this program, and the safety value of a project is one of the primary selection criteria. (The Sanilac County transportation map is included in Chapter 3.)

#### Transportation Overview

Even though there have been no recent accidents involving commercial vehicles that have resulted in death or injury, these accidents occur, as do accidents between passenger vehicles. As such, transportation accidents were given a medium priority.

## **Hazardous Material Incidents**

### **HAZARDOUS MATERIAL - TRANSPORTATION**

Hazard material incident: an uncontrolled release of hazardous materials during transport, capable of posing a risk to health, safety, property or the environment.

#### Hazard Description

As a result of the extensive use of chemicals in our society, all modes of transportation – highway, rail, air, marine, and pipeline – are carrying thousands of hazardous materials shipments on a daily basis through local communities. A transportation accident involving any one of those hazardous material shipments could cause a local emergency affecting many people.

Michigan has had numerous hazardous material transportation incidents that affected the immediate vicinity of an accident site or a small portion of the surrounding community. Those types of incidents, while problematic for the affected community, are fairly commonplace. They are effectively dealt with by local and state emergency responders and hazardous material response teams. Larger incidents, however, pose a whole new set of problems and concerns for the affected community. Large-scale or serious hazardous material transportation incidents that involve a widespread release of harmful material (or have

the potential for such a release) can adversely impact the life safety and/or health and well-being of those in the immediate vicinity of the accident site, as well as those who come in contact with the spill or airborne plume. In addition, damage to property and the environment can be severe as well. Statistics show almost all hazardous material transportation incidents are the result of an accident or other human error. Rarely are they caused simply by mechanical failure of the carrying vessel.

#### Hazardous Material Incidents: Transportation Overview

Although there have not been any significant hazardous materials transportation incidents, there have been many minor petroleum and hazardous materials spills throughout the years. Most major highways within the county are primarily two lanes and interstates. These routes are heavily congested in the summer months and often icy or impassable in the winter. It is certainly only a matter of time before a serious hazardous materials incident occurs on a county roadway, railway, or waterway. Because of the dangers that could arise from these accidents, they were given a high priority.

### OIL/GAS WELL

An uncontrolled release of oil or gas, or the poisonous by-product hydrogen sulfide, from wells.

#### Hazard Description

Oil and natural gas are produced from fields scattered across 63 counties in the Lower Peninsula. Since 1925 over 44,000 oil and natural gas wells have been drilled in Michigan, of which roughly half have produced oil and gas. To date, Michigan wells have produced approximately 1.4 billion barrels of crude oil and 4 trillion cubic feet of gas.

The petroleum and natural gas industry are highly regulated and has a fine safety record, but the threat of accidental releases, fires and explosions still exists. In addition to these hazards, many of Michigan's oil and gas wells contain extremely poisonous hydrogen sulfide (H<sub>2</sub>S) gas. Hydrogen sulfide is a naturally occurring gas mixed with natural gas or dissolved in the oil or brine and released upon exposure to atmospheric conditions. Over 1,300 wells in Michigan have been identified as having H<sub>2</sub>S levels exceeding 300 parts per million (ppm).

As the table below indicates, at concentrations of 700 ppm, as little as one breath of hydrogen sulfide can kill. Although hydrogen sulfide can be detected by a "rotten egg" odor in concentrations from .03 ppm to 150ppm, larger concentrations paralyze a person's olfactory nerves so that odor is no longer an indicator of the hazard. Within humans, small concentrations can cause coughing, nausea, severe headaches, irritation of mucous membranes, vertigo, and loss of consciousness. Hydrogen sulfide forms explosive mixtures with air at temperatures of 500 degrees Fahrenheit or above and is dangerously reactive with powerful oxidizing materials. Hydrogen sulfide can also cause the failure of high-strength steels and other metals. This requires that all company and government responders be familiar not only with emergency procedures for the well site, but also with the kinds of materials that are safe for use in sour gas well response.

## Physiological Response to H<sub>2</sub>S

TABLE 4.9

10ppm	Beginning eye irritation
50-100 ppm	Slight conjunctivitis and respiratory tract irritation after 1-hour exposure
100 ppm	Coughing, eye irritation, loss of sense of smell after 2-15 minutes. Altered respiration, pain in the eyes and drowsiness after 15-30 minutes followed by throat irritation after 1 hour. Several hours of exposure results in gradual increase in severity of these symptoms and death may occur within the next 48 hours.
200-300 ppm	Marked conjunctivitis and respiratory tract irritation after 1 hour of exposure.
500-700 ppm	Loss of consciousness and possibly death in 30 minutes to 1 hour.
700-1000 ppm	Rapid unconsciousness, cessation of respiration and death.
1000-2000 ppm	Unconsciousness at once, with early cessation of respiration and death in a few minutes. Death may occur even if the individual is removed to fresh air at once.

### **Oil and Gas Well Accidents Overview**

There are less than 100 oil and natural gas wells in Sanilac County along with approximately 20 miles of gas pipeline. This is a relatively small quantity when compared with state leader, Otsego County, with over 5700 wells. As a general rule, most gas companies prefer to respond to incidents involving their wells themselves – and in the vast majority of cases that is what happens. Because gas companies often have controlled burns, and deal with wells on a daily basis, it is impossible to ascertain how many incidents have actually occurred in the county. However, there is still the possibility that an emergency response agency could find themselves in the situation of responding to an incident at a gas well. Responders must understand the dangers associated with H<sub>2</sub>S and must have a working knowledge of these wells that are in their areas of responsibility. Due to the small number of wells, these events were given a moderate priority, which is the lowest priority for hazards that have been identified. Any hazard that had a low priority was not included in this plan update.

### **Petroleum and Natural Gas Pipeline Accidents**

Petroleum and natural gas pipeline accident: an uncontrolled release of petroleum or natural gas, or the poisonous by-product hydrogen sulfide, from a pipeline.

#### **Hazard Description**

Though often overlooked, petroleum and natural gas pipelines pose a real threat in many Michigan communities. Petroleum and natural gas pipelines can leak or fracture and cause property damage, environmental, contamination, injuries, and even loss of life. The vast majority of pipeline accidents that occur in Michigan are caused by third party damage to the pipeline, often due to construction or some other activity that involves trenching or digging operations.

Michigan is both a major consumer and producer of natural gas and petroleum products. According to the Michigan Public Service Commission (MPSC), approximately 25% of the natural gas consumed in Michigan is produced within the state. The remaining 75% is imported by five interstate pipeline companies that have access to the major natural gas producing regions in North America. Michigan cycles more natural

gas through its storage system than any other state. Michigan ranks 11<sup>th</sup> in the nation in production of natural gas and ranks 6<sup>th</sup> in consumption at 937.2 billion cubic feet. Michigan's petroleum product consumption in 1997 was 189 million barrels, ranking it 10<sup>th</sup> nationally. These figures underscore the fact that vast quantities of petroleum and natural gas are extracted from, transported through, and stored in the state, making many areas vulnerable to petroleum and natural gas emergencies. Michigan's gas and petroleum networks are highly developed and extensive, representing every sector of the two industries – from wells and production facilities, to cross-country transmission pipelines that bring the products to market, to storage facilities, and finally to local distribution systems.

While it is true that the petroleum and natural gas industries have historically had a fine safety record, and that pipelines are by far the safest form of transportation for these products, the threat of fires, explosions, ruptures, and spills nevertheless exists. In addition to these hazards, there is the danger of hydrogen sulfide (H<sub>2</sub>S) release. These dangers (fully explained in the Oil and Natural Gas Well Accidents section) can be found around oil and gas wells, pipeline terminals, storage facilities, and transportation facilities where the gas or oil has a high sulfur content. Hydrogen sulfide is not only an extremely poisonous gas but is also explosive when mixed with air at temperatures of 500 degrees Fahrenheit or above.

#### Petroleum and Natural Gas Pipeline Accidents in Sanilac County

There have been no significant events that have occurred in recent years.

#### Petroleum and Natural Gas Pipeline Accidents Overview

There are several petroleum and natural gas pipelines running throughout the County. Sanilac County has several compressor stations and storage fields in the area. In the Emergency Service Office are plans and emergency contact numbers for these locations. One point that is stressed in most of these plans is for local emergency crews not to do anything on scene until a representative from the company arrives.

Because petroleum and natural gas pipeline accidents are an inevitable occurrence, affected local communities must be prepared to respond to the accident, institute necessary protective actions, and coordinate with federal and state officials and the pipeline company emergency crews to effectively manage and recover from the accident. That can best be accomplished through collaborative planning, training, and exercising of emergency procedures with all potentially involved parties. Due to the relatively small number of miles of pipelines, and lack of significant injuries, this hazard was given a moderate priority to address.

### **HAZARDOUS MATERIAL AND INDUSTRIAL INCIDENTS- FIXED SITE, INCLUDING PROPANE STORAGE SITES**

Hazardous Material Incident: an uncontrolled release of hazardous materials from a fixed site, capable of posing a risk to health, safety, property, and the environment.

Industrial Accidents-A fire, explosion, or other severe accident (especially if it involves hazardous materials) at an industrial facility that results in serious property damage, injury, or loss of life.

#### Hazard Description (Hazardous Material Incidents)

Hazardous materials are present in quantities of concern in business and industry, agriculture, universities, hospitals, utilities, and other community facilities. Hazardous materials are materials or substances which,

because of their chemical, physical, or biological nature, pose a potential threat to life, health, property and the environment if they are released. Examples of hazardous materials include corrosives, explosives, flammable materials, radioactive materials, poisons, oxidizers, and dangerous gases.

Hazardous materials are highly regulated by the government to reduce risk to the general public, property and the environment. Despite precautions taken to ensure careful handling during the manufacture, transport, storage, use and disposal of these materials, accidental releases are bound to occur. Areas at most risk are within a 1-5-mile radius of identified hazardous material sites. Many communities have detailed plans and procedures in place for responding to incidents at these sites, but release can still cause severe harm to people, property, and the environment if proper mitigative action is not taken in a timely manner.

#### Hazard Description-Industrial Accidents

Industrial accidents differ from hazardous material incidents in the scope and magnitude of offsite impacts. Whereas hazardous material incidents typically involve an uncontrolled release of material into the surrounding community and environment that may require evacuations or in-place sheltering of the affected population, the impacts from industrial accidents are often confined to the site or facility itself, with minimal physical outside impacts. Nonetheless, industrial accidents, such as fires, explosions, and excessive exposure to hazardous materials, may cause injury or loss of life to workers at the facility, and significant property damage. In addition, industrial accidents can cause severe economic disruption to the facility and surrounding community, as well as significant long-term impacts on the families of the workers injured or killed.

#### Hazardous Material Incidents/Industrial Accidents in Sanilac County

There have not been any hazardous material/industrial accidents in Sanilac County to report in recent years.

#### Hazardous Material Incidents/Industrial Accidents Overview

Like all heavily industrialized states, Michigan will always be concerned with the risk of accidental hazardous material releases. However, the threat of accidental hazardous material releases that can affect life, health, property or the environment can be greatly reduced by: 1) developing and maintaining adequate community hazardous material response plans and procedures; 2) adequately training hazardous material workers and off-site emergency responders; 3) educating the public about hazardous materials safety; 4) enforcing basic hazardous material safety regulations; and 5) mitigating, wherever possible, the threat of accidental hazardous material releases. Fortunately, many Michigan communities are making great strides in these important areas.

NOTE: Nuclear research facilities can produce/use radioactive materials, as well as other hazardous substances, and therefore need to be dealt with by specially trained personnel. Caution should be exercised at these facilities, and proper radiological survey equipment should be used during a response.

As a major manufacturing and industrial center, Michigan has had its share of industrial explosions and/or fires that resulted in deaths or injuries. Fortunately, industrial and fire safety regulations enacted over the years have kept these types of accidents to a minimum. Although industrial accidents occur with regularity in Michigan, major incidents with mass casualties, such as the three deadly explosions that occurred in 1998 and 1999, are relatively rare.

Independence Fireworks near Osseo, MI on December 11, 1998 resulted in the death of 7 people and

injuries to 13 people.

Ford Rouge Complex in Dearborn, Michigan on February 1, 1999 resulted in the death of 6 people and injuries to 14 people.

Independence Fireworks near Osseo, MI on March 29, 1999 resulted in the death of 5 people.

#### Superfund Amendments and Reauthorization Act (SARA), Title II

There are currently 5 Sites in Sanilac County designated SARA Title III, Section “302 Sites”. These sites are required to have an emergency plan on file with the Local Emergency Planning Commission, Fire Department, and their facility. All 5 “302 Sites” in Sanilac County have an emergency plan on file with the Local Emergency Planning Committee and their individual Fire Departments.

The meetings that were held in the county, attendees and the emergency manager expressed some concern for the safety and security of propane storage sites. The county would like to improve security and inventory the sites for the future safety of the residents. (Buffer Zones for 302 Sites are half-mile radius.)

#### Hazardous Material Overview

Even though there have not been any recent events resulting from hazardous materials, they present a major danger that could remain a concern for many years to come. Thus, this hazard has been identified as a high priority hazard.

#### **Nuclear Power Plant Accidents**

Nuclear power plant accidents: an actual or potential release of radioactive material at a commercial nuclear power plant or other nuclear facility, in sufficient quantity to constitute a threat to the health and safety of the off-site population.

#### Hazard Description

Such an occurrence, though not probable, could affect the short and long-term health and safety of the public living near the nuclear power plant, and cause long-term environmental contamination around the plant. As a result, the construction and operation of nuclear power plants are closely monitored and regulated by the Federal government.

#### Nuclear Power Plant Failures Overview

Communities with a nuclear power plant must develop detailed plans for responding to and recovering from such an incident, focusing on the 10-mile Emergency Planning Zone (EPZ) around the plant, and a 50-mile Secondary EPZ that exists to prevent the introduction of radioactive contamination into the food chain. Michigan has 3 active and 1 inactive commercial nuclear power plants, in addition to 4 small nuclear testing/research facilities located at 3 state universities and within the City of Midland. Sanilac County does not have a nuclear power plant.

Sanilac County does not have a nuclear power plant located within 50 miles and is not within the Secondary EPZ or ingestion pathway zone. Thus, they are not required to have a plan in place for that zone. The closest active Nuclear Power Plant is located within Michigan is over 100 miles, at the Fermi 2 Nuclear Plant in Monroe County. Should an event occur that would impact the County, the Emergency Management Director would defer to the governing agency.

## **Technological Hazards**

### **INFRASTRUCTURE FAILURES**

Infrastructure failure: a failure of critical public or private utility infrastructure resulting in a temporary loss of essential functions and/or services.

#### **Hazard Description**

Michigan's citizens are dependent on the public and private utility infrastructure to provide essential life supporting services such as electric power, heating and air conditioning, water, sewage disposal and treatment, storm drainage, communications, and transportation. When one or more of these independent, yet interrelated systems fail due to disaster or other cause – even for a short period of time – it can have devastating consequences. For example, when power is lost during periods of extreme heat or cold, people can literally die in their homes if immediate mitigative action is not taken. When the water or waste treatment systems in a community are inoperable, serious public health problems arise that must be addressed immediately to prevent outbreaks of disease. When storm drainage systems fail due to damage or an overload of capacity, serious flooding can occur.

These are just some examples of the types of infrastructure failures that can occur, and all of these situations can lead to disastrous public health and safety consequences if immediate mitigative actions are not taken. Typically, it is the most vulnerable members of society (i.e., the elderly, children, impoverished individuals, and people in poor health) that are the most heavily impacted by an infrastructure failure. If the failure involves more than one system, or is large enough in scope and magnitude, whole communities and possibly even regions can be severely impacted.

#### **Communication Loss**

Communication loss can be catastrophic in emergency situations in the county. Power outages or direct damage to communication equipment could mean life or death in certain situations. The population is dependent on emergency services getting to the incident site in a timely manner, and if there is damage to the equipment, the services may not reach their destination at all. The elderly population in the county is especially vulnerable to power outages and times of extreme weather, and these times are the most important to get services to them. In that case, there needs to be an alternative way of communication for the emergency services to reach their destination.

The county has come up with a few ideas to help solve this problem. They suggested that Mutual aid assistance for failures in utility and communications systems (including 9-1-1) could help alleviate the problem. Alternative 9-1-1 access could be done through radio operators whose homes are identified through special markings. Also, they could use generators for backup power at critical facilities. Finally, the replacement or renovation of aging structures and equipment has been deemed a high priority.

#### **Infrastructure Failures in Sanilac County**

On 12/21/2013 an ice storm hit Central Michigan resulting in power outages in Sanilac County and throughout the region causing numerous homes and businesses to lose power. Because of the extensive coverage of the storm and the hazardous traveling conditions, many homes in the region did not gain their power back for several days.

On August 14, 2003 a major blackout that covered much of the Northeastern US also impacted Sanilac

County. While the County was not directly affected by the blackout, residents from the Detroit area, traveled north to Sanilac to wait out the blackout. As a result, this large influx of people created shortages in food, specifically bread and milk, and gasoline for the residents of the County.

#### Infrastructure Failures Overview

Most of Sanilac County's infrastructure failures are secondary hazards caused by other major events such as floods, windstorms, snow and ice storms. The main infrastructure failures are power outages, which are normally restored in a matter of hours. However, due to the impact that result from the infrastructure failures, they were given a high priority to address.

## **Fire Hazards**

### **WILDFIRES**

Wildfire: an uncontrolled fire in grass or brushlands, or forested areas.

#### Hazard Description

Contrary to popular belief, lightning strikes are not a leading cause of wildfires in Michigan. Today, lightning causes only 4 percent of all wildfires, and the rest are caused by human activity. Outdoor burning is the leading cause of wildfires in Michigan. Debris burning was responsible for 32 percent of the wildfires in Michigan in 1999. Incendiary, or intentional, fires accounted for another 12 percent of the total wildfires.

Upon examination of the causes of fire, it becomes apparent that most Michigan wildfires occur close to where people live and recreate, which puts both people and property at risk. The immediate danger from uncontrolled wildfires is the destruction of timber, structures, other property, wildlife, and injury or loss of life to people who live in the affected area or who are using recreational facilities in the area.

#### Wildfires in Sanilac County

There have been no significant wildfires in Sanilac County in recent years, with only nine fires being reported to the DNR over the past 20 years. With the majority of the land being utilized for agricultural purposes, there is little area that has been retained as forest.

#### Wildfire Overview

Only nine fires have been reported over the past 20 years. This results in a 45 percent chance of a wildfire occurring in a given year. However, these fires have resulted in causing limited damage and no deaths or injuries resulting from the fires, wildfires were given a moderate priority to address.

### **STRUCTURAL FIRES**

Structural fire: a fire, of any origin that ignites one or more structures, causing loss of life and/or property.

#### Hazard Description

In terms of average annual loss of life and property, structural fires – often referred to as the “universal hazard” because they occur in virtually every community – are by far the biggest hazard facing most communities in Michigan and across the country. Each year in the United States, fires result in approximately 5,000 deaths and 25,000 injuries requiring medical treatment. According to some sources,

structural fires cause more loss of life and property damage than all types of natural disasters combined. Direct property losses due to fire exceed \$9 billion per year – and much of that figure is the result of structural fire.

According to the Federal Emergency Management Agency's National Fire Data Center, residential fires represent 74% of all structural fires and cause 80% of all fire fatalities. Approximately 85% of those fatalities occur in single-family homes and duplexes. Perhaps the most tragic statistic of all is that over 40% of residential fires and 60% of residential fatalities occur in homes with no smoke alarms.

According to statistics compiled by the Fire Marshal Division, Michigan Department of State Police for 2003 (the last year for which statewide statistics are available), nearly 19,000 structural fires occurred in Michigan, resulting in 161 deaths and 624 injuries. Dollar losses for structural fires were estimated at nearly \$230 million. The Fire Marshal Division estimated that a structural fire occurred in Michigan every 28 minutes in 2003. Nationally, Michigan's fire death rates in 2007 of 15.4 persons per million (population) puts it in the upper third of all states in the nation.

There are several major challenges to firefighting in Sanilac County. The first challenge is regarding the Michigan fire service and the lack of a state-mandated fire safety code and code enforcement program for all occupancies. The second major challenge is the firefighting capacity within Sanilac County. There is not a full-time firefighting staff within the County and without full-time firefighters communities are reliant on paid-on-call firefighters or do not have a fire department. In addition, due to the smaller size of the departments, when there is a multiple alarm fire within the County, multiple agencies have to respond to assist in battling the fire. This can create a strain on the communities should another fire or emergency occur.

#### Structural Fires in Sanilac County

There are numerous structural fires annually in Sanilac County. Often these fires result in the loss of a home or a business. Thus, while the County is susceptible to fires, their vulnerability in recent years has been limited to the loss of property. Even though the vulnerability is low, the risk remains high as a result of human behavior.

ON 01/08/2015 a fire broke out at Kolar Bros. Construction, Inc, outside of the Village of Minden City, which destroyed the building and all of its contents, including multiple pieces of equipment, forklifts, and construction vehicles. Over 40 firefighters from throughout the region assisted in battling the fire. One firefighter was hospitalized with carbon monoxide poisoning and several other firefighters suffered from smoke inhalation.

#### Structural Fires Overview

Structural fires occur every year, beyond the ordinary single-home fires that happen in every community. Since historic areas are less well-fireproofed and tend to have greater densities, the risk of major fire impacts appears to be higher. Because of the impact and potential danger to the community, structural fires were viewed as the hazard that poses the greatest threat to the residents of the County and was given a high priority to address.

#### **SCRAP TIRE FIRES**

Scrap tire fire: a large fire that burns scrap tires being stored for recycling/re-use.

#### Hazard Description

Michigan generates some 7.5 to 9 million scrap tires each year. Although responsible means of disposal have become more common, tire dumps prior to 2010 could present environmental and safety hazards that will last into the foreseeable future, if not addressed. By 2001, the State of Michigan had identified a total in excess of 24 million scrap tires in disposal sites scattered around the state. By 2010, these sites were all reported as removed from the county.

The Scrap Tire Regulatory Program is implemented by the Waste Management Division of the Michigan Department of Environmental Quality, under the authority of Part 169 of the Natural Resources and Environmental Protection Act (451 P.A. 1994), as amended. Policies and regulations established under this law provide the basis for the MDEQ to implement and administer an effective scrap tire management program per the following initiatives: 1) a compliance and enforcement program was implemented; 2) a scrap tire policy recycling hierarchy was established; 3) special uses of scrap tires were approved; and 4) a grant program was established to address abandoned tires.

