BAY COUNTY HAZARD MITIGATION PLAN

FEMA Approved Version

ACKNOWLEDGEMENTS

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Terry Spencer, Monitor Township Supervisor
Jim Starkey, Bangor Fire Department
Randy Stefaniak, Portsmouth Township Fire Department
Greg Walterhouse, Bay County Resident
Paul Wasek, Williams Township Supervisor
Ryan Wolf, Bay City Fire Captain

Other Contributors

Bill Ernat, East Michigan Council of Governments Program Manager

TABLE OF CONTENTS

TABLES

MAPS

ACRONYMS

ACE	Army Corps of Engineers
BCHAC	Bay County Hazard Advisory Committee
BRIC	Building Resilient Infrastructure & Communities
CDC	Center for Disease Control
CMAS	Commercial Mobile Alert System
CMI	Crop Moisture Index
CRS	Community Rating System
CSXT	CSX Transportation
DHS	United State Department of Homeland Security
DOI	United States Department of Interior
EAP	Emergency Action Plan
EAS	Emergency Alert System
EF	Enhanced Fujita
EGLE	Michigan Department of Environment, Great Lakes, and Energy
EMCOG	East Michigan Council of Governments
EMC	Emergency Management Coordinator
EMWIN	Emergency Managers Weather Information Network
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EPZ	Emergency Planning Zone
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FMA	Flood Mitigation Assistance
GIS	Geographic Information System
HHS	United States Department of Health and Human Services
HMA	Hazard Mitigation Assistance
HMEP	Hazardous Materials Emergency Preparedness
HMGP	Hazard Mitigation Grant Program
HMTUSA	Hazardous Materials Transportation Uniform Safety Act
HS	Homeland Security
HSPD	Homeland Security Presidential Directive
IPAWS	Integrated Public Alert & Warning System
IWIN	Interactive Weather Information Network
KPH	Kilometers Per Hour
LEIN	Law Enforcement Information Network
LEPC	Local Emergency Planning Committee

LPT	Local Planning Team
MDA	Michigan Department of Agriculture
MDARD	Michigan Department of Agriculture & Rural Development
MDNR	Michigan Department of Natural Resources
MDOT	Michigan Department of Transportation
MIRIS	Michigan Resource Information System
MIWFPA	Michigan Interagency Wildland Fire Protection Association
MMR	Mobile Medical Response
MPH	Miles Per Hour
MPSC	Michigan Public Service Commission
MSP	Michigan State Police
MSP/EMHSD	Michigan State Police/Emergency Management Homeland Security Division
NA	Not Applicable
NCEI	National Center for Environmental Information
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NID	National Inventory of Dams
NIMS	National Incident Management System
NLSI	National Lightning Safety Institute
NOAA	National Oceanic and Atmospheric Administration
NRT	National Response Team
NTSB	National Transportation Safety Board
NWS	National Weather Service
OEM	Office of Emergency Management
PDD	Presidential Decision Directive
PEAS	Pollution Emergency Alerting System
RCRA	Resource Conservation and Recovery Act
RRTN	Regional Response Team Network
SARA	Superfund Amendments and Reauthorization Act
SNS	Strategic National Stockpile
TBD	To Be Determined
USDA	United States Department of Agriculture
USDOT	United State Department of Transportation
USDOT/OHMS	United States Department of Transportation, Office of Hazardous Materials Safety
USGS	United States Geological Survey
WMD	Weapons of Mass Destruction

CHAPTER 1: INTRODUCTION

Bay County is located on Saginaw Bay, situated on Lake Huron in the east central portion of the Lower Peninsula of Michigan, which includes industrial, fishing, farming, and salt mining as major business enterprises. The County is bordered on the north by Arenac County, on the west by Bay and Midland Counties, on the south by Saginaw and Tuscola Counties and on the east by the Saginaw Bay of Lake Huron. The County covers an approximate area of 403,840 acres or about 631 square miles, of which an estimated 284,973 acres or 445 square miles is land and 118,867 acres or 186 square miles is water (Saginaw Bay). Using the 2017 US Census estimate population figure of 105,350, the population density of the county is roughly 238 people per square mile of land area. The County consists of fourteen townships and five cities. The county seat is located in the City of Bay City.