In 1997, Part 169 was amended to require that a statewide emergency response plan be put into place to address response to fires at collection sites.

#### Scrap Tire Fires in Sanilac County

Sanilac County has not had a significant tire fire in recent memory.

#### Scrap Tire Overview

With the elimination of scrap tire sites within Sanilac County, this hazard has been greatly reduced and was given a low priority. Low priority hazards have not been addressed in this plan, as high, medium, and moderate priority hazards all were viewed as greater risks to Sanilac County and its residents.

## **Seasonal Population Increase**

### **SEASONAL POPULATION INCREASE**

Seasonal population increase: a population, in the county, beyond the normal level of people to which resources are allocated.

#### Hazard Description

As more and more people vacation to the northern portions of Michigan, local communities in northern Michigan are going to find it harder to maintain levels of safety and resources to keep the population in the jurisdictions comfortable and safe. The trend of people buying summer homes or cottages is growing, and with the advent of Baby-Boomers reaching retirement age, the seasonal and permanent populations of the northern counties will continue to slowly grow.

Many stresses are put on local governmental agencies such as fire departments, police departments, as well as hospitals, the road commission, and ambulance services to maintain the status quo of service for their county. With more people relocating to the northern counties for extended periods of time, the level of staff and resources may not suffice for the needs of the population.

#### Seasonal Population Increases in Sanilac County

Sanilac County is no exception to seasonal population spikes in the summer, deer season, and to a lesser extent, the winter months. On top of permanent population growth, which grew from 39,928 in 1990 to 44,547 in 2000 (+4600), Sanilac County has 3,244 housing units classified as seasonal, recreational, and

occasional by the U.S. Census in 2000.

In the summer of 2003, a power outage occurred throughout the northeast U.S., including portions of Detroit. As a result, Sanilac County experienced a high influx of people from the Detroit area going to their seasonal homes within the county. The emergency management office reported that there were low supplies of food and stresses on emergency services in Sanilac County.

#### Seasonal Population Increase Overview

Seasonal population increase will continue to be a problem in Sanilac County unless there are preventative measures taken to solve it. The population of Sanilac County is projected to decrease slightly, but with dwindling budgets, Sanilac County is finding it hard to maintain the status quo for emergency services. The seasonal population influx will only make the situation harder to manage. Also, infrastructure problems in southern Michigan can be a factor that directly affects Sanilac County. This hazard was given a moderate priority.

### **Civil Disturbances**

#### **CIVIL DISTURBANCES**

Civil disturbance: collective behavior that results in a significant level of law-breaking, perceived threat to public order, or disruption of essential functions and quality of life.

#### Hazard Description

Civil disturbances can be classified within the following four types: (1) acts or demonstrations of protest, (2) hooliganism, (3) riots, or (4) insurrection. Since most of these types of disturbance share similarities with each other, and the classifications presented here are not absolute and mutually exclusive, it is recommended that this entire section be studied as a whole. The descriptions that follow, while roughly organized by type of disturbance, provide information of interest in evaluating and understanding all types of civil disturbance, and therefore should not be treated as independent subsections or read in isolation from each other.

The first type, demonstrations of protest, usually contains some level of formal organization or shared discontent that allows goal-oriented activities to be collectively pursued. This first category includes political protests and labor disputes. Many protest actions and demonstrations are orderly, lawful, and peaceful, but some may become threatening, disruptive, and even deliberately malicious (on the part of at least some of those involved either in the protest itself or in reaction to the protest). It is only the latter type of event that should properly be classified as a civil disturbance. The destruction of property, interruption of services, interference with lawful behaviors of ordinary citizens and/or emergency responders, the use of intimidation or civil rights violations, and threats or actual acts of physical violence may all occur during civil disturbance events. Actual Michigan events have included the willful destruction of property and impeded property access during labor strikes, and heated conflicts between opposing participants at political rallies or issue-driven demonstrations. Different risks and forms of disturbance are connected with the nature and perceived importance of the cause, the degree of organization among those who are active in the protest, and the amount of group cohesion among those who are involved.

The second category of civil disturbance, hooliganism, is relatively unorganized and involves individual or collective acts of deviance inspired by the presence of crowds, in which the means (and responsibility) for ordinary levels of social control are perceived to have slackened or broken down. Certain types of events,

such as sporting events, “block parties,” or concerts, become widely publicized and, in addition to normal citizens who merely seek entertainment, tend to also attract certain types of persons who seek situations in which anonymity, confusion, and a degree of social disorder may allow them to behave in unlawful, victimizing, or unusually expressive ways that would normally be considered unacceptable by most ordinary people. An Example includes the disorder that has followed various championship sporting events. Although the majority of persons present are ordinary citizens (although many may have some level of intoxication), a minority of persons begin making itself known through unlawful or extreme acts of deviance, and it is from this part of the crowd that the hazard primarily stems.

Common problems include the widespread destruction of property, numerous types of assault and disorderly conduct, and criminal victimization. It should also be noted that many persons who are normally law-abiding may temporarily behave in unusually aggressive ways during these events, often prompted by an understandably defensive anxiety about the disorder and behavior exhibited by the deviant minority, but also possibly exacerbated by a level of alcoholic intoxication as well as the temptation by some to engage in appealing deviant behaviors that under normal circumstances of social control would not be selected. Many citizens remain law-abiding but may remain in the area of a civil disturbance either because they live in the area, have activities (including social and recreational ones) that they wish to continue engaging in, have legitimate business to conduct, or because they are curious or concerned and wish to observe or witness the situation as it occurs. The majority of such law-abiding citizens will leave the area in an orderly way when given clear instructions by a legally recognized authority to do so. There are cases in which hooliganism may become combined with protest, and thus complicate the situation for law enforcement personnel. In some circumstances, elements of protest are added only by a small minority of participants after the disturbances have already begun, but in other circumstances, protest activity may arise out of concerns regarding the extent and nature of pre-emptive law enforcement activities that were intended to prevent a civil disturbance.

The third type, riots, may stem from motivations of protest, but lacks the organization that formal protests include. Although legitimate and peaceful protests may spontaneously form when people gather publicly with the perception that they already share certain values and beliefs, riots tend to involve violent gatherings of persons whose level of shared values and goals is not sufficiently similar to allow their collective concerns or efforts to coalesce in a relatively organized manner. Instead, there tends to be a diffuse sense of shared discontent, but relatively few norms to shape these strivings into clearly coherent action. For example, widespread discontent within a community that is sufficiently cohesive may quickly take on a set of shared leaders and clear organization, such as a march or chant that is clearly in the form of a protest or demonstration, but in an area that doesn’t have the same cohesiveness and shared norms and values, a relatively chaotic form of expression may take place instead, involving assaults, intimidation, and unlawfully destructive expressions of discontent, possibly including the victimization of innocent citizens or businesses who have been selected by part of the crowd to function as scapegoats during their expression of discontent. In addition to the sentiments of discontent that may have sparked the initial activities, however, elements of hooliganism may emerge and even come to predominate, as certain persons may attempt to exploit the social disorder for their own individual ends. In other cases, elements of legitimate protest may also form within this type of civil disturbance, and pockets of organized protest may help to channel and contain the negative elements of hooliganism, looting, etc. that might otherwise threaten all area residents. The complexity of these events for law enforcement can be very great, demanding carefully calculated efforts to analyze the nature of the disturbance, and difficult decisions about how to approach and possibly involve the numerous types of persons, gatherings, groups, and behaviors that may have the potential to either mitigate or exacerbate the situation.

The fourth type of civil disturbance, insurrection, involves a deliberate collective effort to disrupt or replace the established authority of a government or its representatives, by persons within a society or under its authority. Some prison uprisings may fall into this category, although others may more properly be classified as riots or protests, depending upon the presence and extent of specific goals and organization, and the type of action used in achieving such goals. An insurrection has the deliberate goal of either replacing established authorities with a new distribution of power, or with the destruction of established power structures in favor of (usually temporary) anarchy or a smaller-scale set of recognized criminals (gang), ethnic, or other group networks and power structures. The latter circumstances tend to involve disturbances that exist on a relatively small scale, such as in a single local area or involving a prison network or “cult compound” (or any other similarly self-aware group or subculture with identified collective interests and a network that allows rapid communication). However, larger-scale insurrections are also possible, involving issues of class conflict or other widespread social inequalities, highly divisive political issues, or other important large-scale events that disrupt the social equilibrium because they illuminate areas in which cultural values are not sufficiently shared throughout the society or region that is experiencing the conflict, disruption, or strain. In many cases, this kind of large-scale social strain has developed gradually over time, and involves an entire series of compromises, concessions, and migrations that may temporarily relieve the disruptive social and value conflicts, only to reemerge after another period of changes and population growth has caused a breakdown in previous arrangements. This description of the causes of social discontent applies to many protests and riots, as well as insurrection. In cases involving the formation or emergence of significant subcultures or counterculture, such as during the Vietnam era, or when dominant values break down or fail to be established on important key issues or mores, there is the potential for insurrection on a larger scale. The Civil War of 1861-1865 was one such instance, in which the authority of the federal government was either accepted or rejected by various states which then aligned themselves in opposition to each other. Between these two extremes (of a purely localized civil disturbance and a national civil war) are numerous other possibilities for regional, political, class, or ethnic conflicts that may involve one or more categories of citizen in conflict with others. Examples could include prisoners versus law enforcement personnel, a countercultural group versus the establishment, or a violent political activist group in conflict with selected representatives of a contrary viewpoint. (Some such actions may overlap with those of terrorism, q.v.)

#### Civil Disturbance in Sanilac County Overview

Civil disturbances occur rarely in Sanilac County. However, with the ever-increasing threats throughout society, this is a growing problem that cannot be resolved at the local level. This was given a moderate priority. Should a major event occur, the Michigan State Police, and possibly other law enforcement details will have to be called in to assist the local public safety personnel.

#### **NUCLEAR ATTACK**

Nuclear attack: A hostile action taken against the United States which involves nuclear weapons and results in destruction of property and/or loss of life.

#### Hazard Description

Any hostile attack against the United States, using nuclear weapons, which results in destruction of military and/or civilian targets. All areas of the United States are conceivably subject to the threat of nuclear attack. However, the strategic importance of military bases, population centers and certain types of industries place these areas at greater risk than others. The nature of the nuclear attack threat against the U.S. has changed dramatically with the end of the “Cold War” and the conversion of previous adversaries to more democratic forms of government. Even so, the threat still exists for a nuclear attack against this country. Despite the dismantling of thousands of nuclear warheads aimed at U.S. targets,

there still exists in the world a large number of nuclear weapons capable of destroying multiple locations simultaneously. In addition, the number of countries capable of developing nuclear weapons continues to grow despite the ratification of an international nuclear non-proliferation treaty. It seems highly plausible that the threat of nuclear attack will continue to be a hazard in this country for some time in the future.

At this point, attack-planning guidance prepared by the Federal government in the late 1980s still provides the best basis for a population protection strategy for Michigan. That guidance has identified 25 potential target areas in Michigan, and 4 in Ohio and Indiana that would impact Michigan communities, classified as follows: 1) commercial power plants; 2) chemical facilities; 3) counterforce military installations; 4) other military bases; 5) military support industries; 6) refineries; and 7) political targets. For each of these target areas, detailed plans have been developed for evacuating and sheltering the impacted population, protecting critical resources, and resuming vital governmental functions in the post-attack environment. Even though Iosco County has an airbase; the threat of a nuclear attack has been lowered due to the end of the “Cold War” and the closure of the base. There still may be a small threat to the former base because it could still be reused for B-52 Stratofortress bomber operations in case the current Stratofortress base is destroyed. The airfield could also have the potential for terrorism/sabotage and is being looked at under that category.

Nuclear weapons are explosive devices that manipulate atoms to release enormous amounts of energy. Compared to normal chemical explosives such as TNT or gunpowder, nuclear weapons are far more powerful and create harmful effects not seen with conventional bombs. A single nuclear weapon is able to devastate an area several miles across and inflict thousands of casualties. Although nuclear attack is an unlikely threat, the severe damage that would be caused by even one weapon requires the danger to be taken seriously.

The threat of nuclear attack has primarily been associated with the Cold War between the United States and the Soviet Union in the last half of the 20th Century. Although the Cold War is over, there remains a threat of nuclear attack. More nations have developed nuclear weapons and there is also the possibility that terrorists could use a nuclear weapon against the United States.

### Hazard Analysis

#### Understanding Nuclear Weapons

The following information about nuclear weapons is important for understanding the threat of nuclear attack: (1) types of nuclear weapons, (2) measures of weapon power, (3) forms of attack, and (4) types of delivery systems.

Nuclear weapons have been built in a wide variety of types for several different purposes. The first weapons relied on nuclear fission, or the splitting of heavy atoms to release energy and create an explosion. Later, new weapons were invented that used a combination of fission and fusion, which involves the creation of heavier atoms from lighter ones. Fusion bombs are also referred to as hydrogen bombs or H-bombs. For emergency planning purposes, the important differences are that (1) fusion bombs are more difficult to build and (2) that they can be much more powerful. Otherwise, all types of nuclear weapons create the same types of effects.

The power of nuclear weapons is measured by comparing the energy released by the weapon to the energy released by large amounts of conventional high explosive. The strengths of smaller weapons are measured in kilotons (or thousands of tons) of TNT explosive. A twenty-kiloton bomb produces as much

energy as twenty thousand tons of TNT exploded all at once. The strength of larger weapons is measured in megatons, or millions of tons of TNT. A two-megaton bomb produces as much energy as two million tons of high explosive.

Smaller nuclear weapons are generally designed to be used against military targets on the battlefield. These are called tactical nuclear weapons. Larger devices designed to attack cities, infrastructure, and military bases are called strategic nuclear weapons.

Bombs can be set off at varying heights above the target. If the bomb is set off high in the air, its effects are spread out over a wider area and generally more damage is done. This is called an air burst. A bomb that is set off at or near the Earth's surface level wastes much of its energy against the ground. This is called a ground burst. Ground bursts have some specific military uses and terrorists may use ground bursts because they are unable to lift their weapons high enough to create an air burst.

Like any weapon, a nuclear device must be carried to its target by a delivery system. The first nuclear weapons were bombs dropped out of aircraft. Later, tactical weapons were made small enough to fire out of cannons or carry in large backpacks. Intercontinental ballistic missiles (ICBMs) are rockets that can carry one or more nuclear weapons across thousands of miles in less than an hour. Terrorists may lack sophisticated missiles, but they could create effective delivery systems by transporting a nuclear weapon in the back of a truck, aboard a cargo plane, or within a shipping container.

### Effects of Nuclear Weapons

The effects of nuclear weapons are more complicated than those of conventional explosives. Nuclear devices cause damage through six major effects: (1) thermal pulse, (2) blast, (3) prompt radiation, (4) electromagnetic effects, (5) mass fire, and (6) residual radiation.

THERMAL PULSE is an intense flash of light and heat released within the first few seconds of a nuclear explosion. The damage from thermal pulse is almost instantaneous and covers a wide area. People and animals exposed to the pulse can be badly burned. Flammable objects such as buildings, vehicles, and trees may be set on fire. The flash is strongest close to the bomb and becomes weaker with distance. Even people located far away from the explosion may still be blinded by the intense light of the pulse.

BLAST is a powerful wave of force that moves out from the center of the explosion through the air and the ground. The farther the blast travels, the weaker it becomes. Very close to the bomb, the blast will destroy even the most strongly built buildings and will kill everyone not hidden deep underground. Farther away, buildings may survive, but with severe damage, and people will be injured by being picked up and smashed against objects. At still greater ranges, buildings will be less damaged, and injuries will largely result from shattered glass and thrown debris. At all distances, a powerful wind follows the initial blast wave and adds to the destruction. The blast from a ground burst will dig a large crater into the ground, but this cratering will not occur with an air burst.

PROMPT RADIATION is the harmful blast of high energy radiation given off at the same time as the thermal pulse. Prompt radiation includes gamma rays and neutron radiation. This radiation is capable of killing or injuring living beings by damaging tissues and organs. Prompt radiation is quickly absorbed by the atmosphere and does not impact as wide an area as other nuclear weapons effect. In most instances, a person close enough to receive a harmful dose of prompt radiation is also close enough to be immediately killed by the explosion's thermal pulse or blast. However, in unusual cases, some people who survive the immediate effects of the bomb may sicken or die days later, from radiation poisoning.

ELECTROMAGNETIC EFFECTS occur immediately after a nuclear explosion and may damage communications equipment, computers, and electronics. Radios, cell phones, and power lines are especially vulnerable. In most cases, the effects are limited to an area near to the explosion. Some equipment may recover after a period of time, while other devices will need to be replaced. One special type of nuclear attack might cause more widespread electromagnetic effects: a very large nuclear weapon carried high into the atmosphere by a missile is capable of damaging communications and electronics over a very large area.

MASS FIRE results from the ignition of thousands of individual fires by a bomb's thermal pulse, combined with widespread destruction from its blast. Over a period of hours, small fires merge and feed on damaged buildings and debris. Controlling these fires would be very difficult, due to damaged water mains, destroyed fire-fighting equipment, and blocked roads. The result is an extremely intense fire that can spread quickly and reach very high temperatures. Mass fire may significantly expand the area devastated by a bomb, destroying areas that might otherwise be only lightly damaged by other types of effects.

RESIDUAL RADIATION is unlike prompt radiation in that it lasts well after the nuclear explosion has ended. The ground immediately underneath the center of the explosion will be dangerously radioactive for several days due to "induced radiation." There will also be some radioactive dust and debris that will drift downwind of the explosion. This radioactive dust is called "fallout." Fallout will be a minor problem in the case of an air burst explosion but will be very intense in the case of a ground burst attack. Regardless of the type of attack, the danger from fallout will tend to be greatest close to the site of the attack. The cloud of fallout will weaken the longer it lasts and the farther it travels.

Note that the effects of a nuclear attack will depend on the size of the weapon. A larger bomb will cause damage over a wider area. The importance of different types of damage will also vary with the weapon. Large strategic nuclear weapons will create most of their damage through thermal pulse and mass fires, while with small tactical bombs the blast effect and prompt radiation will be relatively more important.

#### Hazard Mitigation Alternatives for Nuclear Attack

- Designated fallout shelters and public warning systems.
- Construction of concrete safe rooms (or shelters) in houses, trailer parks, community facilities, and business districts.
- Using laminated glass, metal shutters, structural bracing, and other hazard-resistant, durable construction techniques in public buildings and critical facilities.
- Increased coverage and use of NOAA Weather Radio (which can provide notification to the community during any period of emergency, including enemy attack).

#### Nuclear Attack Overview

Nuclear attack is an unlikely hazard, but even a single weapon could cause death and destruction on a massive scale. Nuclear weapons inflict damage over a wide area and through a variety of effects, including thermal pulse, blast, fire, and radiation. Despite the end of the Cold War, nuclear attack by foreign nations remains a real possibility, and this danger has been joined by the threat of terrorist nuclear attack. It makes sense to continue to prepare for the nuclear attack hazard as part of an overall emergency management strategy. (Note: Should a nuclear attack occur, the mitigation activities will be supervised by the Department of Homeland Security.)

### **SABOTAGE (TERRORISM)**

Sabotage (terrorism): an intentional, unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political, social, or religious objectives.

#### **Hazard Description**

Sabotage/terrorism can take many forms or have many vehicles for delivery, including: 1) bombings; 2) assassinations; 3) organized extortion; 4) use of nuclear, chemical, radiological, and biological weapons; 5) information warfare; 6) ethnic/religious/gender intimidation (hate crimes); 7) state and local militia groups that advocate overthrowing the U.S. Government; 8) eco-extremism, designed to destroy or disrupt specific research or resource-related activities; and 9) widespread and organized narcotics smuggling and distribution organizations. Because sabotage/terrorism objectives are so widely varied, so too are the potential targets of such actions. Virtually any public facility or infrastructure, or place of public assembly, can be considered a potential target. In addition, certain types of businesses engaged in controversial activities are also potential targets, as are large computer systems operated by government agencies, banks, financial institutions, large businesses, health care facilities, and colleges/universities.

One of the first acts of domestic sabotage/terrorism ever carried out occurred in Michigan on May 18, 1927, in Bath. A disgruntled taxpayer and farmer detonated 1,000 pounds of explosives under the newly constructed Bath Consolidated School killing 38 students and 3 teachers and injuring 58 others. The perpetrator then blew himself up, along with the school superintendent. As tragic as that event was, it could have been worse were it not for the fact that half of the explosives failed to detonate as planned, which certainly would have killed many more students and teachers.

Another well-known domestic terrorist attack is the Oklahoma City bombing of the Alfred Murrah Federal Building. This was a terrorist attack with a direct attacker ties to Sanilac County.

Concentrated activities to prevent terrorist activities have become even more vital with the passage of time and in the wake of the 9/11 events of destruction in New York City and Washington D.C. Many more resources may anticipate being mobilized to prevent terrorist activities in the near future.

Although at first it might appear Sanilac County is an unlikely target for terrorism, it cannot be totally discounted. Potential targets include the dams, the water treatment plant, the runways at the airports, and all industrial sites in the area. Furthermore, any government building, school, or individual can become a target of domestic terrorism.

Sabotage and Terrorism include a broad range of potential hazards that affect a community from a variety of perspectives. This hazard is defined as an intentional, unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political, social, or religious objectives. Sabotage/terrorism can take many forms or have many vehicles for delivery, including: 1) bombings; 2) assassinations; 3) organized extortion; 4) use of nuclear, chemical, radiological, and biological weapons; 5) information warfare; 6) ethnic/religious/gender intimidation (hate crimes); 7) state and local militia groups that advocate overthrowing the U.S. Government; 8) eco-extremism, designed to destroy or disrupt specific research or resource-related activities; and 9) widespread and organized narcotics smuggling and distribution organizations.

#### **Sabotage Overview**

Even though there have not been any recently recorded sabotage/terrorism events occurring recently in

Sanilac County, the Emergency Management staff has regularly scheduled training events to address these circumstances. With the ever-growing threat of local acts, the County is working to prepare their personnel should an event occur. Because of the impact any act would create and the damages that would result, this hazard was given a high priority to address.

## **Public Health Emergencies**

### **PUBLIC HEALTH EMERGENCIES**

Public health emergency: a widespread and/or severe epidemic, incident of contamination, or other situation that presents a danger to or otherwise negatively impacts the general health and well-being of the public.

#### **Hazard Description**

Public health emergencies can take many forms: 1) disease epidemics; 2) large-scale incidents of food or water contamination; 3) extended periods without adequate water and sewer services; 4) harmful exposure to chemical, radiological, or biological agents; 5) large scale infestations of disease-carrying insects or rodents. Public health emergencies can occur as primary events by themselves, or they may be secondary events another disaster or emergency, such as flood, tornado, or hazardous material incident. The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, a large number of people. Public health emergencies can be statewide, regional, or localized in scope and magnitude.

Perhaps the greatest emerging public health threats would be the intentional release of a radiological, chemical, or biological agent or a natural or man-made pandemic with the potential to adversely impact a large number of people. Such a release would most likely be an act of sabotage aimed at the government or at a specific organization or segment of the population. Fortunately, Michigan has not yet experienced such a release aimed at mass destruction.

#### **Public Health Emergencies in Sanilac County**

The most common type of public health emergency involves influenza that spreads through educational institutions, the workplace and other entities that experience a large volume of public traffic. Influenza typically kills between 200 and 500 individuals in Michigan alone and has the potential to change its structure and rapidly affect large populations.

In early 2020, the coronavirus (COVID-19) reached pandemic proportions as it reached American soil. This resulted in many states, including Michigan, calling for a state-wide temporary closure of non-essential businesses, thereby resulting in the closure of schools, businesses, and parks. The full impact of this pandemic, which had yet to reach its peak at the time when this document was being finalized, will not be known for several years.

Occurrences of influenza and disease are common to residents, students and visitors to Sanilac County and typically impact only a small portion of the population. Although most of public health related events occur in schools and are quickly managed, the potential does exist for these events to rapidly spread to adjacent populations.

Most public health emergencies in Sanilac County impact only a small number of individuals and occur

more than once annually. The potential for these events to continue is high and can be effectively managed. However, increased public awareness of potential outbreaks of influenza or other disease has also raised the real possibility that a large-scale event could occur. For this reason, development and testing of surveillance systems and integrated planning between local, state, and federal sources continues to receive much-needed attention.

### Public Health Emergency Overview

Michigan has had several large-scale public health emergencies in recent history, with the most recent being COVID-19. Prior to COVID-19, nothing had caused widespread severe injury or death. One of Michigan's most serious emergencies to hit Michigan occurred in 1973 when a local farmer fed polybrominated biphenyls (PBB) laced feed to his dairy herd. Michigan Chemical Corporation had accidentally supplied the Michigan Farm Bureau Services with sacks of fire-proofing chemical PBB, which is known to cause cancer, genetic mutation, and birth defects, and the PBB was inadvertently substituted for magnesium oxide (commonly used in antacid tablets used for human consumption) in a custom dairy feed # 402. During the crucial eight-month period between the farmer's first observations and the discovery of the accident, serious contamination had already occurred. By 1975 the state had quarantined more than 500 farms. Condemned for slaughter were more than 17,000 cattle; 3,415 hogs; 1.5 million chickens and 4.8 million eggs. The 1973 PBB contamination incident is unprecedented in U.S. history, but the long-term implications of contamination may be less than was feared.

In the 1980s, the state health department confirmed that 95 percent of Michigan's population had PBB in their bodies from eating beef, drinking milk, or consuming other products from contaminated farms. A cancer epidemic was feared. Although one has not occurred, so far anyway, studies do show the most exposed families have increased breast and digestive cancer, and lymphoma. Among the effects observed in the exposed populations the daughters of the most highly exposed women began menstruation, on average, before they reached their twelfth birthdays, which is slightly earlier on the average than most girls. ("In the United States, the average age of menarche, the onset of menstruation is 12.8 years; most girls begin menstruating between the ages of 11 and 14, but the normal range extends from 9 to about 17 years."<sup>6</sup>

In 2001, Michigan health officials were introduced to the emerging health threats posed by foot-and-mouth disease and the West Nile encephalitis virus. Although foot-and-mouth disease is a highly contagious disease that only affects animals, a widespread outbreak such as that which occurred in parts of the United Kingdom in the spring of 2001 could have significant public health implications for humans as well, due to the potentially large numbers of dead animal carcasses that would have to be disposed of to prevent disease outbreaks. The Michigan Department of Agriculture and Rural Development, in conjunction with numerous other federal, state and local agencies and the agriculture industry, continues to monitor the foot-and-mouth disease situation and take the necessary steps to prevent the introduction and spread of the disease in the United States.

## **Geological Hazards**

### **EARTHQUAKES**

Earthquake: a shaking or trembling of the crust of the earth caused by the breaking and shifting of rock beneath the surface.

#### Hazard Description

Earthquakes range in intensity from slight tremors to great shocks. They may last from a few seconds to several minutes or come as a series of tremors over a period of several days. The energy of an earthquake is released in seismic waves. Earthquakes usually occur without warning. In some instances, advance warnings of unusual geophysical events may be issued. However, scientists cannot yet predict exactly when or where an earthquake will occur. Earthquakes tend to strike repeatedly along fault lines, which are formed where large plates of the earth's crust below the surface constantly push and move against one another. Risk maps have been produced which show areas where an earthquake is more likely to occur. Earthquake monitoring is conducted by the U.S. Geological Survey, the National Oceanic and Atmospheric Administration, and universities throughout the country.

The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Most casualties result from falling objects and debris. Disruption of communications systems, electric power lines, gas, sewer and water mains can be expected. Water supplies can become contaminated by seepage around water mains. Damage to roadways and other transportation systems may create food and other resource shortages if transportation is interrupted. In addition, earthquakes may trigger other emergencies such as fires and hazardous material spills, thereby compounding the situation.

#### Earthquake Overview

No severely destructive earthquake has ever been documented in Michigan. However, several mildly damaging earthquakes have been felt since the early 1800s. The exact number is difficult to determine, as scientific opinion on the matter varies. With most of these earthquakes, damage (if any) was limited

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<sup>6</sup>The Yale Guide to Women's Reproductive Health: From Menarche to Menopause

to cracked plaster, broken dishes, damaged chimneys, and broken windows. (Biggest Michigan threats would be to pipelines, buildings that are poorly designed and constructed, and shelving, furniture, mirrors, gas cylinders, etc. within structures that could fall and cause injury or personal property damage)

The greatest impact on Sanilac County would probably come from damage to natural gas and petroleum pipelines. If the earthquake occurs in the winter, areas of the state could be severely impacted by fuel shortages.

Damage would probably be negligible in well-designed and constructed buildings. However, poorly designed and constructed buildings could suffer considerable damage under the right circumstances.

In January 1990, Executive Order (EO) 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, was signed into law. This EO requires that appropriate seismic design and construction standards and practices be adopted for any new construction or replacement of a federal building or federally building during or after an earthquake.

Sanilac County is not in an area designated as being at high risk from ground movement; yet by encouraging awareness of the hazards of poor construction practices and/or routine evaluations of existing structures for deficiencies, vulnerabilities can be identified and repaired before loss is sustained.

There is some chance of a moderate earthquake over the next few decades, which might be strong enough to damage some property and underground infrastructure. Earthquakes were identified as a low priority and were not addressed as a priority. Low priority hazards have not been addressed in this plan,

as high, medium, and moderate priority hazards all were viewed as greater risks to Sanilac County and its residents.

### **SUBSIDENCE**

Subsidence: the lowering or collapse of the land surface caused by natural or human-induced activities that erode or remove subsurface support.

#### **Hazard Description**

Subsidence is the lowering or collapse of the land surface due to loss of subsurface support. It can be caused by a variety of natural or human-induced activities. Natural subsidence occurs when the ground collapses into underground cavities produced by the solution of limestone or other soluble materials by groundwater. Human-induced subsidence is caused principally by groundwater withdrawal, drainage of organic soils, and underground mining. In the United States, these activities have caused nearly 17,000 square miles of surface subsidence, with groundwater withdrawal (10,000 square miles of subsidence) being the primary culprit. In addition, approximately 18% of the United States land surface is underlain by cavernous limestone, gypsum, salt, or marble, making the surface of these areas susceptible to collapse into sinkholes.

Generally, subsidence poses a greater risk to property than to life. Nationally, the average annual damage from all types of subsidence is conservatively estimated to be at least \$125 million.

#### **Mine Subsidence**

In Michigan, the primary cause of subsidence is underground mining. Although mine subsidence is not as significant a hazard in Michigan as in other parts of the country, many areas in Michigan are potentially vulnerable to mine subsidence hazards. Mine subsidence is a geologic hazard that can strike with little or no warning and can result in very costly damage. Mine subsidence occurs when the ground surface collapses into underground mined areas. In addition, the collapse of improperly stabilized mine openings is also a form of subsidence. About the only good thing about mine subsidence is that it generally affects very few people, unlike other natural hazards that may impact a large number of people. Mine subsidence can cause damage to buildings, disrupt underground utilities, and be a potential threat to human life. In extreme cases, mine subsidence can literally swallow whole buildings or sections of ground into sinkholes, endangering anyone that may be present at that site. Mine subsidence may take years to manifest. Examples of collapses occurring decades after mines were abandoned have been documented in several areas of the country.

#### **Michigan's Mining Experience**

Michigan's rich mining heritage has played a significant role in the State's development into a world economic power. Due to its diverse geology, Michigan has a wide variety of mineral resources, most notable of which are copper ore, iron ore, coal, sand, gravel, gypsum, salt, oil, and gas. It is not surprising then that underground mining has occurred on a significant scale throughout Michigan's history. The principal types of underground mining that occurs, or has occurred in Michigan, include coal mining, metallic mineral mining, salt mining, gypsum mining, and solution mining.

#### **Copper Mining**

Copper mining, in particular, put Michigan on the map as a major mining area. Although native copper ore occurs in other parts of the world, at one time the quantity of Michigan's native ore was unsurpassed. From the mid to late 1800s, Michigan's Keweenaw Peninsula mines produced more native copper ore than any other mining area in North America. As those resources became depleted, copper mining began near

White Pine in Ontonagon County. The target strata in the White Pine mining operations were on an anticline that was mined both at depths as shallow as 100 feet and as deep as 2900 feet. Over-mining of pillars in shallow parts of the mine caused collapse and subsidence at the surface, on mine property, during the 1980s. The “Copper County” area generally crosses Ontonagon, Houghton, and Keweenaw Counties.

#### Salt/Solution Mining

Michigan also has one of the world’s largest underground salt accumulations. The thickest salt beds lie under most of the Lower Peninsula. These formations are, in some places, over 3,000 feet thick and composed of layers of salt and other minerals. Michigan ranked first or second in national salt production from 1880 to the late 1920s. The bulk of the salt production was from natural brines pumped from six salt formations. Salt was also produced from artificial brines that were derived by injecting freshwater into salt formations and retrieving the resulting brines (called solution mining). The old Detroit salt mine produced rock salt using the “room and pillar” method until 1983. (The room and pillar method involves creating large underground expanses [rooms] in which to mine, supported by pillars [natural or artificial structural members] that held in place the roofs of these rooms.) The Detroit salt mine was approximately 1,100 feet below ground and encompassed approximately 1,100 acres of subsurface land. The room and pillar method is being used only in the single salt mine that is still operating in Michigan, by the Detroit Salt Company, which has an excellent safety record. Salt is also being produced from brines extracted at various locations within the state.

#### Gypsum Mining

Gypsum has been mined in Michigan since 1841. In the Grand Rapids area, gypsum is mined by the “room and pillar” method. Open pit mining is used in the Alabaster region (Iosco County). In both of these areas, gypsum beds directly underlie thin layers of glacial drift. Closed topographic lows observed in both areas are believed to be due to groundwater solution of the gypsum and subsequent collapse of the overlying material.

#### Coal Mining

Michigan also once supported a thriving coal mining industry. Records indicate that over 165 different coal mines operated in Michigan’s coal-bearing region, which includes 31 counties in the south-central portion of the lower Peninsula. Over 100 of the 165 known coal mines in the state were located in the Saginaw Bay area. Coal was first discovered in Michigan in 1835 in Jackson County. From that discovery, several small underground and surface coal mines were opened in that area of the state. In 1861, coal was discovered near Bay City, and in 1897 commercial coal mining began in Bay County. That led to the establishment of numerous additional mines in Saginaw, Tuscola, and Genesee counties, which tended to be larger, deeper and more extensive mines. That was the start of Michigan’s coal mining industry.

The state’s underground coal mines were an average of 110 feet deep and were worked by the “room and pillar” method. Michigan had continuous coal mining from 1897 to 1952, when the last underground coal mine near St. Charles, Saginaw County, closed. From 1860 (the year mine records were first kept) until 1975 (the year the last surface coal mine closed), the 165 commercial coal mines produced a total output of over 46 million tons of coal. The maximum coal output was achieved in 1907, when Michigan’s 37 operating coal mines produced two million tons per year - enough to supply 16% of Michigan’s total demand for coal.

#### Mine Subsidence Problem in Michigan

The legacy of underground mining can be felt in numerous locations across the state. Many of the

underground mining areas, whether active or abandoned, are vulnerable to subsidence in some form. Unfortunately, records of abandoned mines are often sketchy and sometimes non-existent. Therefore, it is often difficult to determine exactly where the mines were located. Many areas of Michigan may have developed over abandoned mines and may not even be aware of it. Oftentimes, the only way a community or home/business owner becomes aware of a potential hazard is when subsidence actually occurs and damage or destruction results.

#### Subsidence Overview

Sanilac County has not experienced any cases of subsidence on record. However, with the number of mines that exist and have been abandoned, it could be possible for a future occurrence(s) of subsidence to occur in the County. This was identified as a low priority and was not addressed as a priority.

## HAZARD PRIORITIZATION

**Table 4.10**

To help identify significant projects having the greatest impact to mitigate damages, the SCHMAC ranked the hazards based on probable occurrence, the risk assessment, and the vulnerability assessment. This ranking resulted in the overall prioritization of the hazards impacting Sanilac County. Below is the table that was utilized in developing this prioritization.

Probable occurrence had a high value of 10 (occurring multiple times within a year) to 1 (occurring not more than once within the past 100 years). Risk assessment was out of a possible 10 points and was based on the overall risk the hazard (or hazards) posed to the County. The risk assessment was the hazard's risk to the residents based on the following criteria: likelihood to occur, capacity to cause physical damage, potential to cause casualties, and duration of threat from hazard. Vulnerability assessment was how vulnerable the residents are to impact of each hazard with high, medium, and low criteria.

<b>Event</b>	<b>Probable Occurrence</b>	<b>Risk Assessment</b>	<b>Vulnerability Assessment</b>	<b>Overall Priority</b>
Structural Fires	10	8.60	High	High
Terrorism/Sabotage	10	8.60	High	High
Infrastructure Failure	10	6.10	High	High
Public Health Emergencies	10	4.50	High	High
Severe Winter Weather (1)	10	7.40	High	Medium
Tornadoes	8	6.00	High	Medium
Hazardous Materials Incidents (2)	10	6.00	High	Medium
Transportation Accidents	10	7.70	Medium	Medium
Severe Summer Weather (3)	10	7.30	Medium	Medium
Water-related Hazards (4)	10	7.00	Medium	Medium
Nuclear Incident (5)	1	6.40	High	Moderate
Drought	8	6.20	Medium	Moderate
Fog	10	5.20	Medium	Moderate
Wildfires	10	7.20	Low	Moderate
Civil Disturbance	10	6.40	Low	Moderate
Season Population Changes	10	5.50	Low	Moderate
Oil and Natural Gas Well Incidents	1	1.00	Low	Moderate

(1) Severe winter weather includes- Ice/Sleet Storms, Snowstorms, and Extreme Cold

(2) Hazard Materials Incidents include-Hazard Mitigation Fixed Site and Hazard Mitigation Transportation

(3) Severe summer weather includes-Lightning, Severe Winds, Thunderstorms, Extreme Heat, and Hail

(4) Water related hazards include-Shoreline Erosion, Shoreline Flooding, and Riverine Flooding

(5) Nuclear Incidents include-Nuclear Attack and Nuclear Power Plant Incidents

## HAZARD IMPACT/VULNERABILITY

The tables on the following pages identify how the participating municipalities are potentially impacted by each of the hazards as well as how vulnerable they could be should a natural weather event occur.

In **Table 4.11 Hazard by Impact**, each of the participating municipalities were asked how an event could impact that municipality should it occur. High impact events could be events that resulted in multiple deaths and extensive property damage, medium impact events could be events that resulted in a death and/or injuries to multiple persons and moderate property damage, and moderate impact events could be events that resulted in injuries with minimal property damage.

In **Table 4.12, Asset Vulnerability**, vulnerable assets (facilities and people) for the participating municipalities were identified for the natural (weather-related) events. Those assets that could be vulnerable during an event, are identified in the appropriate column. (For example: should a hailstorm occur in the City of Brown City, the assets that would be vulnerable to damage or injury are identified in that cell.) Earthquakes have been table, as they are not significant for this part of Michigan. Even when they occur, and that is infrequently, often times they are not even felt by people.

## HAZARDS BY IMPACT FOR SANILAC COUNTY MUNICIPALITIES

Table 4.11

Community	High Impact Hazards	Medium Impact Hazards	Moderate Impact Hazards	Community	High Impact Hazards	Medium Impact Hazards	Moderate Impact Hazards
Sanilac County	A, B, C, D	E, F, G, H, I, J	K, L, M, N, O, P, Q	Argyle Township	G, H, Q	D, E, F, I, M,	A, B, C, J, K, L, N, O, P,
Brown City	C, D, F, K	A, B, E, G, H, I, J, L, Q	M, N, O, P	Delaware Township	F	E, I, J,	A, B, C, D, G, H, K, L, M, N, O, P, Q
Croswell	A, B, D, G, K, Q	C, H, O	E, F, I, J, L, M, N, P	Elk Township	A, C, E		B, D, F, G, H, I, J, K, L, M, N, O, P, Q
Marlette	B, D, F, G, J, K, N, Q	A, C	E, H, I, L, M, O, P	Elmer Township		E, F, I, M	A, B, C, D, G, H, J, K, L, N, O, P, Q
Sandusky		F, O	A, B, C, D, E, G, H, I, J, K, L, M, N, P, Q	Flynn Township			A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q
Village of Applegate	D, F, G, H, O	B, E, I, P	A, C, J, K, L, M, N, Q	Forester Township			A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q
Village of Deckerville	A, E, F, I	C, G	B, D, H, J, K, L, M, N, O, P, Q	Fremont Township			A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q
Village of Lexington	B, K	A, D, E, F, G, H, I, O,	C, J, L, M, N, P, Q	Lamotte Township			A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q
Village of Port Sanilac			A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q	Maple Valley Township			A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q

Community	High Impact Hazards	Medium Impact Hazards	Moderate Impact Hazards	Community	High Impact Hazards	Medium Impact Hazards	Moderate Impact Hazards
Marlette Township		A, C, E, F, H, I, M, O	B, D, G, J, K, L, N, P, Q	Washington Township		E, F, H, I	A, B, C, D, G, J, K, L, M, N, O, P, Q
Minden Township		A, B, C, D, E, F, G, H, I, L, M, N, O	J, K, P, Q	Watertown Township	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q		
Moore Township	B, D, E, F, K, L	C, G, H, I, J, M, N, O, Q	A, P	Wheatland Township		B, D, G, H, K, Q	A, C, E, F, I, J, L, M, N, O, P
Sanilac Township	B, K	E, F, H, I, J, L, M, N,	A, C, D, G, O, P, Q	Worth Township	B, F, K, P	E, G, H	A, C, D, I, J, L, M, N, O, Q
Speaker Township	A, B, D, G, H,	J, Q	C, E, F, I, K, L, M, N, O, P				

HAZARDS: A-Structural fires; B-Terrorism/Sabotage; C-Infrastructure Failure; D-Public Health Emergencies; E-Severe Winter Weather; F-Tornadoes; G-Hazardous Material Incidents; H-Transportation Accidents; I-Severe Summer Weather; J-Water-Related Hazards; K-Nuclear Incident; L-Drought; M-Fog; N-Wildfires; O-Civil Disturbance; P-Season Population Changes; Q-Oil and Natural Gas Well Incident

**ASSET VULNERABILITY  
FOR SANILAC COUNTY  
MUNICIPALITIES**

**Table 4.12**

<b>Community</b>	<b>Hail</b>	<b>Lightning</b>	<b>Severe Winds</b>	<b>Tornados</b>	<b>Extreme Heat</b>	<b>Ice/Sleet Storms</b>	<b>Snowstorms</b>	<b>Extreme Cold</b>	<b>Flooding</b>	<b>Shoreline Flooding &amp; Erosion</b>	<b>Drought</b>	<b>Fog</b>
Sanilac County	A,B,C	A,B,C	A,B,C	A,B,C	A	A,B,C	A,B,C	A	A,B	A	A	A
Brown City	A,B,C, D,E,F	A,B,C,D, E,F	A,B,C, D,E,F	A,B,C,D, E,F	A	A,B,C,D, E,F	A,B,C,D,E,F	A	A,B,C,D,E F		A	A
Croswell	A,B,C, D,E,F	A,B,C,D, E,F	A,B,C, D,E,F	A,B,C,D, E,F	A	A,B,C,D, E,F	A,B,C,D,E,F	A	A,B,C,D,E F		A	A
Marlette	A,B,C, D,E,F, G	A,B,C,D, E,F,G	A,B,C, D,E,F,G	A,B,C,D, E,F,G	A	A,B,C,D, E,F,G	A,B,C,D,E,F, G	A	A,B,C,D,E F,G		A	A
Sandusky	A,B,C, D,E,F, G	A,B,C,D, E,F,G	A,B,C, D,E,F,G	A,B,C,D, E,F,G	A	A,B,C,D, E,F,G	A,B,C,D,E,F, G	A	A,B,C,D,E F,G		A	A
Village of Applegate	A,B,D, E	A,B,D,E	A,B,D,E	A,B,D,E	A	A,B,D,E	A,B,D,E	A	A,B,D,E		A	A
Village of Deckerville	A,B,C, D,E,F, G	A,B,C,D, E,F,G	A,B,C, D,E,F,G	A,B,C,D, E,F,G	A	A,B,C,D, E,F,G	A,B,C,D,E,F, G	A	A,B,C,D,E F,G		A	A
Village of Lexington	A,B,C, D,E	A,B,C,D,E	A,B,C, D,E	A,B,C,D,E	A	A,B,C,D,E	A,B,C,D,E	A	A,B,C,D,E	A	A	A
Village of Port Sanilac	A,B,C, D,E	A,B,C,D,E	A,B,C, D,E	A,B,C,D,E	A	A,B,C,D,E	A,B,C,D,E	A	A,B,D,E	A	A	A
Argyle Township	A,B,D, E	A,B,D,E	A,B,D,E	A,B,D,E	A	A,B,D,E	A,B,D,E	A	A,B,D,E		A	A
Delaware Township	A,B,D	A,B,D	A,B,D	A,B,D	A	A,B,D	A,B,D	A	A,B,D,E	A	A	A
Elk Township	A,B,D	A,B,D	A,B,D	A,B,D	A	A,B,D	A,B,D	A	A,B,C,D,E		A	A