Predominantly regarded as a rural county, land use is as follows: agriculture is 68.2 percent of the total land area, forestland/rangeland account for 19.6 percent, commercial, residential, industrial comprise 9.5 percent, public land is 1.7 percent, and bodies of water comprise 1.1 percent of the land area.

North-south access is provided by Interstate 75 in the central portion of the County and US-13 in the eastern half of the County. East-west access is provided by US-10/M-25 in the southern portion of the County and Estey Rd in the northern portion of the County.

National Preparedness Goal

The National Preparedness Goal defines what it means for the whole community to be prepared for all types of disasters and emergencies. The goal is: "A secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk."[1] The five mission areas identified above are defined below:

- **Prevention**-prevent, avoid, or stop an imminent threatened or actual act of terrorism.
- **Protection**-protect our citizens, residents, visitors, and assets against the greatest threats and hazards in a manner that allow our interests, aspirations, and way of life to thrive.
- **Mitigation**-reduce the loss of life and property by lessening the impact of future disasters.
- **Response**-respond quickly to save lives, protect property and the environment and meet basic human needs in the aftermath of a catastrophic incident.
- **Recovery**-recover through a focus on the timely restoration, strengthening and revitalization of infrastructure, housing, and a sustainable economy, as well as the health, social, cultural, historic, and environmental fabric of communities affected by a catastrophic incident.[2]

For the purposes of this document, this Plan will concentrate on one of the five mission areas: mitigation.

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, human-related, and technological hazards. There is a cyclical relationship between the five mission areas of emergency management; utilizing the whole community approach, efforts are made to prevent, prepare for, respond to, recover

[1] Federal Emergency Management Agency
[2] Federal Emergency Management Agency

from, and mitigate against disasters. Following any response to a hazardous event, 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, Bay 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 Bay 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 local hazard mitigation plans in order to be eligible for pre- and post-disaster funding from the federal government. The Plan was prepared in accordance with the Federal Emergency Management Agency (FEMA) documents: Local Mitigation Handbook 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 Bay 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.

Bay County Emergency Management Coordinator and the Bay County Hazard Mitigation Advisory Committee (BCHMAC) 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 familiar with Bay 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 Bay 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 major 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 each of the major 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 Bay County Hazard Mitigation Plan that was approved in 2010. This process began in 2019, 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. It 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 find and 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 Bay 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.

A map of Bay County identifying the population centers and local units of government follows.

Bay County Municipal Map
Map 1.1

Executive Summary

The Bay County Hazard Mitigation Plan was created to protect the health, safety, and economic interests of the Bay 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 Bay County. Implementation of recommendations will reduce loss of life, destruction of property, and economic losses due to natural, societal, 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 Bay 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, structural fires, hazardous material incidents, fraudulent cyber activity, 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 Bay County, it involved the participation of the communities within the County. Bay County's communities consist of five cities and 14 Townships. The communities are listed below:

Cities

Auburn, Bay City, Essexville, Pinconning, and Midland (partial)

Townships

Bangor, Beaver, Frankenlust, Fraser, Garfield, Gibson, Hampton, Kawkawlin, Merritt, Monitor, Mount Forest, Pinconning, Portsmouth, Williams

Bay County Community Information

Table 1.1

Community Name	2010 pop.	2017 Est. pop.	Change %	Participated in the 2010 Plan	Currently a participant in 2022 plan	NFIP participant	NFIP map date
Auburn	2,087	1,934	-7.33%	Yes	Yes	NSFHA	6-29-88
Bay City	34,932	33,736	-3.42%	Yes	Yes	Yes	9-29-10
Essexville	3,478	3,375	-2.96%	Yes	Yes	Yes	9-17-10
Midland	157	187	19.11%	No	No	Yes	5-04-09
Pinconning	1,307	1,468	12.32%	Yes	Yes	Yes	9-17-10
Bangor Township	14,641	14,248	-2.68%	Yes	Yes	Yes	9-17-10
Beaver Township	2,885	2,822	-2.18%	Yes	Yes	Yes	9-17-10 (M)
Frankenlust Township	3,562	3,525	-1.04%	Yes	Yes	Yes	9-17-10
Fraser Township	3,192	3,116	-2.38%	Yes	Yes	Yes	9-17-10
Garfield Township	1,743	1,890	8.43%	Yes	No	Yes	9-17-10 (M)
Gibson Township	1,210	1,140	-5.79%	Yes	Yes	No	
Hampton Township	9,652	9,484	-1.74%	Yes	Yes	Yes	9-17-10
Kawkawlin Township	4,848	4,747	-2.08%	Yes	No	Yes	9-17-10
Merritt Township	1,441	1,306	-9.37%	Yes	No	Yes	9-17-10
Monitor Township	10,735	10,571	-1.53%	Yes	Yes	Yes	9-17-10
Mount Forest Township	1,392	1,465	5.24%	Yes	Yes	No	9-17-10
Pinconning Township	2,431	2,239	-7.90%	Yes	No	Yes	9-17-10
Portsmouth Township.	3,306	3,235	-2.15%	Yes	Yes	Yes	9-17-10
Williams Township	4,772	4,862	1.89%	Yes	Yes	Yes	9-17-10 (M)
Bay County	107,771	105,350	-2.25%	Yes	Yes	NA	

M-No flood elevation determined, all zone A, C, X
NSFHA-Non-Special Flood Hazard Area

CHAPTER 2: THE PLANNING PROCESS

In May of 2019, the Bay County Emergency Management staff began the update process by giving a presentation at a Bay County Board of Commissioners meeting in Bay City with East Michigan Council of Governments (EMCOG) staff providing an overview of the update process. The purpose of the meeting was to advise the public and Bay County Board of Commissioners and the general public of the need to update the 2010 Bay 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 Bay County Emergency Management Coordinator (EMC), Ryan Manz.

The Bay County LEPC designated the Hazard Mitigation Local Planning Team (LPT), which was formed with members of the LEPC along with other local representatives. It is composed of volunteers and professionals from county municipalities and various agencies located throughout the county/region, including the Michigan State Police, American Red Cross, Michigan Department of Health and Human Services, and the Department of Natural Resources. The hours and travel costs of the LPT were used as the match for the grant. Hourly rates of the LPT members were either their hourly rate for their position, if they were being paid to attend, or the national volunteer rate for those LPT member not paid for attending the meeting. The national volunteer rates and calculated annually by the University of Maryland's Do Good Institute. Copies of the 2019, 2020, and 2021 rates are found in Appendix B.

To further promote the update and municipal participation, a written questionnaire were sent to the municipal governments for their input on the update process. The questionnaire sought information on hazards and how they impacted the Municipality. A second survey was available to the general public, with a notice posted on the Emergency Management website. The survey was done through SurveyMonkey. There were a total of 150 responses from the general public. This information was made available to the advisory committee. This information was then taken into consideration when the hazards were prioritized as well as the selection of projects. A copy of the municipal survey is included in Appendix C, which also includes a summary of the municipalities' responses. The responses from several municipal governments were incorporated into the final mitigation actions found in Chapter 5. However, several municipalities submitted their responses after the action list was completed, which prohibited the inclusion of those items into the plan if they were not already included.

Through a series of open meetings to the public, the EMC and EMCOG staff directed an assessment of the Plan in order to determine what changes, if any, would be necessary for the update. The LPT 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 Bay County Building and on the Emergency Management website. The following table (Table 2.1) identifies the meeting dates, locations, and subject matter for the meetings. At the end of this chapter, there 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.

Bay County Hazard Mitigation Advisory Committee Meeting Schedule/Discussion Topic

TABLE 2.1

Meeting Date	Meeting Location	Discussion Topic(s)
3-12-2019	Bay County Board Room 515 Center St., Bay City	Public presentation to kick-off the update process. Advised the public why an update was needed and provided a general overview on the process.
5-30-2019	Bay County Health Department 1200 Washington Ave., Bay City	First meeting with the advisory committee. Provided an overview on the update process and the need for municipalities to participate. A discussion was held on the hazards and a general consensus was made on the hazards that have an impact on the County. Factors and their percentages were identified to complete the risk assessment.
6-27-2019	Bay County Health Department	The risk assessment was completed. Preliminary discussion was held on the vulnerability assessment.
7-25-2019	Bay County Health Department	Vulnerability assessment was completed.
8-22-2019	Bay County Health Department	Hazards were prioritized using the following criteria: risk assessment, vulnerability assessment, ability to be mitigated.
9-26-2019	Bay County Health Department	Hazard prioritization was finalized. Goals and objectives were discussed, beginning with the 2010 goals and objectives. New goals and objectives were identified, with the goals being more general in nature and the objectives being specific to each goal.
10-24-2019	Bay County Health Department	Review of the 2010 project list was initiated, with the status, lead agency and outcome identified for each of the projects identified in the 2010 plan. There was also a brief discussion on completing a community survey and why it is important for each municipality to complete a survey.