Community	Hail	Lightning	Severe Winds	Tornados	Extreme Heat	Ice/Sleet Storms	Snowstorms	Extreme Cold	Flooding	Shoreline Flooding & Erosion	Drought	Fog
Elmer Township	A,B	A,B	A,B	A,B	A	A,B	A,B	A	A,B		A	A
Flynn Township	A,B	A,B	A,B	A,B	A	A,B	A,B	A	A,B		A	A
Forester Township	A,B,	A,B,	A,B,	A,B,	A	A,B,	A,B,	A	A,B	A	A	A
Fremont Township	A,B,	A,B,	A,B,	A,B,	A	A,B,	A,B,	A	A,B		A	A
Lamotte Township	A,B,D	A,B,D	A,B,D	A,B,D	A	A,B,D	A,B,D	A	A,B,D		A	A
Maple Valley Township	A,B,	A,B,	A,B,	A,B,	A	A,B,	A,B,	A	A,B		A	A
Marlette Township	A,B,	A,B,	A,B,	A,B,	A	A,B,	A,B,	A	A,B		A	A
Minden Township	A,B,	A,B,	A,B,	A,B,	A	A,B,	A,B,	A	A,B,C,D,E		A	A
Moore Township	A,B,D	A,B,D	A,B,D	A,B,D	A	A,B,D	A,B,D	A	A,B,D,E		A	A
Sanilac Township	A,B,	A,B,	A,B,	A,B,	A	A,B,	A,B,	A	A,B	A	A	A
Speaker Township	A,B,D	A,B,D	A,B,D	A,B,D	A	A,B,D	A,B,D	A	A,B,D,E		A	A
Washington Township	A,B	A,B	A,B	A,B	A	A,B	A,B	A	A,B,		A	A
Watertown Township	A,B	A,B	A,B	A,B	A	A,B	A,B	A	A,B		A	A
Wheatland Township	A,B	A,B	A,B	A,B	A	A,B	A,B	A	A,B		A	A
Worth Township	A,B	A,B	A,B	A,B	A	A,B	A,B	A	A,B	A	A	A

Assets: A-People; B-City/Village/Township Hall; C-Police Station; D-Fire Station; E-Warning Siren; F-School; G-Health Care Facility

## CHAPTER 5: ANALYSIS OF ALTERNATIVE ACTIONS (2007 PLAN)

As part of the 2007 Hazard Mitigation Plan process, prior to the development of the mitigation strategies, the Sanilac County Hazard Mitigation Advisory Committee (SCMHAC) developed goals and objectives. Upon the development of the goals and objectives, mitigation actions were then determined, based on the six categories of mitigation actions. Below are the goals and objectives, and the mitigation action categories, as determined for the 2007 Hazard Mitigation Plan. The chart in this chapter is a summary of the 2007 Plan action items including their priority in the 2007 Plan, their current status, and the outcomes resulting from the activity.

Revised goals and objectives for the Plan update, as determined by the SCHMAC members will appear in Chapter 6: Action Plan.

**Goals** are general guidelines that explain what a community wants to accomplish. Goals are often long term and represent broad visions. **Objectives** define strategies or implementation steps to attain the identified goals. They are specific, measurable and may have completion dates.

### 2007 Sanilac County Hazard Mitigation Goals and Objectives

#### **GOAL 1: Protect Public Health and Safety:**

##### OBJECTIVES:

- Provide community wide hazard warning systems (natural, health and terrorism)
- Provide information and resources to increase hazard awareness and education
- Maintain existing resources and provide necessary training
- Identify and obtain necessary resources and equipment to prevent or minimize hazard effects
- Identify system that monitors firefighting personnel/equipment in the County

#### **GOAL 2: Minimize damage to public and private property:**

##### OBJECTIVES:

- Adopt policies to make property less vulnerable
- Apply proactive mitigation measures to prevent hazard damage
- Obtain necessary equipment, resources, and training to protect property if hazard occurs
- Conduct training sessions and exercises to prepare for possible hazards

#### **GOAL 3: Maintain essential services:**

##### OBJECTIVES:

- Identify, inspect, and maintain all critical infrastructure and facilities
- Repair or replace critical infrastructure and facilities that are damaged or degraded
- Protect critical infrastructure and facilities from hazard damage
- Obtain necessary resources and equipment to insure essential services are maintained in the event of a hazard

**GOAL 4: Manage growth/development:****OBJECTIVES:**

- Develop hazard resistant growth policies
- Discourage development in high hazard areas
- Integrate hazard mitigation planning into land use planning
- Encourage sustainable development
- Protect and conserve natural resources

The next steps in the 2007 hazard mitigation planning process were to identify mitigation actions suitable to the community, evaluate the effect the action will have on the specified mitigation objective and prioritize actions to decide what sequence or order these actions should be pursued. This step will also be utilized in the Plan update and is located in Chapter 5: Action Plan.

**2007 Mitigation Strategies**

1. **Prevention**-government administrative or regulatory actions or processes that influence the way land and buildings are developed and built.
2. **Property Protection**-actions that involve the modification of existing buildings or structures to protect them from a hazard or removal from a hazard area.
3. **Public Education and Awareness**-actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.
4. **Natural Resource Protection**-actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
5. **Emergency Services**-actions that protect people and property during and immediately after a disaster or hazard event.
6. **Structural Projects**-actions that involve the construction of structures to reduce the impact of a hazard.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
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### A. Multi-Hazard Actions

Continue to develop Emergency Response Team Program to help prepare for all hazard events in the County.	High	Ongoing	Office of Emergency Management	Multiple specialty teams trained annually.
Ensure that the County and individual communities have adequate equipment, staff, and training to respond to transportation related accidents specific to their needs.	High	Ongoing	Office of Emergency Management	Efforts are made to adequately train and staff to meet the needs of the municipalities.
Produce and distribute family emergency preparedness information relating to all natural hazards affecting the County.	High	Ongoing	Office of Emergency Management	6-8 awareness weeks are held annually to advise the public of natural hazards.
Organize outreach program to vulnerable populations during and after hazard events, including wildfires, extreme winter and summer weather events, periods of extreme temperatures, public health emergencies, and other hazards that can impact the community.	Medium	Ongoing	Office of Emergency Management	Implementation and continued use of Smart 911.
Enhance and expand a public education program for all-natural hazards that threaten the community.	Medium	Ongoing	Office of Emergency Management	Classes held to train public on weather events.
Expand and enhance an all hazards education and awareness program in schools, which includes classroom presentations and incorporating wildfire and weather hazard preparedness into school curriculums.	Medium	Ongoing	Office of Emergency Management	Tornado drills held at schools that meet state requirements.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Identify optimal staffing levels for County and community needs- seek funding to meet optimal needs.	Medium	Not Started	Office of Emergency Management	Lack of funding to increase staffing has reduced the priority of this item.
Ensure that gasoline stations have the capacity to pump gasoline during power outages.	Low	Ongoing	Office of Emergency Management	A list of stations is kept by Emergency Management Director (EMD).
Conduct workshops at community gatherings to encourage residents to develop a Family Disaster Plan, which includes the preparation of a Disaster Supplies Kit.	Low	Ongoing	Office of Emergency Management	Presentations made to public throughout the year.
Build the capacities of the county GIS program to function as a tool to address multiple hazards. This effort would require the creation/ updating of datasets such as parcels/ownership, location of all structures, driveways, with ingress/egress conditions, roads, forest types, ownership types, floodplains, utilities (power lines, gas lines, and water lines), wetlands, water features, bridges and culverts (SARA III sites)	Low	Ongoing	Sanilac County Equalization Department	GIS had county-wide parcel identification completed in 2015.
Increase usage of NOAA Weather Radio by subsidizing purchase and distribution of radios to county residents, organizations, and businesses. Use NOAA radios as a community emergency alert system to inform on hazard events.	Low	Ongoing	Office of Emergency Management	Grant secured to purchase radios for municipal buildings.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Acquire portable/changeable message signs to direct crowds and provide information.	Low	Not Started	Office of Emergency Management	Grant funds not available for the purchase of the message sign.
<b>B. Structural Fire</b>				
Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, and recreation areas, and other appropriate sites.	High	Ongoing	Local Fire Departments	Plans received by municipalities.
Improved and continuing training for emergency responders, and provision of equipment for them.	High	Ongoing	Local Fire Departments	Annual training available for all fire-fighting personnel.
Code existence and enforcement. Designs that include the use of firewalls and sprinkler systems (especially in tall buildings, dormitories, attached structures, and special facilities).	Medium	Ongoing	Local Building Departments	Administered by the Sanilac County Construction and Land Use Department.
Encourage residents to develop a Family Disaster Plan, which includes the preparation of a Disaster Supplies Kit.	Medium	Ongoing	Office of Emergency Management	Presentations made to public throughout the year.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Transportation planning that provides roads, overpasses, etc. to maximize access and improve emergency response times, and evacuation potential, for all inhabited or developed areas of a community (not just designing for the minimum amount of road capacity to handle normal traffic volumes in the community.)	Medium	Ongoing	Sanilac County Road Commission	Administered by Road Commission.
Elimination of clandestine methamphetamine laboratories through law enforcement and public education.	Low	Ongoing	Local Law Enforcement	Administered by Public Safety and Drug Task Force (DTF).
Control of civil disturbances and criminal activities that could lead to arson.	Low	Ongoing	Local Law Enforcement	Administered by Public Safety.
<b>C. Airplane Crash</b>				
Develop a plan for Airplane Crash events including crash site security, crowd and traffic control, and protection of evidence.	High	2007	Local Law Enforcement	Plan updated in 2014.
Training for emergency personnel to provide first aid and services to airplane crash victims.	High	Ongoing	Emergency Medical Personnel	EMS personnel handles these matters.
Training, planning and preparedness for mass-casualty incidents involving air crashes.	Medium	Ongoing	Michigan State Police	State Police Region 3 manages these matters.
Improvements in Capabilities and Training for Airplane Crashes.	Medium	Ongoing	Michigan State Police	State Police Region 3 manages these matters.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Suppression of Hazardous Materials and Fire	Low	Ongoing	Local Fire Departments	Advances in firefighting equipment.
Providing for Improvements in Airport Maintenance, Security, and Safety	Low	Not Started	Local Airports	Not applicable.
<b>D. Wildfire</b>				
Training and exercises for response personnel.	High	Ongoing	Local Fire Departments	Annual training available.
Media broadcasts of fire weather and fire warnings.	High	Ongoing	Office of Emergency Management	Media is provided information on these events.
Have adequate water supplies for emergency firefighting (in accordance with NFPA Standards).	High	2008	Local Fire Departments	Continuation of dry hydrant installation.
Keeping roads and driveways accessible to vehicles and fire equipment— (spare keys to gates around property should be provided to the local fire department, and an address should be visible from the road so homes can be located quickly).	Medium	Ongoing	Local Fire Departments	Ordinance in place for addresses and road widths. Keys are available to fire departments for larger buildings.
GIS mapping of vegetative coverage, for use in planning decisions and analyses through comparison with topography, zoning, developments, infrastructure, etc.	Medium	Ongoing	Sanilac County Equalization Department	Equalization department is trained in GIS.
Encourage residents to develop a Family Disaster Plan, which includes the preparation of a Disaster Supplies Kit.	Medium	Ongoing	Office of Emergency Management	Presentations made to public throughout the year.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Organizing neighborhood wildfire safety coalitions (to plan how the neighborhood could work together to prevent a wildfire).	Med.	Not Started	Local Fire Departments	Wildfires not prevalent in the County, not applicable.
Including wildfire safety information in materials provided by insurance companies to area residents.	Low	Not Started	Local Fire Departments	Wildfires not prevalent in the County, not applicable.
When Wildfire threatens, residents should be instructed to carry and listen to battery-operated radios for reports and evacuation information, and follow the instructions given by local officials. Cars should be backed into garages or parked in an open space facing the direction of escape, with doors and windows closed and the key in the ignition. Garage windows and doors should be closed but left unlocked. If residents have time, they can take steps to protect their homes by closing windows, vents doors, venetian blinds and heavy drapes; removing lightweight curtains; shutting off gas at the meter; turning off pilot light; opening fireplace damper; closing fireplace screens; moving flammable furniture into the center of the home away from windows and sliding-glass doors; and turning on a light in each room to increase visibility of homes in heavy smoke. Outside, residents	Med.	Not Started	Local Fire Departments	Wildfires not prevalent in the County, not applicable.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
can seal attic and ground vents with pre-cut plywood or commercial seals, turn off propane tanks, place combustible patio furniture inside, connect the garden hose to outside taps, set up a portable gasoline-powered pump, place lawn sprinklers on the roof and near above-ground fuel tanks, wet the roof, wet or remove shrubs within 15 feet of the home and gather fire tools.				
<b>E. Terrorism/Sabotage</b>				
Training, planning, and preparedness of local law enforcement and other responders for terrorist/sabotage/WMD attacks.	High	Ongoing	Local Law Enforcement	Annual training offered to local law enforcement.
Development of a thorough community risk and threat assessment that identifies potential vulnerabilities and targets for a sabotage/terrorism/WMD attack.	High	2008	Office of Emergency Management	Updated analysis completed in 2013.
Alertness, awareness, and monitoring of organizations and activities that may threaten the community.	High	Ongoing	Local Law Enforcement	Completed on state level.
Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, and recreation areas, and other appropriate sites.	Medium	Ongoing	Local Fire Departments	Required by state statute.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Implementing school safety and violence prevention programs.	Medium	Ongoing	Local School Districts	Law enforcement provides education.
Establishing avenues of reporting (and rewards) for information preventing terrorist incidents and sabotage.	Medium	Ongoing	Local Law Enforcement	Offered through law enforcement.
Heightening security at public gatherings, special events, and critical community facilities and industries.	Medium	Ongoing	Local Law Enforcement	Offered through law enforcement.
Greater awareness of, and provision for, mental health services in schools, workplaces, and institutional settings.	Medium	Ongoing	Community Health Department	Available through law enforcement and public health.
Encourage residents to develop a Family Disaster Plan, which includes the preparation of a Disaster Supplies Kit.	Low	Ongoing	Office of Emergency Management	Presentations made to public throughout the year.
Pre-planning for debris management staging and storage areas. (Debris could be rubble, vehicles, etc that would get in the way or be left over following an attack or incident. The area may simultaneously need to be treated as a crime scene, site of urban search and rescue, area of hazardous materials, and/or a public health threat.)	Low	Ongoing	Office of Emergency Management	Last update was completed in 2015.
Consistent use of computer data back-up systems and anti-virus software.	Low	Ongoing	Local Governments	Back-up systems in place where computers are found.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Using laminated glass and other hazard-resistant, durable construction techniques in public buildings and critical facilities.	Low	Ongoing	Local Governments	Materials installed as required by code.
<b>F. HazMat Fixed Site</b>				
Trained, equipped, and prepared site and local hazardous material emergency response team.	High	Ongoing	Local Fire Departments	Training available annually.
Training in and compliance with all safety procedures and systems related to the manufacture, storage, transport, use, and disposal of hazardous materials.	High	Ongoing	Office of Emergency Management	Training is available annually.
Maintaining an active and viable Local Emergency Planning Committee (LEPC).	High	Ongoing	Office of Emergency Management	The LEPC meets monthly, headed by the EMD.
Developing and exercising site emergency plans and community response plans as required under SARA Title III.	High	Ongoing	Office of Emergency Management	Completed by EMD.
Development of Risk Management Plans for sites that manufacture, store, or handle hazardous materials, to comply with EPA regulations.	High	2010	Office of Emergency Management	Plans are required by state statute.
Trained, equipped, and prepared search and rescue teams.	High	Ongoing	Local Law Enforcement	Training is available annually for all rescue teams.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, and recreation areas, and other appropriate sites.	Medium	Ongoing	Local Fire Departments	Plans received by municipalities.
Public warning systems and networks for hazardous material releases.	Medium	Ongoing	Office of Emergency Management	System is in place and is in operable condition.
Facility and community training and exercise programs.	Medium	Ongoing	Office of Emergency Management	Public safety training is available.
Training in and compliance with all safety procedures and systems related to the manufacture, storage, transport, use and disposal of hazardous materials.	Medium	Ongoing	Office of Emergency Management	Public safety training is available.
Road closures and traffic control in accident areas.	Medium	Ongoing	Local Law Enforcement	Managed by law enforcement.
Hazardous material public awareness.	Medium	Not Started	Office of Emergency Management	Few occurrences have placed this as a low priority.
Development of Risk Management Plans for sites, that manufacture, store, or handle, hazardous materials, to comply with EPA regulations.	Medium	Ongoing	Office of Emergency Management	Plans received by municipalities.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Elimination of clandestine methamphetamine laboratories through law enforcement and public education.	Low	Ongoing	Local Law Enforcement	Law enforcement handles this issue.
Brownfield cleanup activities.	Low	Ongoing	Sanilac County Brownfields Commission	This is addressed by Environment Protection Agency (EPA).
Identification of radioactive soils and high-radon areas.	Low	Ongoing	EPA/EGLE	This is addressed by EPA.
Enhanced security and anti-terrorist/sabotage/civil disturbance measures.	Low	Ongoing	Local Law Enforcement	This is addressed by law enforcement.
Increased coverage and use of NOAA Weather Radio (which can provide notification to the community during any period of emergency, including large scale hazardous material incidents).	Low	Ongoing	Office of Emergency Management	Grant secured to purchase radios for municipal buildings.
Encourage residents to develop a Family Disaster Plan, which includes the preparation of a Disaster Supplies Kit.	Low	Ongoing	Office of Emergency Management	Presentations made to public throughout the year.
<b>G. Petroleum/Natural Gas Pipeline Accidents</b>				
Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, and recreation areas, and other appropriate sites.	High	Ongoing	Local Fire Departments	Plans received by municipalities.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Awareness of hydrogen sulfide gas dangers and personal protection actions for these dangers.	Medium	On Hold	Office of Emergency Management	Plans completed in 2014/2015, business has since left the area.
Encourage residents to develop a Family Disaster Plan, which includes the preparation of a Disaster Supplies Kit.	Low	Ongoing	Office of Emergency Management	Presentations made to public throughout the year.
<b>H. Thunderstorm Hazards (Summer)</b>				
Public early warning systems and networks.	High	2007	Office of Emergency Management	Additional sirens added in 2014, 2015, and 2016.
Training and increased use of weather spotters.	High	Ongoing	Office of Emergency Management	Classes held to train public on weather events.
Public education and awareness of thunderstorms dangers.	High	Ongoing	Office of Emergency Management	Classes held to train public on weather events.
Increased coverage and use of NOAA Weather Radio.	High	Ongoing	Office of Emergency Management	Grant secured to purchase radios for municipal buildings.
Pre-arranging for shelters for stranded motorists/travelers, and others.	Medium	Not Started	Office of Emergency Management	Traveler program not in place. Sanilac County Transportation System uses fire stations in emergencies.
Installing lightning protection devices on the community's infrastructure.	Medium	Ongoing	Local Governments	Installed at municipal buildings throughout the county.
Maintaining adequate road and debris clearing capabilities.	Medium	Ongoing	Sanilac County Road Commission	Road Commission addresses this responsibility,

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Encourage residents to develop a Family Disaster Plan, which includes the preparation of a Disaster Supplies Kit.	Medium	Ongoing	Office of Emergency Management	Presentations made to public throughout the year.
Organizing outreach to isolated, vulnerable, or special-needs populations.	Medium	Ongoing	Human Development Commission/ Office of Emergency Management	Monthly list of “at risk” population sent to EMD.
Using surge protectors on critical electronic equipment.	Medium	Ongoing	Local Governments	Surge protectors used throughout the county.
Proper anchoring of manufactured homes and exterior structures such as carports and porches.	Medium	Ongoing	County Building Department	Oversight is through the County Construction and Land Use Department.
Using appropriate wind engineering measures and construction techniques (e.g. structural bracing, straps and clips, anchor bolts, laminated or impact-resistant glass, reinforced entry and garage doors, window shutters, waterproof adhesive sealing strips, and interlocking roof shingles) to strengthen public and private structures against see wind damage.	Low	Ongoing	County Building Department	Oversight is through the County Construction and Land Use Department.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Organizing outreach to vulnerable populations during periods of severe weather events, including establishing and building awareness of accessible heating and/or cooling centers in the community, and other public information campaigns about this hazard.	Low	Ongoing	Central Dispatch 9-1-1	This is done through the use of Smart 911.
Construction of concrete safe rooms in homes and shelter areas in mobile parks, fairgrounds, shopping malls, or other vulnerable public areas.	Low	Not Started	County Building Department	Funding not available for construction of facilities, making this a low priority.
Pre-planning for debris management staging and storage areas. (Debris could be rubble, vehicles, objects from destroyed/damaged structures, vegetation or other items knocked down or blown by winds, or broken power lines or phone lines that had frozen or been weighted down by fallen branches and trees.)	Low	Ongoing	Sanilac County Road Commission	Road Commission addresses this responsibility,
Using structural bracing, window shutters, laminated glass in window panes, and hail-resistant roof shingles to minimize damage to public structures.	Low	Ongoing	County Building Department	Materials installed as required by code.
<b>I. Transportation Accidents</b>				
Improvements to driver education, traffic law enforcement, and transportation planning that balance needs of public transportation conveyers with the safety of the general public.	High	Ongoing	Sanilac Road Commission/ Local	This is managed by private firms, law enforcement, and road commission.