Meeting Date	Meeting Location	Discussion Topic(s)
1-23-2020	Bay County Health Department	The review of the 2010 project list was completed. As not all information was available for each of the projects, a follow-up discussion will be required to obtain the missing information. More discussion was held on the community survey, and the committee members asked that several of the questions be modified for the public to better understand them.
2-27-2020	Bay County Health Department	Reviewed the 2010 project list and updated the missing information. Some information still not available, Ryan will get information to Bill. Began review of alternative mitigation strategies from State of Michigan Plan.
	Virtual Meetings	**(Due to COVID-19, all meetings until further notice would be done virtually.)**
6-11-2020	Virtual Meeting (Bay County the host)	Alternative strategies discussion continued. The May flooding was discussed at length with local issues discussed. While there are no dams in Bay County, the failing dams had a minimal impact on Bay County. Significant hazardous events were discussed and forms for the committee members to complete were included in the meeting packet. The community and residential surveys were discussed, and Bill Ernat was asked to make several modifications.
7-23-2020	Virtual Meeting (Bay County the host)	Alternative strategies were reviewed and finalized. Significant hazardous events were identified and discussed. Projects for the action list were mentioned and the committee members asked to see examples of FEMA-eligible and FEMA-approved projects. Lastly, proof-readers were sought to proof chapters upon their completion. Several volunteers offered their time.
8-27-2020	Virtual Meeting (Bay County the host)	Additional significant hazardous events were identified. The committee then discussed potential projects for the Plan. Ryan Manz, Emergency Management Coordinator for Bay County suggested that any list of projects begin with the 2010 Plan projects that are not considered complete.

Meeting Date	Meeting Location	Discussion Topic(s)
9-24-2020	Virtual Meeting (Bay County the host)	The project list for the action items was discussed and it was determined that the advisory committee would identify those projects found in the 2010 Hazard Mitigation Plan that are still pertinent and would eliminate the others.
10-22-2020	Virtual Meeting (Bay County the host)	The project list was again discussed, with several projects being added, and on project being eliminated. The prioritization of projects was then initiated, and it was determined that the projects that could provide the greatest impact would be the top priority. Projects were then prioritized based on their immediate impacts.
12-10-2020	Virtual Meeting (Bay County the host)	Municipal information was discussed as the representatives were advised that the municipal resources, and vulnerabilities were mentioned and that each municipality will be asked to provide that information. In addition, assets that are vulnerable to natural events would also be identified and included in the Hazard Mitigation Plan.
1-28-2021	Virtual Meeting (Bay County the host)	It was mentioned that municipal participation is low and additional municipalities need to begin attending the meetings and providing input. The advisory committee members then began providing input on project information, such as the desired action, the location, and the goals/ objectives achieved with the projects. Information on approximately 50 percent of the projects was completed.
2-25-2021	Virtual Meeting (Bay County the host)	The attendees mentioned that attendance at the meetings was promoted at both the township association meeting and at the road commission meeting. The attendees then completed the identification of the information started in January (desired action, location, and goals/ objectives achieved).