## SANILAC COUNTY IMPLEMENTATION STRATEGY TABLE: 2007-2015

Mitigation	Priority	Status	Lead Agency	Outcomes
Trained, equipped, and prepared search and rescue teams.	High	Ongoing	Local Law Enforcement	Training is available annually for personnel.
Improved design, routing, and traffic control at problem roadway areas.	High	Ongoing	Sanilac County Road Commission	Road commission is responsible for this action step.
Long-term planning that provides more connector roads for reduced congestion of arterial roads.	Medium	Ongoing	Sanilac County Road Commission	Road commission is responsible for this action step.
Marine safety and general boater awareness programs.	Medium	Ongoing	Local Law Enforcement	Law enforcement is responsible for this action step.
Training, planning, and preparedness for mass-casualty incidents involving all modes of public transportation.	Low	Ongoing	Michigan State Police	Region 3 of the Michigan State Police is responsible for this action step.
Enforcement of weight and travel restrictions.	Low	Ongoing	Sanilac County Road Commission	Road commission and law enforcement are responsible for this action step.

## CHAPTER 6: ACTION PLAN

Through a systematic process, that included the review of all action items identified in the Sanilac County 2007 Hazard Mitigation Plan (2007 Plan) and the possible mitigation strategies as identified in the 2003 Local Hazard Mitigation Planning Workbook (Workbook), the Sanilac County Hazard Mitigation Advisory Committee (SCHMAC) was able to identify the following actions to be the most effective strategies for hazard mitigation for 2020 Hazard Mitigation Plan for Sanilac County. The actions include mitigation actions identified in the 2007 Plan that are ongoing or have not been completed and are still considered to be relevant, as well as new strategies that have been identified by the SCHMAC.

The SCHMAC initiated the selection process with a review of the goals and objectives as identified in the 2007 Plan and modified them to fit the needs of Sanilac County in 2020 and beyond. These goals and objectives are identified below.

The action plan items from the 2007 Plan were then evaluated and those items that were deemed complete or no longer applicable were eliminated from this plan (see review of all 2007 items in Chapter 5). The SCHMAC then began review of the possible mitigation strategies as identified in the Workbook. After reviewing and identifying over 250 possible mitigation strategies (many of them duplicate strategies for multiple hazards) the SCHMAC was able to reduce the number of possible strategies to 47. The selected list of 47 mitigation strategies is found in Appendix C. The list of original strategies is found in Appendix D.

The SCHMAC was then asked to identify hazard mitigation projects/processes that addressed the items on the list. The projects/processes that address hazards that could be attained more easily have been given a high priority. Projects/processes items that are not as easily attained were given a lesser importance and have been identified as a medium priority. Projects/processes that are the most difficult to attain were identified as moderate priorities. It should be noted that those projects that met the high or medium priority criteria but were identified as not being as cost effective as other projects, were ranked lower in the priority, or were given a lower priority.

Sanilac County municipalities were asked to identify those high priority projects (FEMA-eligible) that they would participate in should the project be funded, and local funds be available. A table following the list has been included that identifies those projects.

The list of action items (projects) has been greatly reduced from the 2007 Plan, which had 94 actions. This reduction was per the suggestion of the MSP/EMHSD staff. The 2007 prioritization process was based on the number of mitigation activities found for each hazard, with a voting process for the action items in that hazard. Therefore, each hazard had high, medium, and low priority projects. The prioritization of the proposed action list is based on frequency of the events and their cost effectiveness. There is not specifically a high priority project for each hazard, as was done in the 2007 Plan.

Multiple actions identified in the 2020 Plan have been purposely re-worded to be less specific than in the 2007 Plan, which allows those items to address multi-hazard actions, rather than the hazard-by-hazard approach in the previous plan. New items not identified in the 2007 Plan have been labeled as “NEW” in their descriptions.

## **GOALS AND OBJECTIVES**

### **GOAL 1: Protect Public Health and Safety**

#### **OBJECTIVES**

- Provide community wide hazard warning systems (natural, health and terrorism)
- Provide information and resources to increase hazard awareness and education
- Maintain existing resources and provide necessary training
- Identify and obtain necessary resources and equipment to prevent or minimize hazard effects
- Identify system that monitors personnel/equipment in the County

### **GOAL 2: Minimize damage to public and private property**

#### **OBJECTIVES**

- Adopt policies to make property less vulnerable
- Apply proactive mitigation measures to prevent hazard damage
- Obtain necessary equipment, resources, and training to protect property if hazard occurs
- Conduct training sessions and exercises to prepare for possible hazards

### **GOAL 3: Maintain essential services**

#### **OBJECTIVES**

- Identify, inspect, and maintain all critical infrastructure and facilities
- Repair or replace critical infrastructure and facilities that are damaged or degraded
- Protect critical infrastructure and facilities from hazard damage
- Obtain necessary resources and equipment to ensure essential services are maintained in the event of a hazard

### **GOAL 4: Manage growth/development**

#### **OBJECTIVES**

- Develop hazard resistant growth policies
- Discourage development in high hazard areas
- Integrate hazard mitigation planning into land use planning
- Encourage sustainable development
- Protect and conserve natural resources

## HIGH PRIORITY HAZARD MITIGATION ACTIONS

### Action Item 1

#### **Add/Replace uniform all-purpose warning sirens throughout the County, as needed.**

Action: Identify locations to place warning sirens throughout the County to provide notification to all county residents. Install/replace uniform all-purpose warning sirens to be able to reach the entire population of Sanilac County.

- Location: County-wide
- Lead Agency: Office of Emergency Management (OEM)
- Other Participating Agencies: Deckerville, City of Marlette, Argyle Township, Minden Township
- Hazards Addressed: All weather-related hazards
- Potential Funding Source(s): FEMA Hazard Mitigation Grant Program (HMGP) Grants, United States Department of Agriculture (USDA) grants, local municipalities
- Project Costs: To Be Determined (TBD)
- Completion Date: 2023
- Priority: High
- Goal/Objective Achieved: Goal 1, Objective a.
- Benefit(s): Public will have better notification of hazardous weather conditions

### Action Item 2 (NEW)

#### **Purchase of generators and back-up battery packs to be used as back-up power supply at warning sirens, municipal buildings, and other critical county governmental facilities**

Action: Identify all critical governmental facilities that need a back-up (gas powered) generator and battery pack and seek funding to purchase necessary equipment.

- Location: County-wide
- Lead Agency: OEM
- Other Participating Agencies: Brown City, Argyle Township, Elk Township, Flynn Township, Maple Valley Township, Minden Township
- Hazards Addressed: Weather-related hazards, infrastructure failure
- Potential Funding Source(s): Local governments, FEMA Hazard Mitigation Grant Program (HMGP) Grants
- Project Cost: TBD
- Completion Date: 2022
- Priority: High
- Goal/Objective Achieved: Goal 3, Objective c.
- Benefit(s): Continuation of local municipal services and warning sirens without interruption.

### Action Item 3

#### **Continued training for all first responders**

Action: Continue ongoing training to maintain certifications and job requirement for responders

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: Sanilac County Medical Control, Sanilac County Fire Chiefs' Association, Village of Lexington, Argyle Township, Elk Township, Forester Township, Speaker Township
- Hazards Addressed: All Hazards
- Potential Funding Source(s): Local municipalities, State of Michigan

- Project Cost: TBD
- Completion Date: Ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, Objective c; Goal 2, Objective d, Goal 4, Objective e.
- Benefit(s): First responders are better prepared to handle emergencies, providing a safer environment for both the public and themselves.

#### **Action Item 4 (NEW)**

##### **Develop a program to educate the public on the manufacturing and usage of controlled drugs**

Action: Educate the public through public service announcements (PSAs) and school programs on the manufacture of controlled drugs and the use of illegal drugs.

- Location: County-wide
- Lead Agency: Sanilac County Drug Task Force
- Participating Agencies: Local law enforcement agencies, local school districts
- Hazards Addressed: Public health (drug use)
- Potential Funding Source(s): Millages through local school districts and municipalities
- Project Cost: TBD
- Completion Date: Ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, Objective b.
- Benefit(s): Public health, public safety, reduction in manufacture and use of drugs.

#### **Action Item 5**

##### **Recruit fire fighters/EMS personnel**

Action: Develop a program for the recruitment of fire fighter/EMS personnel and recruit/hire fire fighter/EMS personnel.

- Location: County-wide
- Lead Agency: Sanilac County Fire Association
- Participating Agencies: OEM, Village of Lexington, Forester Township, Speaker Township
- Hazards Addressed: All hazards
- Potential Funding Source(s): Grants, participating municipalities
- Project Cost: TBD
- Completion Date: Ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, Objective d; Goal 3, Objective d.
- Benefit(s): Improved public safety through the hiring of additional fire fighters/EMS personnel.

#### **Action Item 6 (NEW)**

##### **Create an inventory of municipal equipment and trained personnel that may be available for emergencies.**

Action: Inventory existing emergency equipment as well as qualified personnel and their certifications for the development of a county-wide inventory.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: Brown City, Croswell, City of Marlette, Sandusky, Village of Lexington, Flynn Township

- Hazards Addressed: All hazards
- Potential Funding Source(s): NA
- Project Cost: NA
- Completion Date: Ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, Objective e.
- Benefit(s): Public continues to be notified of hazards by the County's warning sirens.

#### **Action Item 7 (NEW)**

##### **Replace older, damaged culverts/bridges throughout the County as needed**

Action: Complete a survey of culverts and bridges throughout the County and identify those that need to be replaced. Replace culverts/bridges as needed.

- Location: Countywide.
- Lead Agency: County Drain Commissioner
- Participating Agencies: Sanilac County Road Commission, Argyle Township, Elk Township, Forester Township, Minden Township, and Wheatland Township
- Hazards Addressed: flooding and infrastructure failure
- Potential Funding Source(s): FEMA Hazard Mitigation Assistance (HMA) Grants, County Road Commission, MDOT, Federal Highway Administration (FWHA), County Drain Commission, local municipalities
- Project Costs: TBD
- Completion Date: Ongoing
- Priority: High
- Goal/Objective Achieved: Goal 3, Objectives a and b.
- Benefit(s): Reduce flooding and improved infrastructure system

#### **Action Item 8 (NEW)**

##### **Encourage the inclusion of hazard mitigation into other county planning documents**

Action: Encourage municipal agencies to include hazard mitigation into master plans/comprehensive land use plans and other planning documents.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: Sanilac County, all townships, cities, and villages
- Hazards Addressed: All hazards
- Potential Funding Source(s): FEMA Hazard Mitigation Assistance (HMA) Grants
- Project Costs: NA
- Completion Date: Ongoing
- Priority: High
- Goal/Objective Achieved: Goal 4, Objectives a, b, c, and d.
- Benefit(s): The identification of the Hazard Mitigation Plan has not been incorporated into other plans within the County. The identification of the Plan in other local planning documents will promote community awareness of hazard mitigation, thereby and improving the public health and safety.

### **Action Item 9 (NEW)**

#### **Upgrade the sanitary sewer collection system**

Action: Insert sleeve into sanitary sewer mains to improve the seal of the mains, reducing loss of sewer contents into soil and lake water.

- Location: Village of Lexington
- Lead Agency: Village of Lexington
- Participating Agencies: Sanilac County and Brown City
- Hazards Addressed: Public Health
- Potential Funding Source(s): USDA
- Project Costs: \$3 million
- Completion Date: 2021
- Priority: High
- Goal/Objective Achieved: Goal 2, Objective c; Goal 3, Objective b.
- Benefit(s): Reduction of hazardous materials into drinking water aquifer and lake water.

### **Action Item 10**

#### **Inspect for hazardous material spillage on property located throughout Sanilac County**

Action: Inspect property throughout County for hazard material spillage and report findings to local and state authorities for necessary clean-up activities.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: All communities
- Hazards Addressed: Hazardous Materials
- Potential Funding Source(s): Emergency Management Program Grant funds
- Project Cost: TBD
- Completion Date: 2021
- Priority: High
- Goal/Objective Achieved: Goal 1, Objective d.
- Benefit(s): Improve quality of life in Sanilac County if properties containing hazardous materials are identified and issues are resolved.

### **Action Item 11**

#### **Complete an analysis of properties along the shoreline of Lake Huron to determine what steps, if any, are needed to prevent damage from shoreline erosion and ice floes**

Action: Complete a survey of properties along Lake Huron to determine if current and future shoreline erosion and/ ice floes will pose a physical threat to those properties.

- Location: Properties along Lake Huron shoreline
- Lead Agency: OEM
- Participating Agencies: Delaware Township, Forester Township, Sanilac Township, Worth Township, Village of Forestville, Village of Lexington, Village of Port Sanilac
- Hazards Addressed: Shoreline erosion
- Potential Funding Source(s):
- Project Cost: TBD
- Completion Date: 2020
- Priority: High
- Goal/Objective Achieved: Goal 2, Objective b.
- Benefit(s): Properties along Lake Huron shoreline will be assessed and if problems are found,

measures can be identified and possibly addressed to correct those problems.

## **MEDIUM PRIORITY HAZARD MITIGATION ACTIONS**

### **Action Item 12**

#### **Continue to work with businesses and public agencies in the development and implementation of internal warning and response plans**

Action: Encourage the development of internal warning and response plans for businesses and public facilities. The plans would be used for multiple hazards and provide a more organized method to respond during disasters or other times of crises.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: Local first responders, local businesses, Sanilac County Sheriff's Department
- Hazards Addressed: all hazards
- Potential Funding Source(s): Emergency Management Program Grant (EMPG) funding
- Project Cost: NA
- Completion Date: Ongoing
- Priority: Medium
- Goal/Objective Achieved: Goal 1, Objective b.
- Benefit(s): Improved safety in public buildings as a result of a more informed community.

### **Action Item 13 (NEW)**

#### **Expand the network of HAM radio operators throughout the County to assist in the notification of hazardous events**

Action: Work with the existing HAM radio operators to expand their network and increase their capacity to send out information throughout the County.

- Location: County-wide
- Lead Agency: Ham radio operator
- Participating Agencies: OEM
- Hazards Addressed: All hazards
- Potential Funding Source(s): NA
- Project Cost: NA
- Completion Date: 2022
- Priority: Medium
- Goal/Objective Achieved: Goal 1, Objective a.
- Benefit(s): Notification system improved by adding an additional information source. With additional source, better overall outreach to the community.

### **Action Item 14 (NEW)**

#### **Remove natural obstructions in man-made waterways, culverts, and drainage ditches.**

Action: Remove natural obstructions in man-made waterways, culverts, and drainage ditches along county roads and highways.

- Location: County-wide
- Lead Agency: Drain Commission

- Participating Agencies: OEM, Road Commission, Brown City, Croswell, Marlette, Village of Deckerville, Village of Lexington, Argyle Township, Elk Township, Flynn Township, Forester Township, Maple Valley Township, Minden Township, Speaker Township
- Hazards Addressed: Flooding
- Potential Funding Source(s): Road Commission, Drain Commission, grants
- Project Cost: TBD
- Completion Date: Ongoing
- Priority: Medium
- Goal/Objective Achieved: Goal 2, Objective b.
- Benefit(s): Improved flood control with the removal of dead trees and other obstructions in the drainage ditches and culverts, along county roads and highways.

## **MODERATE PRIORITY HAZARD MITIGATION ACTIONS**

### **Action Item 15**

#### **Purchase of NOAA weather radios for schools, municipal buildings, medical care facilities, and campgrounds**

Action: Complete an inventory of existing NOAA weather radios to determine the need for additional radios. Purchase radios accordingly.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: Brown City, Village of Lexington, Argyle Township, Elk Township, Minden Township, schools, municipalities, medical care facilities, and campground operators
- Hazards Addressed: all weather-related hazards
- Potential Funding Source(s): FEMA Hazard Mitigation Assistance (HMA) Grants, local municipalities
- Project Cost: TBD
- Completion Date: Ongoing
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, Objective a.
- Benefit(s): Improved notifications system will provide a safer environment during weather-related hazards.

### **Action Item 16 (NEW)**

#### **Plant “living” snow fences along designated roadways**

Action: Identify locations for the planning of “living” snow fences and work with property owners to allow for their installation.

- Location: County-wide
- Lead Agency: Road Commission
- Participating Agencies: Drain Commission, Argyle Township
- Hazards Addressed: severe winter weather conditions
- Potential Funding Source(s): Road Commission, DNR, MSP
- Project Cost: TBD
- Completion Date: 2022
- Priority: Moderate

- Goal/Objective Achieved: Goal 2, Objective b.
- Benefit(s): Improved highway travel during winter season.

#### **Action Item 17**

##### **Purchase additional equipment for fire fighters**

Action: Complete an inventory of local firefighting equipment and seek funds for the departments to purchase the equipment.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: Sanilac County Medical Control Department, DNR, Sanilac County Fire Chiefs' Association, Village of Lexington
- Hazards Addressed: all hazards
- Potential Funding Source(s): grants, local municipalities
- Project Cost: TBD
- Completion Date: Ongoing
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, Objective d; Goal 2, objective c.
- Benefit(s): Improved response to address hazards, leading to improved safety to the public and first responders.

#### **Action Item 18**

##### **Promote the need to complete disaster awareness/emergency planning for special events, schools, government agencies, and businesses**

Action: Promote the need to complete disaster awareness/emergency planning, including but not limited to major storm events, public health emergencies, and hazard material spills, for special events, schools, government agencies, and businesses. Also included in the planning will be to promote families developing Family Disaster Plans and promoting of an Emergency Evacuation Day" to test and evaluate site emergency plans for schools, businesses, and government buildings throughout the County.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: Elk Township, Forester Township, Speaker Township, school districts, businesses, Sanilac County Planning Commission, Sanilac County Department of Construction & Land Use, municipal planning commissions
- Hazards Addressed: all hazards
- Potential Funding Source(s): Emergency Management Program Grant funds
- Project Cost: NA
- Completion Date: Ongoing
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, Objective b.
- Benefit(s): Public awareness will be raised, which will enhance the general public's knowledge on what to do during an emergency.

## Sanilac County Hazard Mitigation Community Participation Chart

Table 6.1

Community	Action Item (s)	Community	Action Item (s)
Sanilac County	1,2,3,4,5,6,7,8,9,10, 11,12,13,14,15,16, 17,18	Flynn Township	2,6,10,14
Brown City	2,6,9,10,14,15	Forester Township	3,5,7,10,14,18
Croswell	6,10,14	Fremont Township	2,7,10,14
Marlette	1,2,3,4,5,6,7,8,9,10, 12,13,15,17,18	Lamotte Township	1,2,3,4,5,6,7,8,12,13,14, 15,16,17,18
Sandusky	2,6,10	Maple Valley Township	2,10,14
Applegate	2,7,10,14	Marion Township	2,7,10,14
Deckerville	1,10,14	Marlette Township	3,4,5,6,7,8,10,14,16,17, 18
Lexington	3,5,6,9,10,14,15,17	Minden Township	1,2,7,10,14,15
Peck	2,9,10,11,18	Moore Township	4,5,7,10,12,16,17
Port Sanilac	2,6,9,11	Sanilac Township	2,7,10,14
Argyle Township	1,2,3,7,10,14,15,16	Speaker Township	3,5,10,14,18
Custer Township	2,7,10,14	Washington Township	2,7,8,10,12,14
Delaware Township	1,3,5,6,7,10,11,15,16, 17	Watertown Township	1,2,3,7,8,9,10,14,15,16, 17,18
Elk Township	2,3,5,6,7,10,14,15,17, 18	Wheatland Township	7,10
Elmer Township	3,4,5,6,7,8,10,12,14,1 7, 18	Worth Township	1,2,3,6,7,8,10,11,13,14, 15,17,18

## CHAPTER 7: FOLLOW-UP

The follow-up for Sanilac County is an important part of the planning process. Follow-up is the process in which the plan will be monitored, evaluated, and updated within a five-year cycle. When updated, the plan will be reviewed, revised, and resubmitted to the Michigan State Police, Emergency Management and Homeland Security Division for approval by Federal Emergency Management Agency (FEMA). As appropriate, the plan will also be evaluated after a disaster, or after unexpected changes in land use or demographics in or near hazard areas. The Sanilac County Hazard Mitigation Advisory Committee (SCHMAC) will also be kept apprised of a change in federal regulations, programs, and policies, such as a change in the allocation of FEMA's funding for mitigation grant programs. These evaluations will be addressed in the plan and may affect the action items for mitigation goals and activities. The hazard mitigation plan should be considered by community planners within Sanilac County, when future updates of their comprehensive plans are taking place.

The SCHMAC will continue to monitor the status and track the progress of the plan elements on an annual basis. The SCHMAC will oversee the progress made on the implementation of the identified action items and update the plan as needed to reflect changing conditions. Representatives will also meet annually to evaluate plan progress and recommend updates. The Sanilac County Emergency Management Director will facilitate the meetings.

Evaluation of the plan will not only include checking the implementation status of mitigation action items, but also assessing their degree of effectiveness and assessing whether other natural hazards needs to be addressed and added to the plan. This will be accomplished by reviewing the benefits (or avoided losses) of the mitigation activities that were in place within each jurisdiction and the County. These will be compared to the goals the Plan has set to achieve. The SCHMAC will also evaluate whether mitigation action items need to be discontinued or modified in light of new developments or changes within the County.

As required, this plan will be updated within five (5) years of the date of FEMA's approval of the plan. The plan may be updated earlier, at the discretion of the SCHMAC and its jurisdictions. The SCHMAC's ability to update the mitigation process by adding new data and incorporating it into the mitigation plan will allow for the efficient use of available resources, staff, and programs. They will meet to discuss the plan and document data collected including hazard events, completed mitigation activities, new mitigation activities, and FEMA grant application efforts. The information will be used for the five (5) year update. The Sanilac County Emergency Management Director will coordinate the annual meeting and keep records of the participants and information received.

In order to have continued public support of the mitigation process, it is important that the public be involved not only in the preparation of the initial plan, but also in any modifications or updates to the plan. The public is invited to the annual meetings, in compliance with the Public Meetings Act.

To ensure that public support is maintained, the following actions may be taken by SCHMAC:

- Updates to the plan.
- The Sanilac County plan has been web posted along with contact information that allows any citizen to read it and provide feedback.

- Develop informational mailings to be distributed to the public about mitigation efforts in the county and updates made to the plan.
- Develop mitigation flyers or mailings that contain mitigation activities and action items that promote reducing damages and risks of natural hazards.

**APPENDIX A –  
SANILAC COUNTY HAZARD MITIGATION ADVISORY  
COMMITTEE SIGN-IN SHEETS**

SANILAC COUNTY

Date 2-4-2020

MITIGATION PLAN UPDATE SIGN-IN SHEET

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
BILL EVERT	EMCOG	BEVAT@emco.org	—
Rodd Hillman	Sanilac County EM		
Laurie Burnis	City of Sanilac, KY	dlburn@sanilac.ky	21
Neil Roggenbuck	Lamotte Township	nroggenbuck@lts@gmail.com	
Brian McGinnis	City of Marellette	pcha157@cityofmarlette.com	438
Lenny O'Connor	MINDEN Township	teconno@echochoice.com	50
Steve Boles	Crosswell Fire		50
ERNEST KILGUS	ELC TWP FIRE	EPKILGUS@comcast.net	30
Mike Paterson	ELC TWP TWP	RECAPATT@comcast.net	1
DARLENE McElwain	ELC TWP.	darlene1950@hotmail.com	25
Ed Peter	Aegle Twp		30
KELLY BEAF	Aegle Twp	Aegle Twp @ Hot me. com.	30
Dale Wood	MARLETTE TWP	dalewood1964@gmail.com	50
Glen Phillips	MARLETTE TWP	gphillips@marlette-twp.com	50
Jason Nielsen	SPEAKER TWP	speackertownshipsuperior@gmail.com	2
SCOTT KERNY	WATERLOO TOWNSHIP	wntrwtoowntwstee@outlook.com	4
Phil & Essie Macdonald	North Twp	supervisor@northmi.org	56
Christopher Heiden	Village of Lexington	lexsp@att.net	54
Clint Holmes	City of Brown City	browncty@greatlakes.net	52
Kelly Kelly	Elmer Twp.	elmer_twp_treasurer@hotmail.com	11
Bruce Rich	Elmer Twp	Bruce Rich 303.8@gmail.com	40
JAN O'Keefe	Sanilac Twp	JOAN@sanilac-twp.org	
Larry O'Keefe	Port Sanilac	jlavrance@keefe@gmail.com	30

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Date 9-19-19

Date 9-19-19

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## SANILAC COUNTY

Date 12-13-18

## MITIGATION PLAN UPDATE SIGN-IN SHEET

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
Bill Ewart	EMCOB	(989) 992-8700	-
Gary Hebeling	Sanilac Commissioner	810-404-0406	7
Nadisa Heilig	Whore Twp Clerk	810-837-0393	<del>200</del> 24
Kyle Mitchell	Maple Valley Twp	810-404-2589	34
Bill Sackett	BOC	810-404-0268	34
Miko Patterson	Elk	810-404-5647	-
Travis Kilgus	Elk Twp Fire	810 404-5272	25
Nature Medallion	Elk Twp.	8103342258	25
Ellen Beaf	Angie	517 526-2099	35
Edward Beaf	Angie	" "	35
Steve Bales	Angie Fire	810-710-4199	50
Gary Daler	Forester Twp	810 376 4359	40
John Kulaers	Custer Twp	810-414-5646	10
Terry O'Connor	Miner Twp Supervisor	989-553-3456	50
Todd Williams	Sanilac EM		
Gint Holmes	City of Brown City	810 346 2325	49

## SANILAC COUNTY

## MITIGATION PLAN UPDATE SIGN-IN SHEET

Date 12-10-18

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
* Kathy Dorman	Moore Twp.	khdtamr@icloud.com	
* Gies Dorman	Moore Twp.	gssdorman@gmail.com	
* Leslie Billet	Moore Twp.	lbil10159@gmail.com	
* Brent Sparks	Flynn Twp.	BrentBanks85@yahoo.com	
* Katherine Wilson	Flynn Twp.	Kwilson@flynn-township.org	
* Jeff Keesler	Flynn Twp.	JeffKeesler2012@gmail.com	
* BRADY BREWSTER	Flynn Twp.	SDMAN3000@yahoo.com	
* Grant Burgess	Flynn Twp.	gburgess1840@yahoo.com	
* GARREY BIRNICKI	Sanilac Co. Sheriff's	gbirnicki@sanilaccounty.net	
* Scott Hillig	Moore Twp.	810-832-0392	
* Nuss-Hillig	Moore Twp.	810-832-0393	
* Markie Plante	Moore Twp.	810-648-2901	
* William Ringler	Moore Twp.	810-648-2801	
* Marge Henrick	FORESTER	810-376-4393	
* Edward Pratt	ALPYKE	517546 2099 alpyke-township@hotmail.com	
* Ellen Pratt	ALPYKE	"	
* Okay Corley	Flynn - Board of Commissioners	bobc@bigtwater.net	
* Dennis Michel	Whetland Twp.	810-376-8201	
* Susan Michel	Whetland Twp.	susan44michel@yahoo.com	
* * MICHAEL RICHARDS	ELK TWP	8103342258 danielm11e50@hotmail.com	
* * Wanda Galtka	ELK TWP	810 378-5354	
* * Denise Barthe	Maple Valley Twp.	jd@maplevalltwp76twp@yahoo.com	
* Phil Barthe	Maple Valley Twp.		
* ED SMITH	CONBASSMAN MIREAU	EDWARD.SMITH@mirauhouse.gov	586-566-3654

## Date \_\_\_\_\_

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Date 8-13-18

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
Bob Smith	ABC Corp	555-123-4567	100

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## NAME \_\_\_\_\_

[illegible]

Date April 19, 2018

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NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)

[illegible]

Date 2.22.18

**NAME**  
**(PLEASE PRINT)**

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
Larry O'Connor	Minnesota State Supervisor	989.553.3456	50
Doug Neumann	Wentworth Township Supervisor/Dickensville	Hosp'tl Safety Director 810 4648668	30
Clint Holmes	City of Brown City	browncty@gmail.com	58
Corey Schmidt	City of Marquette	manager@cityofmarquette.com	40
Rick Mitchell	Maize Valley Twp		34
Bruce Sawyer	Sauvage County Commissioner	BRUCE.SAWYER@co.wmte.com	34
Todd Nilmon	Sauvage EMD		0
Bill Everett	EMDC	betward@mcq.org	0
Doug Neumann		neusdk@gmail.com	

PRINTED NAME	SIGNATURE	ORGANIZATION	MILES DRIVEN (Round Trip)
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## PRINTED NAME

**SIGNATURE**

## ORGANIZATION

MILES DRIVEN  
(Round Trip)[illegible]

Date 11-2-17

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## MITIGATION PLAN UPDATE SIGN-IN SHEET

PRINTED NAME	SIGNATURE	ORGANIZATION	MILES DRIVEN (Round Trip)
Steve Bales	Steve Bales	Creosote Fire	50
Ernie Krucas	Ernie Krucas	Eric Fine	25
Clint Holmes	Clint Holmes	City of Brown City	58
Rick Mitchell	Rick Mitchell	Maple Valley Twp	50
Corey Schmidt	Corey Schmidt	City of Marquette	38
Michael Patterson	Michael Patterson	ERC Township	25
Catharine Phares	Catharine Phares	Creosote Fire	10
Bill Ernst	Bill Ernst	EMCO	1
David Williams	David Williams	EMCO	1

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PRINTED NAME	ORGANIZATION	EMAIL ADDRESS	MILES DRIVEN (Round Trip)
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Date 6-29-17[illegible][illegible]

Date:

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## **APPENDIX B – SANILAC COUNTY LOCAL COMMUNITY SUBSECTIONS**

All local communities were encouraged to participate in the update of the Hazard Mitigation Plan (“Plan”) update. Their input was requested on two different levels, participation in the Plan itself, and the submittal of a survey that addressed the issues of that particular community.

Participation in the Plan update included attending any of a number of meetings of the Sanilac County Hazard Mitigation Advisory Committee (SCHMAC), which was used in advisory capacity for the Sanilac County data. The SCHMAC held scheduled monthly meetings in order to complete the Plan in a timely manner. The second means to participate was the completion of a community survey. The results of the survey provide feedback on the issues facing each community. The responses are found below.

Below is a list of the participating communities and their local representatives.

Sanilac County: Todd Hillman, Emergency Management Director, Bill Sarkella and Gary Heberling, Board of Commissioners, Brian Moran, 9-1-1 Dispatcher, Paul Rich, Sheriff Dept. Sgt.

Brown City: Clint Holmes, City Manager; Justin Holsworth; Fire Chief

City of Croswell: Steve Bales, Fire Chief

City of Marlette: Corey Schmidt, City Manager; Brian McGinnis, Police Chief; Keith Redlin, Fire Battalion Chief

City of Sandusky: Laurie Burns, City Clerk; Matt Harris, Director of Public Works; Todd Hillman, Fire Chief

Village of Applegate: Jeff Johnston, Asst. Fire Chief

Village of Deckerville: Donald Murdock, Village President

Village of Lexington: Chris Heiden, Water Plant Manager; Keefe Radtke, Fire Chief

Village of Peck: Paul Rich, Police Chief

Village of Port Sanilac: Douglas Moran, Fire Chief, Larry O’Keefe, Business Manager

Argyle Township: Ed Pfaff, Clerk; Ellen Pfaff, Deputy Clerk

Custer Township: Catherine Knoerr, Department Supervisor; John Knoerr, Supervisor

Delaware Township: Chris Heiden, Fire Fighter

Elk Township: Brian Anklam, Trustee; Wanda Grifka, Clerk; Ernie Kilgus, Fire Chief; Scott Lewis, Asst. Fire Chief; Darlene McCelland, Trustee; Michael Patterson, Supervisor

Elmer Township: Brad Rich, Trustee; Kathy Kelly, Treasurer

Flynn Township: Chery Conely, Deputy Clerk; Katherine Wilson, Clerk; Brent Banks, Treasurer; Jeff Keesler, Trustee; Brady Brown, Trustee; Grant Burgess, Supervisor

Forester Township: Marge Hoenicke, Clerk; Gary Daley, Supervisor

Fremont Township: Jeff Furness, Supervisor

Lamotte Township: Neil Roggenbuck, Trustee

Maple Valley Township: Rick Mitchell, Supervisor; Janice Bartle, Clerk; Phil Bartle, Trustee

Marion Township: Audrey Stolicken, Treasurer; Deborah Williamson, Clerk

Marlette Township: Glen Phillips, Trustee/Zoning Administrator; Dale Wood, Trustee

Minden Township: Terry O’Connor, Supervisor

Moore Township: Greg Dorman, Supervisor; Bill Pringle, Trustee; Kathy Dorman, Scott Heilig, Naysa Heilig, Clerk

Madeline Pringle, Lesli Billet, Treasurer

Sanilac Township: Bill Noelke; Jan O’Keefe, Zoning Administrator

Speaker Township: Jason Nielson, Supervisor; Dawn Cubitt, Clerk; Trevor Stone, Fire Chief

Washington Township: Tina Willis, Clerk

Watertown Township: Scott Kenny, Trustee

Wheatland Township: Scott Cameron, Deputy Clerk; Doug Neumayer, Supervisor; Susan Nichol, Treasurer

Worth Township: Philip Assenmacher, Supervisor

It should be noted that the language within this Appendix was shaped by the EMD and EMCOG staff in order to better reflect FEMA planning requirements, and thus was not a verbatim response provided by these local representatives. Due to the number of communities that did not respond to the community survey, only those that responded are identified on the following pages, with their responses. Inquiries about this may be directed to the Sanilac OEM as well as local community representatives.

**1. Does your community have large seasonal shifts in population? Are there a significant number of seasonal homes in the community? What is the reason for the large influx of population? Does the influx of population create a threat to your community, and if so why?**

Brown City: No. No. NA.

City of Croswell: No.

City of Marlette: NO. NA. NA.

City of Sandusky: Snowbirds. No. Special events.

Village of Applegate: Yes. Yes. Hunting season, Oct1-Dec31. No.

Village of Deckerville:

Village of Lexington: Yes. Yes. Tourism, Shopping, Festivals, Beach. No.

Village of Port Sanilac: Yes. Yes. Summer Resort. No.

Argyle Township: No. No. No.

Delaware Township: No. No.

Elk Township: No. No.

Elmer Township: No. No. NA.

Flynn Township:

Forester Township: Yes. Yes. Lakeshore properties

Lamotte Township: Yes. Yes. Retired residents travel south for the winter.

Maple Valley Township:

Marion Township: Snowbirds

Marlette Township: No. No.

Minden Township:

Moore Township: No. No.

Sanilac Township: Yes. Yes. Sanilac Township is a lakeshore community and includes Port Sanilac. No threats are present.

Speaker Township: No. No. NA.

Washington Township: No. No. No.

Watertown Township: No. No. NA.

Wheatland Township: Yes, Approximately 25 percent of the homes are seasonal homes. Summer/Deer hunting. No.

Worth Township: Yes. Along Lakeshore Rd. Second/summer homes on Lake Huron. No additional threat.

**2. Are there any annual events held in the community that attract large numbers of people? If so, describe the event(s), location, dates, and approximate attendance.**

Brown City: Brown City Days; downtown BC; 2<sup>nd</sup> weekend in June; and 2K run

City of Croswell: Santa Parade, Saturday after Thanksgiving

City of Marlette: Summer festival (fireworks, parade, carnival)- third weekend in July

City of Sandusky: Lighted Implement Parade, Thumb Festival

Village of Applegate: Applegate Summer Festival-August-600-700 people

Village of Deckerville:

Village of Lexington: Lakeside Craft Show, Music in the Park, 4<sup>th</sup> of July, Street Fair-Downtown, Thumb Fest-Downtown, Christmas Tree Lighting

Village of Port Sanilac: Fireworks on July 4<sup>th</sup>-5,000 people, Summer Festival, end of July-2,000 people, Blues Festival-6,000 people

Argyle Township: Annual firemen's auction,

Delaware Township: No.

Elk Township: Peck Days

Elmer Township: No.

Flynn Township:

Forester Township:

Lamotte Township: Annual hog roast at fire hall/township hall in Sept/Oct. brings in about 600 people.

Maple Valley Township:

Marion Township: Homecoming event-first weekend in August, bringing in about 1800 people.

Marlette Township: Marlette County Fair Days, Bens Great Outdoors Events

Minden Township:

Moore Township: No.

Sanilac Township: Port Sanilac has July 4<sup>th</sup> parade, summer festival, a farmers market, craft shows, and an antique camper/boat show.

Speaker Township: Hog Run, August of each year, bringing in up to 1200 motorcycles in Melvin for hospice run.

Watertown Township: No.

Washington Township: No.

Wheatland Township: No.

Worth Township: Independence Day fireworks in Lexington, Music in the Park; Lexington has events every Friday night at Tierney Park.

**3. Using the criteria below, please rate the following natural hazards 1-10, with 1 being a low threat to your community and 10 a high threat on the capacity to cause damage to property and/or bodily harm/death.**

**Capacity to Cause Physical Damages/Casualties**

10. municipality-wide occurrence causing extensive damage/multiple deaths
9. regional occurrence causing extensive damage/multiple deaths
8. local occurrence causing extensive damage/multiple deaths
7. municipality-wide occurrence causing moderate damage/ a death with injuries
6. regional occurrence causing moderate damage/ a death with injuries
5. local occurrence causing moderate damage/ a death with injuries
4. municipality-wide occurrence causing minimal damage/injuries
3. regional occurrence causing minimal damage/injuries
2. local occurrence causing minimal damage/injuries
1. event occurring within the municipality with no damage

	A	B	C	D	E	F	G
Brown City	6	6	2	5	6	8	3
City of Croswell	3	3	3	3	3	3	3
City of Marlette	3	3	7	7	3	9	1
City of Sandusky	2	2	1	1	1	4	2
Village of Applegate	6	4	2	3	1	9	1
Village of Deckerville	9	9	2	2		8	2
Village of Lexington	5	4	1	2	1	5	1
Village of Port Sanilac	2	2	1	1	1	2	1
Argyle Township	4	4	3	2	3	5	6
Delaware Township	4	5	2	6	2	8	3
Elk Township	8	1	1	1	3	1	3
Elmer Township	5	5	1	1	1	5	5
Flynn Township	3	2	2		1	3	2
Forester Township	3	3	1	2	3	3	2
Lamotte Township	3	3	3	3	3	3	3
Maple Valley Township	3	3	1	1	2	3	2
Marion Township							

Marlette Township	5	5	2	3	3	6	5
Minden Township	4	6	4	3	4	6	4
Moore Township	7	6	5	6	7	9	6
Sanilac Township	5	5	5	5	5	5	5
Speaker Township	2	2	2	5	2	2	2
Washington Township	4	5	1	3	2	6	1
Watertown Township	10	10	7	8	10	10	10
Wheatland Township	2	2	2	2	2	3	2
Worth Township	4	3	1	3	1	7	3

A-Severe Winter Weather (Ice/Sleet/Snow Storms, Extreme Cold); B-Severe Summer Weather (Lightning, Severe Winds, Thunderstorms, Extreme Heat, Hail); C-Wildfires; D-Flooding Related Hazards (Shoreline Flooding, Shoreline Erosion, Riverine Flooding); E-Drought; F-Tornadoes; G-Fog

4. Using the criteria below, please rate the following man-made/technological hazards 1-10, with 1 being a low threat to your community and 10 a high threat on the capacity to cause damage to property and/or bodily harm/death.

**Capacity to Cause Physical Damages/Casualties**

- 10. municipality-wide occurrence causing extensive damage/multiple deaths
- 9. regional occurrence causing extensive damage/multiple deaths
- 8. local occurrence causing extensive damage/multiple deaths
- 7. municipality-wide occurrence causing moderate damage/ a death with injuries
- 6. regional occurrence causing moderate damage/ a death with injuries
- 5. local occurrence causing moderate damage/ a death with injuries
- 4. municipality-wide occurrence causing minimal damage/injuries
- 3. regional occurrence causing minimal damage/injuries
- 2. local occurrence causing minimal damage/injuries
- 1. event occurring within the municipality with no damage

	A	B	C	D	E	F	G	H	I	J
Brown City:	2	8	9	5	2	5	5	5	9	5
City of Croswell	4	4	10	7	2	5	10	7	7	10
City of Marlette	2	5	10	10	1	2	8	8	9	5
City of Sandusky	4	2	1	1	1	2	1	1	2	1
Village of Applegate	7	3	2	6	5	8	7	1	8	1

Village of Deckerville	2	4	1	2	2	3	4	1	2	8
Village of Lexington	4	2	9	10	1	5	5	1	4	4
Village of Port Sanilac	1	1	1	1	2	2	1	2	1	1
Argyle Township	2	2		2	2	7	7	7	6	2
Delaware Township	1	2	1	2	1	2	2	2	3	1
Elk Township:	1	10	1	1	1	1	3	1	1	4
Elmer Township	1	2	1	1	1	1	2	1	1	2
Flynn Township	1	1	1	1		1	1		1	1
Forester Township	1	1	1	1	1	2	2	1	1	2
Lamotte Township	1	1	1	1	1	1	1	1	1	1
Maple Valley Township	1	1	1	1	1	2	2	1	1	1
Marion Township	5	6	10	10	3	5	6	5	10	2
Marlette Township	5	5	0	0	2	5	2	0	1	5
Minden Township	5	5	1	5	1	5	5	1	4	4
Moore Township										
Sanilac Township	2	2	8	8	2	5	2	2	2	2
Speaker Township	2	3	1	8	2	8	10	5	10	10
Washington Township	1	2	1	1	1	5	3	1	1	1
Watertown Township	10	10	8	10	7	10	10	10	10	10
Wheatland Township	2	3	6	5	3	5	5	5	4	2
Worth Township	2	2	10	10	7	6	4	1	2	1

A-Civil Disturbance; B-Infrastructure Failure; C-Nuclear Incident (nuclear Attack, Nuclear Power Plant Incident) ; D-Terrorism/Sabotage; E-Seasonal/Major Population Change; F-Transportation Accident; G-Hazard Materials Incident (Fixed Site Hazmat Incidents, Transportation Hazmat Incidents) ; H-Oil/Gas Well Accidents; I-Public Health Emergency; J-Structural or Scrap Tire Fire

**5. Does your staff utilize data back-up systems and anti-virus software for the municipality's computers? If no, why not?**

Brown City: Yes. Contract with I. T. Right.

City of Croswell: Yes.

City of Marlette: Yes.

City of Sandusky: Yes.

Village of Applegate: Yes.

Village of Deckerville: Yes.

Village of Lexington: Yes.

Village of Port Sanilac: Yes

Argyle Township: Yes.

Delaware Township: Yes

Elk Township: Yes.

Elmer Township: Yes.

Flynn Township: Yes.

Forester Township: Yes.

Lamotte Township: Yes.

Maple Valley Township: Yes

Marion Township: Yes.

Marlette Township: Yes.

Minden Township: Yes.

Moore Township: Yes.

Sanilac Township: Yes.

Speaker Township: Yes.

Washington Township: Yes.

Watertown Township: Yes.

Wheatland Township: Yes.

Worth Township: Yes, offsite backup done daily.

**6. Has your community installed lightning protection devices on the community's infrastructure? If no, why not?**

Brown City: Yes.

City of Croswell: Yes.

City of Marlette: Not sure.

City of Sandusky: Yes, and cameras as well.

Village of Applegate: Not sure it is needed.

Village of Deckerville: No. Has not been an issue.

Village of Lexington: Yes.

Village of Port Sanilac: No, No funding.

Argyle Township: No. not responsible for infrastructure.

Delaware Township: Yes

Elk Township: Yes.

Elmer Township: Yes.

Flynn Township: Yes.

Forester Township: Yes.

Lamotte Township: Yes.

Maple Valley Township: No. NA, no computers on site.

Marion Township: NA.

Marlette Township: Yes.

Minden Township: Yes.

Moore Township: No.

Sanilac Township: Yes.

Speaker Township: Yes.

Washington Township: Yes.

Watertown Township: No. No budget for this equipment.

Wheatland Township: No, Township Hall is for meetings and voting.

Worth Township: Only when required by building code.

**7. Does your staff use surge protectors on critical electronic equipment? If no, why not?**

Brown City: Yes.

City of Croswell: Yes.

City of Marlette: Yes-for well houses.

City of Sandusky: Yes.

Village of Applegate: Yes.

Village of Deckerville: Yes.

Village of Lexington: Yes.

Village of Port Sanilac: Yes

Argyle Township: Yes.

Delaware Township: Yes.

Elk Township: Yes.

Elmer Township: Yes.

Flynn Township: Yes.

Forester Township: Yes.

Lamotte Township: yes.

Maple Valley Township: Yes.

Marion Township: No, equipment unplugged when not in use.

Marlette Township: Yes.