Meeting Date	Meeting Location	Discussion Topic(s)
4-22-2021	Virtual Meeting (Bay County the host)	Members were reminded that they needed to complete a match form to allow their time to be used as part of the required match. The goals and objectives were then matched to the projects to make sure that all goals/objectives were addressed with projects and that all projects met a goal and objective. It was noted that four objectives were not identified as being met by a project. Members were asked if they wanted to eliminate the objectives or add projects. It was determined that additional projects would be identified. The remaining project information was identified for the first 18 projects.
5-27-2021	Virtual Meeting (Bay County the host)	The time of the meeting was changed from 1:30 pm to 10:30 am on the fourth Thursday. This was done to bolster attendance, as the meeting now would follow the Local Emergency Planning Committee meeting. Additional projects were identified to meet the missing objectives. The information was provided for the remaining projects. Invasive species were discussed minimally, this discussion will continue in June.
6-24-2021	Virtual Meeting (Bay County the host)	The project list was finalized and all information on the projects was completed. An extended conversation took place regarding invasive species with a list of species being provided by the county's environmental staff.
10-14-2021	Virtual Meeting (Bay County the host)	The rough draft of the Hazard Mitigation Plan was presented, and the members of the committee were asked to provide input on the plan and to offer any corrections/suggestions. Several suggestions were made in person as well as through emails. EMCOG staff also provided an overview of the approval process to the committee members.

Through the meetings above, the chapters of the 2010 Plan were reconfigured to correspond to other plans that were modified accordingly. Below are the results of the chapter reviews for each chapter in the Plan.

- Reviewed the Chapter 1: Prerequisites. The two introductory section have been reviewed and revised. This section is Chapter 3: Community Profile.
- Chapter 2: Planning Process remains Chapter 2. Updated this chapter to reflect the current process.

- Reviewed Chapter 32: Risk Assessment. Chapter 4: Hazard Analysis, identified each hazard and provided an overview of it as well as providing significant events, where appropriate, for those hazards. Chapter 4 also included the risk assessment and vulnerability assessment for each of the hazards.
- Reviewed Chapter 4: Assessing Vulnerability. This information was found in Chapter 4: Hazard Analysis.
- Reviewed Chapter 5 Mitigation Strategy. Results from the strategy in this chapter are found in Chapter 5: Analysis of Alternative Actions from the 2010 Plan. Chapter 6: Action List identifies the goals and objectives in this plan, plus the current list of identified projects.
- Chapter 6: Plan Maintenance was reviewed. Chapter 7: Plan Maintenance of this plan corresponds to that chapter.

This update process included the review of the 2010 Bay County Hazard Mitigation Plan, 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 Service, emergency management plans, Michigan Department of Transportation, Michigan Department of Natural Resources, and the local health department.

On November 16, 2021, the public hearing to present the Hazard Mitigation Plan draft was held. The hearing was part of a Bay County Board of Commissioners' meeting. At the meeting, two commissioners and several members of the public asked if their community participated in the update process. In all cases, those communities had participated in the update process.

During the 30-day comment period that followed the public meeting, only one comment was received. That comment was from Laura Ogar, the Bay County Environmental Affairs and Community Development Director. She expressed concern that PFAS and contamination by toxins in flooded areas was not addressed. After speaking to her, this has been included in the public health emergencies section in the hazard analysis chapter.

No other comments were received during this time frame. After the changes in the public health emergency section were completed, the draft was sent to the Michigan State Police for their review and comment.

Bay County Hazard Mitigation Advisory Committee Attendance Table

TABLE 2.2

Participating Agency or Jurisdiction	Returned Survey	Meeting Attended																			
		5/30/19	6/27	7/25	8/22	9/26	10/24	1/23/20	2-27	6-11	7-23	8-27	9-24	10-22	12-10	1-28-21	2-25	4-22	5-27	6-24	10-14
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
Bay County		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
City of Auburn	X																				X
City of Bay City	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
City of Essexville	X																				
City of Pinconning	X																				
Bangor Township	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	x	X
Beaver Township	X																				
Frankenlust Township	X																				
Fraser Township	X																				
Gibson Township	X																				
Hampton Township	X				X		X	X	X	X	X	X	X	X	X		X	X		X	X
Monitor Township								X				X			X				X		X
Mount Forest Township	X																				
Portsmouth Township								X			X				X	X	X	X	X	X	X
Williams Township	X	X	X	X	X	X	X	X			X	X		X							

Participating Agency or Jurisdiction	Returned Survey	5/30/19	6/27	7/25	8/22	9/26	10/24	1/23/20	2-27	6-11	7-23	8-27	9-24	10-22	12-10	1-28-21	2-25	4-22	5-27	6-24	10-14
9-1-1			X		X	X	X	X						X	X	X					
Bay County Health		X	X	X		X	X	X	X	X		X	X	X		X	X	X	X	X	
Mobile Medical Response							X														
Bay County Road Commission									X			X	X		X	X	X			X	X
Bay County Department of Water & Sewer									X	X		X						X	X	X	X
Bay County Sheriff's Department																		X	X		

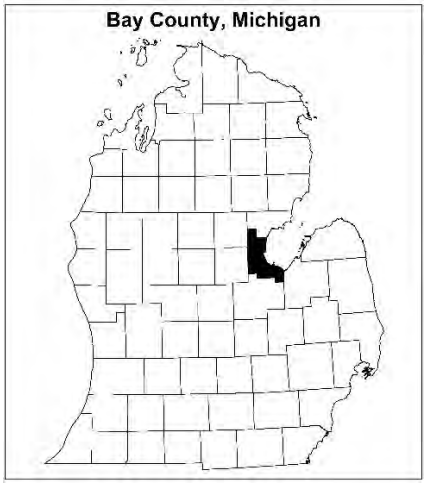
Bay County Local Planning Team Attendance Table

TABLE 2.3

Person	Agency	Number of Meetings Attended
Jay Anderson	GIS Manager, Bay County Transportation	10
Bryan Benchley	Director of Public Safety, Hampton Township	1
Bill Bohlen	Director, Bay County Department of Water & Sewer	7
William Butterfield	Supervisor, Williams Township (2020-2022)	Survey
Ron Campbell	Supervisor, Frankenlust Township	1, survey
John Case	Acting Battalion Chief, Bay City Department of Public Safety	1
Jim Chlebowski	Lieutenant, Bay County Sheriff	1
Terri Close	Supervisor, Hampton Township	10, Survey
Kurt Corradi	Fire Chief, Bay City Department of Public Safety	10
Chuck Cribley	Volunteer, Bay County Emergency Management	1
Robert Dion	Director, Bay City Department of Public Works	14, survey
Brian Ducham	Acting Fire Chief, Bay City Fire Department	1
Bill Ernat	Program Manager, East Michigan Council of Governments	20
Mark Galus	Supervisor, Fraser Township	Survey
Rob Glenn	Fire Chief, Bangor Township Fire Department	17
Ryan Goebel	Superintendent, Bay Area Water Treatment Plant	1
David Haag	City Administrator, City of Auburn	1, Survey
Dan Hansford	City Manager, City of Essexville	Survey
Chris Izworski	Director, Bay County 9-1-1	13
John Kramer	Fire Chief, Monitor Twp	2
Jim Lillo	Manager, Bay County Road Commission	9
Melissa Maillette/Opheim	Emergency Preparedness & Health Education Division Manager, Bay County Health Department	16
Ken Malkin	Supervisor, Monitor Township	2
Ryan Manz	Emergency Management Coordinator, Bay County	20

Person	Agency	Number of Meetings Attended
Timothy Mark	Building Official, Bangor Township	5
Justin Martin	Paramedic Supervisor, Mobile Medical Response	1
Louis Matijega	Assistant Fire Chief, Mount Forest Twp	1, survey
Chris Mausolf	Undersheriff, Bay County	2
Mary McCarry	Clerk, Beaver Township	Survey
Robert Moffit	City Manager, Pinconning	Survey
Terry Moultane	Planning Manager, Bay City Planning Department	1
Laura Ogar	Director, Bay County Environmental Affairs	3
Dennis Pake	Fire Chief, Gibson Township	1, survey
Karey Prieur	Fire Chief, Hampton Township Public Safety	4
Caleb Rowell	Deputy Director, Bay City Public Safety Department	1
Glenn Rowley	Supervisor, Bangor Township	13, survey
Donna Samyn	Treasurer, Hampton Township	1
Matt Schwab	Lieutenant, Bay City Department of Public Safety	2
Ken Skurla	Lieutenant, Bay City Department of Public Safety	1
Wade Slivik	Assessor, Bay City	13
Ryan Smith	GIS Manager, Bay County Transportation	2
Terry Spencer	Supervisor, Monitor Township	2
Jim Starkey	Assistant Fire Chief, Bangor Fire Department	1
Randy Stefaniak	Fire Chief, Portsmouth Township Fire Department	9
Nick Tomczak	Supervisor, Beaver Township	Survey
Greg Walterhouse	Volunteer, Bay County Resident	13
Paul Wasek	Supervisor, Williams Township (2019-2020)	8
Ryan Wolf	Fire Captain, Bay City Public Safety	1