Minden Township: Yes.

Moore Township: Yes.

Sanilac Township: Yes.

Speaker Township: Yes.

Washington Township: Yes.

Watertown Township: No, no budget for this equipment

Wheatland Township: Yes.

Worth Township: Surge protectors on computers, UPS on network computer

**8. What hazard (natural or technological) that can be mitigated do you feel your community is best prepared to mitigate (lessen the impact)? Why?**

Brown City: Tornadoes-through school drills and improved warning systems.

City of Croswell: Computer systems have multiple layers of back-up systems.

City of Marlette: Response to fires, weather events because the City has great first responders and a community of contractors with equipment needed to clear debris/damage.

City of Sandusky: Backing up computer network.

Village of Applegate: Storms/power outages

Village of Deckerville: Structure fires.

Village of Lexington: Fire and Rescue

Village of Port Sanilac: Tornadoes, the Village can alert public

Argyle Township: Fire, township has a strong fire department; automobile accidents- first responders

Delaware Township: Fire-large department

Elk Township: Not sure.

Elmer Township: Fire. Township covered by three separate fire departments.

Flynn Township:

Forester Township:

Lamotte Township: Fire. Excellent county-wide fire system in place.

Maple Valley Township:

Marion Township:

Marlette Township: Fire.

Minden Township: Structural fires, fire training.

Moore Township: Fire-fire department

Sanilac Township: Fire safety, township has training and resources available

Speaker Township: Long term power outages (infrastructure failures). Currently working to update hall to be shelter as needed, for residents.

Washington Township: None.

Watertown Township: Fire-use of other fire departments in the region.

Wheatland Township: Millage that keeps road in good shape.

Worth Township: Thunderstorms, ice storms. Minimal loss due to loss of electricity.

**9. What hazard (natural or technological) that can be mitigated do you feel your community is least prepared to mitigate (lessen the impact)? Why?**

Brown City: infrastructure failure-lack of local contractors/lack of local available funding

City of Croswell:

City of Marlette: A major public health or man-made attack-lack of knowledge and resources. Would require state and federal assistance.

City of Sandusky: Believes that the city is well prepared but could be wrong.

Village of Applegate: Terrorism and tornadoes-not enough resources

Village of Deckerville: Water supply shortage, well is 6 miles from tower.

Village of Lexington: Water production if plant fails

Village of Port Sanilac: Water Rescues, no equipment

Argyle Township: Terrorist attack-not a likely threat

Delaware Township: Tornado-no siren

Elk Township:

Elmer Township: Terrorist or nuclear incident. Not equipped to handle these situations.

Flynn Township:

Forester Township:

Lamotte Township: Riot (civil disturbance), rural community

Maple Valley Township:

Marion Township:

Marlette Township: Public health emergency (medical Virus)

Minden Township: Tornadoes, no shelters for the public.

Moore Township: Terrorism-no police presence

Sanilac Township: Nuclear attack or terrorism, lack of resources to adequately address.

Speaker Township: Flooding.

Washington Township: None.

Watertown Township: Infrastructure (power) failure-no back up power source for lift station or other equipment.

Wheatland Township: Agricultural or Bio-terrorist attack. No forewarning.

Worth Township: Tornado, no local siren.

**10. What types of initiatives, improvements, or efforts do you think could be implemented that would help reduce your community's vulnerability to specific hazards?**

Brown City: Better information concerning contact numbers, offices, and individuals at the state and federal (FEMA) levels.

City of Croswell: Unified digital county-wide radio system that is current and in proper working order.

City of Marlette: The City is in great need of a permanent generator for the water wells. Currently they have portable generator. An automatic-start generator would alleviate the human need to move and connect the portable one.

City of Sandusky: Generators for city Hall

Village of Applegate: Public Awareness

Village of Deckerville:

Village of Lexington: Public education, training

Village of Port Sanilac: New young volunteers

Argyle Township: Back-up generator for township fire department & township hall

Delaware Township: Install siren, purchase weather radios

Elk Township: Power supplier to replace old equipment

Elmer Township: Education

Flynn Township:

Forester Township:

Lamotte Township: More training for first responders.

Maple Valley Township:

Marion Township:

Minden Township: Education, public meetings.

Moore Township: Education, equipment upgrades

Sanilac Township: Education on measures to take in a wide-scale emergency (nuclear attack/terrorism).

Speaker Township: Road improvements and ditch clean-up to prevent erosion, etc.

Washington Township: Generator for Township Hall, NOAA Radios.

Watertown Township: Grants or low-interest loans to upgrade equipment.

Wheatland Township: Not sure.

Worth Township: Installation of a warning siren, backup generator for township hall

**11. Are you aware of any properties that have experienced flood damage to their homes on multiple occasions as a result of flood waters?**

Brown City: No.

City of Croswell:

City of Marlette: Not recently. Two properties had flooding issues years ago. The City has done some stormwater work that has helped, but some issues remain.

City of Sandusky: No.

Village of Applegate: NO.

Village of Deckerville: No.

Village of Lexington: No.

Village of Port Sanilac: No

Argyle Township: No.

Delaware Township: No.

Elk Township: No.

Elmer Township: No.

Flynn Township:

Forester Township: No.

Lamotte Township: No.

Maple Valley Township: No.

Marion Township:

Minden Township: No.

Moore Township: No.

Sanilac Township: No,

Speaker Township: No.

Washington Township: No.

Watertown Township: No.

Wheatland Township: No.

Worth Township: No.

**12. Please identify mitigation measures that would benefit your community.**

Brown City: Subsidies for firefighting equipment, especially for trucks.

City of Croswell:

City of Marlette: Permanent generator for water wells. Critical response training for DPW workers and first responders. Industrial pumps for responding to flooding in residential and commercial areas.

City of Sandusky: Education of elected officials on hazards and mitigation measure available.

Village of Applegate: Generator for back-up for community to gather in a large-scale power outage.

Village of Deckerville:

Village of Lexington: Regional development of a system for emergency contacts numbers that can be used by local municipalities. List could also include equipment and supplies that are available for emergencies.

Village of Port Sanilac: Leadership Training.

Argyle Township: Back up-generator, better outdoor lighting at township properties, shelter during power outages/building damage

Delaware Township: Install siren, purchase weather radios, police service

Elk Township: Eliminate/reduce power failures from electric company.

Elmer Township: Hazardous waste collection. Manure haulers pose a risk should something happen to the load.

Flynn Township:

Forester Township:

Lamotte Township: Awareness Training

Maple Valley Township: Maintenance of water drainage system.

Marion Township:

Minden Township: Weather alert system/weather radios.

Moore Township: Equipment upgrades.

Sanilac Township: Shoreline erosion control. South of Frenchline Road needs to be addressed with 10-12 feet of cliff lost in last 10 years. Waterlines, gas, and electric could all be in danger.

Speaker Township: Generators currently being installed at Fire hall, which can be used as a shelter.

Washington Township: None.

Watertown Township: None.

Wheatland Township: Knowledge of risks, and people to understand that bad things can happen to good people.

Worth Township: Warning siren, generator, fulltime fire/police service.

## Hazard Mitigation Plan Update Municipal Survey

1. Does your community have large seasonal shifts in population?

Are there a significant number of seasonal homes in the community?

What is the reason for the large influx of population? Does the influx of population create a threat to your community, and if so why?

2. Are there any annual events held in the community that attract large numbers of people? If so, describe the event(s), location, dates, and approximate attendance.
3. Using the criteria below, please rate the following natural hazards 1-10, with 1 being a low threat to your community and 10 a high threat on their capacity to cause physical damage to property and/or bodily harm/death.

### Capacity to Cause Physical Damage/Casualties

10-municipality-wide occurrence causing extensive damage/multiple deaths

9-regional occurrence causing extensive damage/multiple deaths

8-local occurrence causing extensive damage/multiple deaths

7-municipality-wide occurrence causing moderate damage/a death with injuries

6-regional occurrence causing moderate damage/a death with injuries

5-local occurrence causing moderate damage/a death with injuries

4-municipality-wide occurrence causing minimal damage/injuries

3-regional occurrence causing minimal damage/injuries

2-local occurrence causing minimal damage/injuries

1-event occurring within the municipality with no damage

	A	B	C	D	E	F	G
Local Municipality							

A-Severe Winter Weather (Ice/Sleet/Snowstorms, Extreme Cold); B-Severe Summer Weather (Lightning, severe winds, Thunderstorms, Extreme Heat, Hail); C-Wildfires; D-Flooding Related Hazards (Shoreline Flooding, Shoreline Erosion, Riverine Flooding); E-Drought; F-Tornadoes; G-Fog

4. Using the criteria below, please rate the following man-made/technological hazards 1-10, with 1 being a low threat to your community and 10 a high threat on their capacity to cause physical damage to property and/or bodily harm/death.

**Capacity to Cause Physical Damage/Casualties**

- 10-municipality-wide occurrence causing extensive damage/multiple deaths
- 9-regional occurrence causing extensive damage/multiple deaths
- 8-local occurrence causing extensive damage/multiple deaths
- 7-municipality-wide occurrence causing moderate damage/a death with injuries
- 6-regional occurrence causing moderate damage/a death with injuries
- 5-local occurrence causing moderate damage/a death with injuries
- 4-municipality-wide occurrence causing minimal damage/injuries
- 3-regional occurrence causing minimal damage/injuries
- 2-local occurrence causing minimal damage/injuries
- 1-event occurring within the municipality with no damage

	A	B	C	D	E	F	G	H	I	J
Local Municipality										

A-Civil Disturbance; B-Infrastructure Failure; C-Nuclear Incident (Nuclear Attack, Nuclear Power Plant Incident); D-Terrorism/ Sabotage; E-Seasonal/Major Population Change; F-Transportation Accident; G-Hazard Materials Incidents (Fixed Site Hazmat Incidents, Transportation Incidents); H-Oil/Gas Well Accidents; I-Public Health Emergency; J-Structural or Scrap Tire Fire

5. Does your staff utilize data back-up systems and anti-virus software for the municipality's computers? If no, why not?
6. Has your community installed lightning protection devices on the community's infrastructure? If no, why not?
7. Does your staff utilize surge protectors on critical electronic equipment? If no, why not?
8. What hazard (natural or technological) that can be mitigated do you feel your community is best prepared to mitigate (lessen the impact)? Why?

- 9.** What hazard (natural or technological) that can be mitigated do you feel your community is least prepared to mitigate (lessen the impact)? Why?
- 10.** What types of initiatives, improvements or efforts do you think could be implemented that would help reduce your community's vulnerability to specific hazards?
- 11.** Are you aware of any properties that have experienced flood damage to their homes on multiple occasions as a result of flood waters?
- 12.** Please identify mitigation measures that would benefit your community.

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Local Municipality

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Date

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Person Completing Survey

## SANILAC COUNTY HAZARD MITIGATION PLAN HAZARD DEFINITIONS

**Civil Disturbance**-Collective behavior that results in a significant level of law breaking, perceived threat to public order, or disruptive essential functions and quality of life.

**Dam Failure**-The collapse or failure of a structure that results in downstream flooding.

**Drought**-A water shortage caused by a deficiency of rainfall, generally lasting for an extended period of time.

**Earthquake**-A shaking or trembling of the crust of the earth, caused by the breaking and shifting of the rock beneath the surface.

**Extreme Temperatures**-Prolonged periods of very high or very low temperatures, often accompanied by other extreme meteorological conditions.

**Fog**-Condensed water vapor in cloudlike masses lying close to the ground and limiting visibility.

**Fraud**-Intentional perversion of truth in order to induce another to part with something of value or to surrender a legal right.

**Hail**-Atmospheric water particles from thunderstorms form into rounded or irregular lumps of ice that fall to the earth.

**Hazardous Material Incident- Fixed Site**-An uncontrolled release of hazardous materials from a fixed site capable of posing a risk to life, health, safety, property, or the environment.

**Hazardous Material Incident-Transportation**-An uncontrolled release of hazardous materials during transport, capable of posing a risk of life, health, safety, property, or the environment.

**Ice and Sleet Storm**-A storm that generates sufficient quantities of ice and sleet to result in hazardous conditions and/or damage of property.

**Industrial Accident**-A fire, explosion, or other severe accident (especially if it involves hazardous materials) at an industrial facility that results in serious property damage, injury, or loss of life.

**Infrastructure Failure**-The failure of critical public or private utility infrastructure that results in a temporary loss of essential functions and/or services.

**Lightning**-The discharge of electricity from within a thunderstorm.

**Major Population Change**-An increase in the population due to a special event or time of year that causes the population of the area to increase twofold or greater.

**Nuclear Attack**-A hostile action taken against the United States, which involves nuclear weapons and results in destruction of property and/or loss of life.

**Nuclear Power Plant Failure**-An actual or potential release of radioactive material at a commercial nuclear power plant, in sufficient quantity to constitute a threat to the health and safety of the off-site population.

**Oil and Gas Well Accident**- An uncontrolled release of oil or natural gas, or the poisonous by-product hydrogen sulfide from production wells.

**Pipeline Accident**-An uncontrolled release of petroleum or natural gas, or the poisonous by-product hydrogen sulfide from a pipeline.

**Public Health Emergency**-A widespread and/or severe epidemic, incident of contamination, or other situation that presents a danger to or otherwise negatively impacts the general health and well-being of the public.

**Riverine Flooding**-The overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snow, or ice melt.

**Sabotage**- the act of destroying or damaging something deliberately so that it does not work correctly.

**Scrap Tire Fire**-A large fire that burns scrap tires being stored for recycling or re-use.

**Severe Weather**-Summer or winter weather events that include one or more of the following events: drought, fog, hail, ice and sleet storm, lightning, severe wind, snowstorm, thunderstorm, and/or tornado.

**Severe Wind**-Non-tornadic winds of 58 miles per hour (mph).

**Shoreline Hazard**-High or low levels that cause flooding or erosion, and other wave and current action that threatens life, health, and property in shoreline areas, including storm surges, rip currents, and the recession of shoreline areas.

**Snowstorm**-A period of rapid accumulation of snow often accompanied by high winds, cold temperatures, and low visibility.

**Structural Fire**-A fire of any origin that ignites one or more structures causing the loss of life and/or property,

**Subsidence**-The lowering or collapsing of a land surface, caused by natural or human-induced activities that erode or remove subsurface support.

**Terrorism**-“...activities that involve violent...or life-threatening acts...that are a violation of the criminal laws of the United States or any State and 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” Federal Criminal Code. 18

U.S.C. ← 2331

**Thunderstorm**-Weather systems accompanied by strong winds, lightning, heavy rain, hail, or tornadoes.

**Tornado**-An intense rotating column of wind (greater than 58 mph) that extends from the base of a severe thunderstorm to the ground.

**Transportation Accident**-A cause or accident involving an air, land, or water-based commercial passenger carrier. These accidents may also include automotive crashes when they involve a large number of vehicles or in some manner cause the shut-down of a major road for a significant period of time.

**Wildfire**-An uncontrolled fire in grasslands, brushlands, or forested areas.

## **APPENDIX C- SANILAC COUNTY**

### **SELECTED ALTERNATIVE MITIGATION STRATEGIES**

1. Continue to develop Emergency Response Team program to help prepare for all hazard events in the County.
2. Ensure that the County and individual communities have adequate equipment, staff, and training to respond to transportation related accidents specific to their needs.
3. Enhance and expand a public education program for all hazards that threaten the community. Program shall include classroom presentations and incorporating wildfire and weather hazard preparedness into school curriculums as well as distributing family emergency preparedness information.
4. Conduct workshops at community gatherings to encourage residents to develop a Family Disaster Plan, which includes the preparation of a Disaster Supplies Kit.
5. Build the capacities of the county GIS program to function as a tool to address multiple hazards.
6. Increase usage of NOAA Weather Radio by subsidizing purchase and distribution of radios to county residents, organizations, and businesses. Use NOAA radios as a community emergency alert system to inform on hazard events.
7. Acquire portable/changeable message signs to direct crowds and provide information.
8. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, and recreation areas, and other appropriate sites.
9. Code existence and enforcement. Designs that include the use of firewalls and sprinkler systems (especially in tall buildings, dormitories, attached structures, and special facilities).
10. Transportation planning that provides roads, etc. to maximize access and improve emergency response times, and evacuation potential, for all inhabited or developed areas of a community (not just designing for the minimum amount of road capacity to handle normal traffic volumes in the community.)
11. Elimination of clandestine methamphetamine laboratories through law enforcement and public education.
12. Control of civil disturbances and criminal activities that could lead to arson.
13. Improvements in Capabilities and Training for Aircraft Crashes.
14. Suppression of Hazardous Materials and Fire.
15. Provide for Improvements in Airport Security and Safety.
16. Have adequate water supplies for emergency firefighting (in accordance with NFPA Standards).
17. When Wildfire threatens, residents should be instructed to carry and listen to battery-operated radios for reports and evacuation information, and follow the instructions given by local officials.
18. Development of a thorough community risk and threat assessment that identifies potential vulnerabilities and targets for a sabotage/terrorism/WMD attack.
19. Heighten security at public gatherings, special events, and critical community facilities and industries.
20. Pre-planning for debris management staging and storage areas.
21. Consistent use of computer data back-up systems and anti-virus software.
22. Maintaining an active and viable Local Emergency Planning Committee (LEPC).
23. Developing and exercising site emergency plans and community response plans as required under SARA Title III.
24. Public warning systems and networks for hazardous material releases.

25. Awareness of gas dangers and personal protection actions for these dangers.
26. Construction of concrete safe rooms in homes and shelter areas in mobile parks, fairgrounds, shopping malls, or other vulnerable public areas.
27. Establishing heating centers/shelters for vulnerable populations.
28. Using snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments.
29. Flood plain (and coastal zone) management – planning acceptable uses for areas prone to flooding (through comprehensive planning, code enforcement, zoning, open space requirements, subdivision regulations, land use and capital improvements planning) and involving drain commissioners, hydrologic studies, etc. in these analyses and decisions.
30. Government acquisition, relocation, or condemnation of structures within floodplain or floodway areas.
31. Protection (or restoration) of wetlands and natural water retention areas.
32. Structural projects to channel water away from people and property (dikes, levees, floodwalls) or to increase drainage or absorption capacities (spillways, water detention and retention basins, relief drains, drain widening/dredging or rerouting, debris detention basins, logjam and debris removal, extra culverts, bridge modification, dike setbacks, flood gates and pumps, wetlands protection and restoration).
33. Drainage easements (allowing the planned and regulated public use of privately owned land for temporary water retention and drainage).
34. Installing (or re-routing or increasing the capacity of) storm drainage systems, including the separation of storm and sanitary sewage systems.
35. Detection and prevention/discouragement of illegal discharges into storm-water sewer systems, from home footing drains, downspouts, and sump pumps.
36. Purchase or transfer of development rights – to discourage development in floodplain areas.
37. Redundancies in utility and communications systems, especially "lifeline" systems; to increase resilience (even if at the cost of some efficiency).
38. Use of generators at critical facilities.
39. Increasing public awareness and widespread use of the "MISS DIG" utility damage prevention service (800 482-7171).
40. Emergency immunization programs to vaccinate against communicable diseases.
41. Provide emergency community water and sewer infrastructure at acceptable operating standards.
42. Efficient response to fallen power lines.
43. Harden critical infrastructure systems to meet seismic design standards for "lifelines".
44. Filling or buttressing subterranean open spaces to discourage their collapse.
45. Hydrological monitoring of groundwater levels in subsidence-prone areas.
46. Compliance with/enforcement of Resource Conservation and Recovery Act (RCRA) standards.
47. Use of designated truck routes.

## **APPENDIX D-SANILAC COUNTY POSSIBLE MITIGATION STRATEGIES**

### **Summer Weather Hazards**

1. Increased coverage and use of NOAA Weather Radio.
2. Producing and distributing family emergency preparedness information relating to thunderstorm hazards.
3. Public education and awareness of summer weather dangers.
4. Training and increased use of weather spotters.
5. Public early warning systems and networks.
6. Tree trimming and maintenance to prevent limb breakage and safeguard nearby utility lines. (Ideal: Establishment of a community forestry program with a main goal of creating and maintaining a disaster-resistant landscape in public rights-of-way.)
7. Buried/protected power and utility lines.
8. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.
9. Pre-planning for debris management staging and storage areas. (Debris could be rubble, vehicles, objects from destroyed/damaged structures, vegetation or other items knocked down or blown by winds.)
10. Pre-planning for debris management staging and storage areas. (Debris is usually vegetation such as tree branches that have fallen under the impact of hail, or broken power or phone lines that had frozen or been weighted down by ice or fallen branches.)
11. Using surge protectors on critical electronic equipment.
12. Installing lightning protection devices on the community's communications infrastructure.
13. Proper anchoring of manufactured homes and exterior structures such as carports and porches.
14. Establishing safe and appropriate locations for temporary debris disposal sites.
15. Securing loose materials, yard, and patio items indoors or where winds cannot blow them about.
16. Pre-planning for debris management staging and storage areas. (Debris could be rubble, vehicles, objects from destroyed/damaged structures, vegetation or other items knocked down or blown by winds, or broken power or phone lines that had frozen or been weighted down by fallen branches and trees.)

### **Drought**

17. Anticipation of potential drought conditions, and preparation of drought contingency plans.
18. Obtaining agricultural insurance.

### **Winter Weather Hazards**

19. Increased coverage and use of NOAA Weather Radio.
20. Producing and distributing family emergency preparedness information relating to severe winter weather hazards.
21. Tree trimming and maintenance to prevent limb breakage and safeguard nearby utility lines. (Ideal: Establishment of a community forestry program with a main goal of creating and maintaining a disaster-resistant landscape in public rights-of-way.)
22. Buried/protected power and utility lines.
23. Establishing heating centers/shelters for vulnerable populations.
24. Organizing outreach to isolated, vulnerable, or special-needs populations.
25. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

26. Pre-planning for debris management staging and storage areas. (Debris is usually the snow and ice itself, or vegetation such as tree branches that have fallen under the impact of winds or the weight of ice. Broken power or phone lines that had frozen or been weighted down by ice or fallen branches could be part of the problem. Some storage areas will definitely be needed for snow removal during blizzards.)
27. Home and public building maintenance to prevent roof and wall damage from "ice dams."
28. Pre-planning for debris management staging and storage areas. (Debris is usually the sleet and ice itself being cleared from roads and roofs, or vegetation such as tree branches that have fallen under the impact of winds or the weight of ice. Broken power or phone lines that had frozen or been weighted down by ice or fallen branches could be part of the problem. In some cases, roofs may collapse under the weight of ice and snow.)
29. Proper building/site design and code enforcement relating to snow loads, roof slope, snow removal and storage, etc.
30. Farmer preparedness to address livestock needs/problems.
31. Pre-arranging for shelters for stranded motorists/travelers, and others.
32. Maintaining adequate road and debris clearing capabilities.
33. Pre-planning for debris management staging and storage areas. (Debris is usually the sleet and ice itself being cleared from roads and roofs, or vegetation such as tree branches that have fallen under the impact of winds or the weight of ice. Broken power or phone lines that had frozen or been weighted down by ice or fallen branches could be part of the problem. In some cases, roofs may collapse under the weight of ice and snow. Some storage areas will definitely be needed for snow removal during blizzards.)