CHAPTER 3: COMMUNITY PROFILE



NATURAL FEATURES OF BAY COUNTY

Bay County was established in 1857. It is located in east-central Michigan's Lower Peninsula along the shores of Lake Huron and Saginaw Bay. Much of the county is rural and dependent upon agriculture, producing dry beans, soybeans, sugar beets, corn, wheat, oats, poultry, pigs, cattle, and dairy products. The commercial and industrial development in the county is located primarily along the shores of Saginaw Bay, around the cities of Bay City, Essexville, and Pinconning. Manufactured products in five Certified Business Parks include aircraft parts, auto parts, and plastics. The county also relies on retail trade and service industries. Bay City State Park is a 2,389-acre state park located on the shore of Saginaw Bay, north of Bay City. The Park contains more than a 1,000 feet of sandy beach and is home Tobico Marsh, one of the largest freshwater coastal wetlands in the Great Lakes region.

Bay County occupies approximately 445 square miles of land and 186 square miles of water for an approximate area of 631 square miles. Bay County's land area has approximately 284,983 acres, which can be broken down into 68.2% crop land, 19.6% forest/rangeland, 1.1% open inland water, and 1.7% publicly-owned land. The remaining 9.5% is comprised of commercial, industrial, residential uses, and roads. The County has a population of 105,350[3]. The population density is approximately 237 persons per square mile of land. While the population density of the area is low compared to the densely populated Southeast Michigan, it is much higher than many of the counties in Saginaw Bay region.

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

[3] US Census, 2017 Estimate

Bay County Municipal Map

Map 3.1

Bay County Population

TABLE 3.1

Municipality	2010 population[4]	2017 (est.) population[5]	Change in population
Cities			
Auburn	2,087	1,934	-7.33%
Bay City	34,932	33,736	-3.42%
Essexville	3,478	3,375	-2.96%
Midland	157	187	19.11%
Pinconning	1,307	1,468	12.32%
Township			
Bangor Township	14,641	14,248	-2.68%
Beaver Township	2,885	2,822	-2.18%
Frankenlust Township	3,562	3,525	-1.04%
Fraser Township	3,192	3,116	-2.38%
Garfield Township	1,743	1,890	8.43%
Gibson Township	1,210	1,140	-5.79%
Hampton Township	9,652	9,484	-1.74%
Kawkawlin Township	4,848	4,747	-2.08%
Merritt Township	1,441	1,306	-9.37%
Monitor Township	10,735	10,571	-1.53%
Mount Forest Township	1,392	1,465	5.24%
Pinconning Township	2,431	2,239	-7.90%
Portsmouth Township.	3,306	3,235	-2.15%
Williams Township	4,772	4,862	1.89%
BAY COUNTY TOTAL	107,771	105,350	-2.25%

Bay County had a projected decrease in population from 2010 to 2017, with a decrease of 2,221 people, or 2.25 percent. There were two municipalities that had significant increase in their populations during the period, Pinconning, and Midland; however, Midland's increase was only on the Bay County's portion of the City. The increase was only 30 people, which increased the population from 157 to 187, which led to an inflated increase percentage.

[4] 2010 US Census

[5] US Census, 2017 Estimate

Bay County Top Employers[6]

TABLE 3.2

Company Name	Location	# of Employees
McLaren Bay County	Bay City	2,083
The Dow Chemical Company	Williams Township & Bay City	1,160
Delta College	University Center/ Frankenlust Township	957
Michigan Sugar	Bay City	900
Bay City Public Schools	Bay City	875
Bay County Government	Bay City	593
Meijer	Bay City	550
Consumers Energy	Hampton Township	457
General Motors Powertrain	Bay City	392
Bay Care Medical Facility	Hampton Township	365