#### **Extreme Temperatures**

34. Organizing outreach to vulnerable populations during periods of extreme temperatures, including establishing and building awareness of accessible heating and/or cooling centers in the community, and other public information campaigns about this hazard.
35. Increased coverage and use of NOAA Weather Radio.
36. Special arrangements for payment of heating bills.

#### **Wildfires**

37. Proper maintenance of property in or near wildland areas (including short grass; thinned trees and removal of low hanging branches; selection of fire-resistant vegetation; use of fire resistant roofing and building materials; use of functional shutters on windows; keeping flammables such as curtains securely away from windows or using heavy fire-resistant drapes; creating and maintaining a buffer zone (defensible space) between structures and adjacent wild lands; use of the fire department's home safety inspections; sweeping/ cleaning dead or dry leaves, needles, twigs, and combustibles from roofs, decks, eaves, porches, and yards; keeping woodpiles and other combustibles away from structures; use of boxed or enclosed eaves on house; thorough cleaning-up of spilled flammable fluids; and keeping garage areas protected from blowing embers).
38. Safe disposal of yard and house waste rather than through open burning.
39. Use of fire spotters, towers, planes.
40. Keep handy household items that can be used as fire tools; a rake, axe, hand/chainsaw, bucket and shovel. Install and maintain smoke detectors and fire extinguishers. Install a smoke alarm on each floor of buildings and homes. Test monthly and change the batteries two times each year. Teach family members how to use the fire extinguisher.
41. Post fire emergency telephone numbers.
42. Organizing neighborhood wildfire safety coalitions (to plan how the neighborhood could work together to prevent a wildfire).

43. Residents should plan several escape routes away from their homes - by car and by foot.
44. Use of structural fire mitigation systems such as interior and exterior sprinklers, smoke detectors, and fire extinguishers.
45. Arson prevention activities, including reduction of blight (cleaning up areas of abandoned or collapsed structures, accumulated junk, or debris, and with any history of flammable substances stored, spilled, or dumped on them).
46. Public education on smoking hazards and recreational fires.
47. Proper maintenance and separation of power lines. Ask the power company to clear branches from power lines.
48. Efficient response to fallen power lines.
49. Training and exercises for response personnel.
50. GIS mapping of vegetative coverage, for use in planning decisions and analyses through comparison with topography, zoning, developments, infrastructure, etc.
51. Media broadcasts of fire weather and fire warnings.
52. Create and enforce local ordinances that require burn permits and restrict campfires and outdoor burning.
53. Mutual aid pacts with neighboring communities.
54. Prescribed burns and fuel management (thinning of flammable vegetation, possibly including selective logging to thin out some areas. Fuels cleared can be given away as firewood or chipped into wood chips for distribution.)
55. The creation of fuel breaks (areas where the spread of wildfires will be slowed or stopped due to removal of fuels, or the use of fire-retardant materials/vegetation) in high-risk forest or other areas.
56. Keeping roads and driveways accessible to vehicles and fire equipment—driveways should be relatively straight and flat, with at least some open spaces to turn, bridges that can support emergency vehicles, and clearance wide and high enough for two-way traffic and emergency vehicle access (spare keys to gates around property should be provided to the local fire department, and an address should be visible from the road so homes can be located quickly).
57. Enclosing the foundations of homes and buildings rather than leaving them open and the underside exposed to blown embers or materials.
58. Safe use and maintenance/cleaning of fireplaces and chimneys (with the use of spark arresters and emphasis on proper storage of flammable items). Residents should be encouraged to inspect chimneys at least twice a year and clean them at least once a year.
59. Proper maintenance and storage of motorized equipment that could catch on fire.
60. Proper storage and use of flammables, including the use of flammable substances (such as when fueling machinery). Store gasoline, oily rags, and other flammable materials in approved safety cans. Stack firewood at least 100 feet away and uphill from homes.
61. Obtaining insurance.
62. Including wildfire safety information in materials provided by insurance companies to area residents.
63. Residents should be instructed on proper evacuation procedures, such as wearing protective clothing (sturdy shoes, cotton or woolen clothing, long pants, a long-sleeved shirt, gloves, and a handkerchief to protect the face); taking a Disaster Supplies Kit; and choosing a route away from fire hazards.
64. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Dam Failures**

65. Ensuring consistency of dam Emergency Action Plan (EAP) with the local Emergency Operations

- Plan (EOP).
66. Regulate development in the dam's hydraulic shadow (where flooding would occur if there was a severe dam failure).
  67. Public awareness and warning systems.
  68. Obtaining insurance.
  69. Increased coverage and use of NOAA Weather Radio.
  70. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
  71. Constructing emergency access roads to dams.
  72. Real estate disclosure laws that identify a home's location within a dam's hydraulic shadow.
  73. Trained, equipped, and prepared search and rescue teams.
  74. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

### **Riverine and Urban Flooding/Shoreline Flooding and Erosion**

75. Accurate identification and mapping of flood-prone areas.
76. Floodplain/coastal zone management – planning acceptable uses for areas prone to flooding (through comprehensive planning, code enforcement, zoning, open space requirements, subdivision regulations, land use and capital improvements planning) and involving drain commissioners, hydrologic studies, etc. in these analyses and decisions.
77. Acceptable land use densities, coverage and planning for particular soil types and topography (decreasing amount of impermeable ground coverage in upland and drainage areas, zoning and open space requirements suited to the capacity of soils and drainage systems to absorb rainwater runoff, appropriate land use and capital improvements planning) and involving drain commissioners, hydrologic studies, etc. in these analyses and decisions.
78. Dry floodproofing of structures within known flood areas (strengthening walls, sealing openings, use of waterproof compounds or plastic sheeting on walls).
79. Wet floodproofing of structures (controlled flooding of structures to balance water forces and discourage structural collapse during floods).
80. Elevation of flood-prone structures above the 100-year flood level.
81. Government acquisition, relocation, or condemnation of structures within floodplain or floodway areas.
82. Public awareness of the need for permits (MDEQ Part 31) for building in floodplain areas.
83. Employing techniques of erosion control within the watershed area (proper bank stabilization, techniques such as planting of vegetation on slopes, creation of terraces on hillsides, use of riprap boulders and geotextile fabric, etc.).
84. Dredging and clearance of sediment and debris from drainage channels.
85. Protection (or restoration) of wetlands and natural water retention areas.
86. Enforcement of basic building code requirements related to flood mitigation.
87. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
88. Obtaining insurance.
89. Joining the National Flood Insurance Program.
90. Participating in the Community Rating System (CRS).
91. Drainage easements (allowing the planned and regulated public use of privately owned land for temporary water retention and drainage).
92. Farmland and open space preservation.
93. Elevating mechanical and utility devices above expected flood levels.
94. Improved/updated floodplain mapping.

95. Real estate disclosure laws.
96. Public education and flood warning systems.
97. Monitoring of water levels with stream gauges and trained monitors.
98. Increased coverage and use of NOAA Weather Radio.
99. Training for local officials on flood fighting, floodplain management, floodproofing, etc.
100. Anchoring of manufactured homes to a permanent foundation, but preferably these structures would be readily movable if necessary or else permanently relocated outside of flood-prone areas.
101. Road closures and traffic control in flooded areas.
102. Trained, equipped, and prepared search and rescue teams.
103. Control and securing of debris, yard items, or stored objects (including oil, gasoline, and propane tanks, and paint and chemical barrels) in floodplains that may be swept away, damaged, or pose a hazard when flooding occurs.
104. Back-up generators for pumping and lift stations in sanitary sewer systems, and other measures (alarms, meters, remote controls, switchgear upgrades) to ensure that drainage infrastructure is not impeded.
105. Employing techniques of erosion control in the area (bank stabilization, planting of vegetation on slopes, creation of terraces on hillsides).
106. Purchase or transfer of development rights – to discourage development in floodplain areas.
107. Stormwater management ordinances or amendments.
108. Wetlands protection regulations and policies.
109. Regional/watershed cooperation.
110. Use of check valves, sump pumps and backflow preventers in homes and buildings.
111. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

**Fixed Site Hazardous Material Incidents** (including explosions and industrial accidents)

112. Maintaining an active and viable Local Emergency Planning Committee (LEPC).
113. Developing and exercising site emergency plans and community response plans as required under SARA Title III.
114. Development of Risk Management Plans for sites that manufacture, store, or handle hazardous materials, to comply with EPA regulations. (For guidance, see the EPA's CEPPO web site at <http://www.epa.gov/swercepp/acc-pre.html>.)
115. Training in and compliance with all safety procedures and systems related to the manufacture, storage, transport, use, and disposal of hazardous materials.
116. Policies stressing the importance of safety above other considerations.
117. Trained, equipped, and prepared site and local hazardous material emergency response teams.
118. Compliance with/enforcement of Resource Conservation and Recovery Act (RCRA) standards.
119. Elimination of clandestine methamphetamine laboratories through law enforcement and public education.
120. Hazardous material public awareness and worker education programs.
121. Facility and community training and exercise programs.
122. Brownfield cleanup activities.
123. Proper separation and buffering between industrial areas and other land uses.
124. Location of industrial areas away from schools, nursing homes, etc.
125. Evacuation plans and community awareness of them.
126. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
127. Public warning systems and networks for hazardous material releases.
128. Increased coverage and use of NOAA Weather Radio (which can provide notification to the

- community during any period of emergency, including large scale hazardous material incidents).
129. Road closures and traffic control in accident areas.
  130. Trained, equipped, and prepared search and rescue teams.
  131. Compliance with all industrial, fire, and safety regulations.
  132. Insurance coverage.
  133. Enhanced security and anti-terrorist/sabotage/civil disturbance measures.
  134. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Hazardous Material Transportation Incidents**

135. Improvements in driver education, traffic law enforcement, and transportation planning that balance the needs of hazardous material transporters with the safety of the general public.
136. Improved design, routing, and traffic control at problem roadway areas.
137. Long-term planning that provides more connector roads for reduced congestion of arterial roads.
138. Railroad inspections and improved designs at problem railway/roadway intersections (at grade crossings, rural signs/signals for RR crossing).
139. Proper planning, design, maintenance of, and enhancements to designated truck routes.
140. Enforcement of weight and travel restrictions for truck traffic.
141. Training, planning, and preparedness for hazardous material incidents along roadways and railways (in addition to fixed site emergencies).
142. Public warning systems and networks.
143. Increased coverage and use of NOAA Weather Radio (which can provide notification to the community during any period of emergency, including large scale hazardous material incidents).
144. Use of ITS (intelligent transportation systems) technology.
145. Compliance with and enforcement of USDOT and MDOT regulations regarding hazardous materials transport.
146. Locating schools, nursing homes, and other special facilities away from major hazardous material transportation routes.
147. Road closures and traffic control in accident areas.
148. Trained, equipped, and prepared local hazardous materials emergency response teams.
149. Trained, equipped, and prepared search and rescue teams.
150. Evacuation plans and community awareness of them.
151. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Infrastructure Failures**

152. Proper location, design, and maintenance of water and sewer systems (to include insulation of critical components to prevent damage from ground freeze).
153. Burying electrical and phone lines, where possible, to resist damage from severe winds, lightning, ice, and other hazards.
154. Redundancies in utility and communications systems, especially "lifeline" systems.
155. Mutual aid assistance for failures in utility and communications systems (including 9-1-1).
156. Programs/networks for contacting elderly or homebound persons during periods of infrastructure failure, to assess whether they have unmet needs.
157. Use of generators for backup power at critical facilities.
158. Regular maintenance and equipment checks.
159. Replacement or renovation of aging structures and equipment (to be made as hazard-resistant as economically possible).
160. Protecting electrical and communications systems from lightning strikes.

161. Tree-trimming programs to protect utility wires from falling branches. (Ideal: Establishment of a community forestry program with a main goal of creating and maintaining a disaster-resistant landscape in public rights-of-way.)
162. Increasing public awareness and widespread use of the "MISS DIG" utility damage prevention service (1-800-482-7171).
163. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Oil and Natural Gas Well Accidents**

164. Community and operator compliance with industry safety regulations and standards.
165. Awareness of hydrogen sulfide gas dangers and personal protection actions for these dangers.
166. Using buffer strips to segregate wells, storage tanks, and other production facilities from transportation routes and adjacent land uses, in accordance with state regulations, and consistent with the level of risk.
167. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
168. Contingency plans for worker and public protection, including the inclusion of rescue and evacuation procedures for well hazard areas in the local emergency operations plan.
169. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Public Health Emergencies**

170. Encouraging residents to receive immunizations against communicable diseases.
171. Maintaining community water and sewer infrastructure at acceptable operating standards.
172. Providing back-up generators for water and wastewater treatment facilities to maintain acceptable operating levels during power failures.
173. Demolition and clearance of vacant condemned structures to prevent rodent infestations.
174. Maintaining a community public health system with sufficient disease monitoring and surveillance capabilities to adequately protect the population from large-scale outbreaks.
175. Increasing public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies.
176. Community support of free or reduced-expense clinics and school health services.
177. Preventing public contact with contaminated sites or waters (including floodwaters).
178. Brownfield and urban blight clean-up activities.
179. Pollution control, enforcement, and cleanup; proper disposal of chemicals and scrap materials.
180. Proper location, installation, cleaning, monitoring, and maintenance of septic tanks.
181. Separation of storm and sanitary sewer systems.

#### **Sabotage/Terrorism/Weapons of Mass Destruction (WMD)**

182. Development of a thorough community risk and threat assessment that identifies potential vulnerabilities and targets for a sabotage/terrorism/WMD attack.
183. Alertness, awareness, and monitoring of organizations and activities that may threaten the community.
184. Implementing school safety and violence prevention programs.
185. Providing legitimate channels of political and public expression.
186. Heightening security at public gatherings, special events, and critical community facilities and industries.
187. Using laminated glass and other hazard-resistant, durable construction techniques in public buildings and critical facilities.
188. Greater awareness of, and provision for, mental health services in schools, workplaces, and

institutional settings.

189. Training, planning, and preparedness by local law enforcement and other responders for terrorist/sabotage/WMD attacks.
190. The development and testing of internal emergency plans and procedures by businesses and organizations.
191. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
192. Establishing avenues of reporting (and rewards) for information preventing terrorist incidents and sabotage.
193. Consistent use of computer data back-up systems and anti-virus software.
194. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.
195. Pre-planning for debris management staging and storage areas. (Debris could be rubble, vehicles, etc. that would get in the way or be left over following an attack or incident. The area may simultaneously need to be treated as a crime scene, site of urban search and rescue, area of hazardous materials, and/or a public health threat.

#### **Population Increase (Seasonal/Event)**

196. Provide personnel on a temporary basis to handle greater loads on public services.
197. Provide for emergency equipment to deal with higher call rates.
198. Develop plans for excessive traffic patterns.

**Civil Disturbances** (prison or institutional rebellions, disruptive political gatherings, violent labor disputes, urban protests or riots, or large-scale uncontrolled festivities)

199. Law enforcement training, staffing, and resource provision.
200. Incident anticipation and planning, and video documentation of events for later study and use.
201. Local law enforcement mutual aid, and support from the Michigan State Police and National Guard.
202. It is possible that design, management, integration, and lowered density of poor or blighted areas may reduce vandalism, crime, and some types of riot events. Crime Prevention Through Environmental Design (CPTED) is a field of planning that deals with this.
203. Insure structures and property in risky areas.
204. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
205. Design requirements for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, etc. that take into consideration emergency and security needs.

**Earthquakes** (biggest Michigan threats would be to pipelines, buildings that are poorly designed and constructed, and shelving, furniture, mirrors, gas cylinders, etc. within structures that could fall and cause injury or personal property damage)

206. Adopt and enforce appropriate building codes.
207. Use of safe interior designs and furniture arrangements.
208. Obtain insurance.
209. "Harden" critical infrastructure systems to meet seismic design standards for "lifelines."
210. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Scrap Tire Fires**

211. Policies for regulated disposal and management of scrap tires, and enforcement of regulations related to them (separation of stored scrap tires from other materials; limits on the size of each

pile; minimum distances between piles and property lines; covering, chemically treating, or shredding tires to limit mosquito breeding; providing for fire vehicle access to scrap tire piles; training employees in emergency response operations; installation of earthen berms around storage areas; prevention of pools of standing water in the area; control of nearby vegetation; an emergency plan posted on the property; storing only the permitted volume of tires authorized for that site).

- 212. Proper siting of tire storage and processing facilities (land use planning that recognizes scrap tire sites as a real hazard and environmental threat).
- 213. Local awareness of scrap tire risk, training, and preparedness of responders.
- 214. Law enforcement to prevent illegal dumping of tires at the site.
- 215. Pest-control measures for mosquitoes and other nuisances around scrap tire yards.

#### **Structural Fires**

- 216. Code existence and enforcement.
- 217. Designs that include the use of firewalls and sprinkler systems (especially in tall buildings, dormitories, attached structures, and special facilities).
- 218. Public education and school programs (especially about the use of stoves, heaters, fireworks, matches/ lighters, etc.)
- 219. Landlords and families can install and maintain smoke detectors and fire extinguishers. Install a smoke alarm on each level of homes (to be tested monthly, with the batteries changed twice each year).
- 220. Family members and residents should know how to use a fire extinguisher.
- 221. Proper installation and maintenance of heating systems (especially those requiring regular cleaning, those using hand-loaded fuels such as wood, or using concentrated fuels such as liquid propane).
- 222. Safe and responsible use of electric and "space" heaters (placed at least 3 feet from objects, with space near hot elements free of combustibles).
- 223. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
- 224. Safe use and maintenance/cleaning of fireplaces and chimneys (with the use of spark arresters and emphasis on proper storage of flammable items). Residents should be encouraged to inspect chimneys at least twice a year and clean them at least once a year.
- 225. Post fire emergency telephone numbers.
- 226. Education and practice of safe cigarette handling and disposal (also candles, fireworks, campfires, holiday lights)
- 227. Measures to reduce urban blight and associated arson (including CPTED?).
- 228. Proper workplace procedures, training and exercising, and handling of explosive and flammable materials and substances.
- 229. Pre-planned escape routes and fire alert responses.
- 230. Improved and continuing training for emergency responders, and provision of equipment for them.
- 231. Defensible space around structures in fire-prone wildland areas.
- 232. Proper maintenance of power lines, and efficient response to fallen power lines.
- 233. Transportation planning that provides roads, overpasses, etc. to maximize access and improve emergency response times, and evacuation potential, for all inhabited or developed areas of a community (not just designing for the minimum amount of road capacity to handle normal traffic volumes in the community.) This includes transportation access within developed sites (shopping malls, stadiums, office & commercial parking lots, etc.)
- 234. Control of civil disturbances and criminal activities that could lead to arson.
- 235. Enforced fireworks regulations.

- 236. Elimination of clandestine methamphetamine laboratories through law enforcement and public education.
- 237. Condominium-type associations for maintaining safety in attached housing/building units or multi-unit structures.
- 238. Obtain insurance.
- 239. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Nuclear Attack**

- 240. Community awareness of designated fallout shelters and attack warning systems.
- 241. Developing and promoting workable population protection plans (evacuation and in-place sheltering plans, as appropriate).
- 242. Construction of concrete safe rooms (or shelters) in houses, trailer parks, community facilities, and business districts.
- 243. Using laminated glass and other hazard-resistant, durable construction techniques in public buildings and critical facilities.
- 244. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
- 245. Increased coverage and use of NOAA Weather Radio (which can provide notification to the community during any period of emergency, including enemy attack).
- 246. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Nuclear Power Plant Accidents**

- 247. Proper awareness of, training on, and implementation of radiological emergency procedures (to include both primary and secondary Emergency Planning Zones, as appropriate).
- 248. Community awareness of designated shelters and accident warning systems.
- 249. Increased coverage and use of NOAA Weather Radio (which can provide notification to the community during any period of emergency, including enemy attack).
- 250. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
- 251. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Pipeline Accidents (Petroleum and Natural Gas)**

- 252. Locating pipelines away from dense development, critical facilities, special needs populations, and environmentally vulnerable areas whenever possible.
- 253. Increasing public awareness of pipeline locations and appropriate emergency procedures.
- 254. Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
- 255. Increasing public awareness and widespread use of the "MISS DIG" utility damage prevention service (800=482-7171).
- 256. Proper pipeline design, construction, maintenance, and inspection.
- 257. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Subsidence**

- 258. Identification, mapping, and preventing or limiting development in old mining areas or geologically unstable terrain.
- 259. Filling or buttressing subterranean open spaces (such as abandoned mines) to discourage their collapse.
- 260. Hydrological monitoring of groundwater levels in subsidence-prone areas.

- 261. Obtain insurance for subsidence hazards.
- 262. Real estate disclosure laws.
- 263. Community awareness of subsidence risks and effects.
- 264. Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

#### **Transportation Accidents**

- 265. Improvements in driver education, traffic law enforcement, and transportation planning that balance the needs of hazardous material transporters with the safety of the general public.
- 266. Improved design, routing, and traffic control at problem roadway areas.
- 267. Long-term planning that provides more connector roads for reduced congestion of arterial roads.
- 268. Railroad inspections and improved designs at problem railway/roadway intersections (at grade crossings, rural signs/signals for RR crossing).
- 269. Enforcement of weight and travel restrictions for truck traffic.
- 270. Use of ITS (intelligent transportation systems) technology.
- 271. Use of designated truck routes.
- 272. Marine safety and general boater awareness programs.
- 273. Commercial operator training and skill enhancement programs.
- 274. Training, planning, and preparedness for mass-casualty incidents involving all modes of public transportation.
- 275. Trained, equipped, and prepared search and rescue teams.