LAND USE

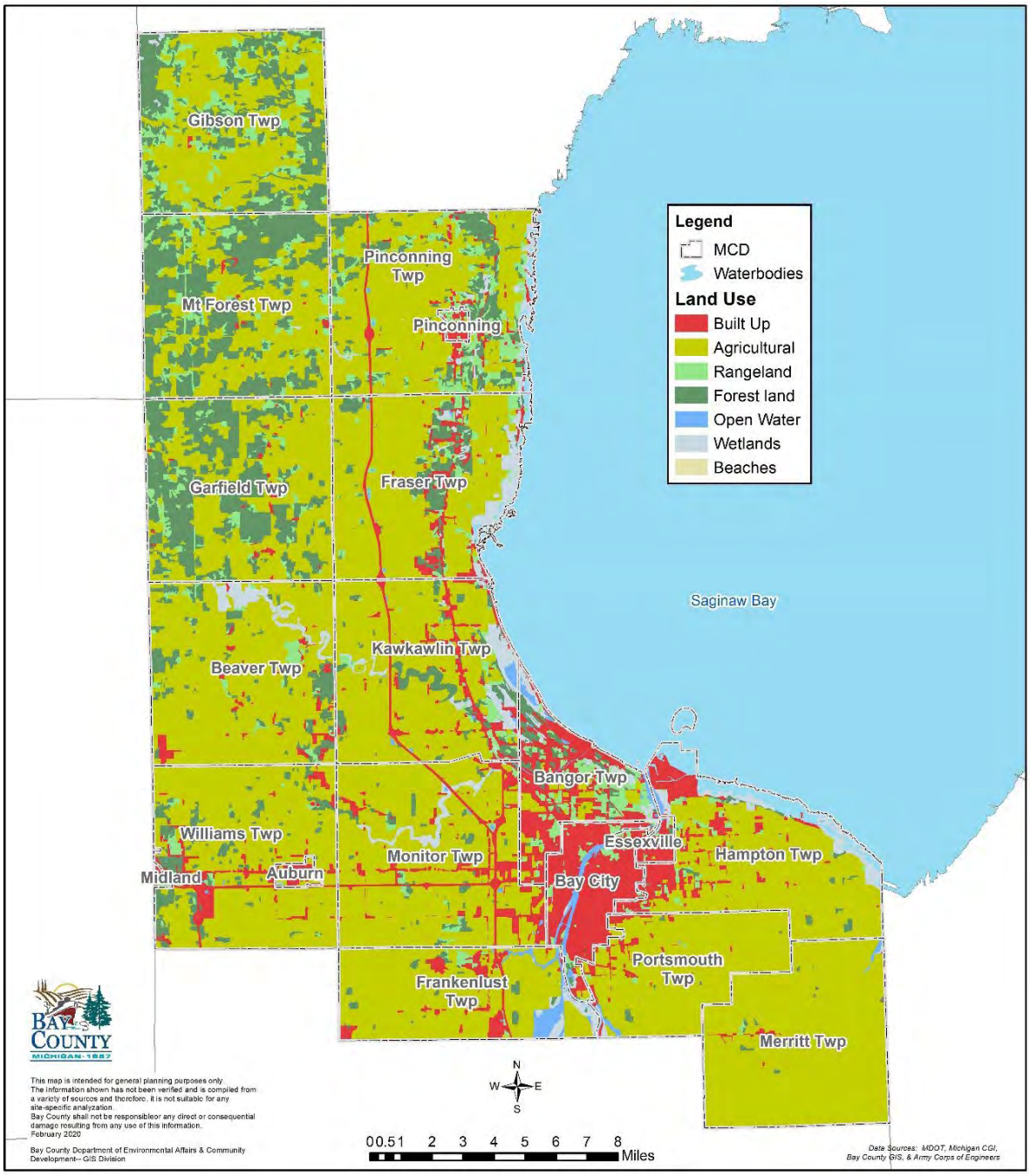
Bay County occupies approximately 445 square miles of land and 186 square miles of water for an approximate area of 631 square miles. Bay County's land area has approximately 284,983 acres, which can be broken down into 68.2% crop land, 19.6% forest/rangeland, 1.1% open inland water, and 1.7% publicly-owned land. The remaining 9.5% is comprised of commercial, industrial, residential uses, and roads. The population density is approximately 237 persons per square mile of land. While the population density of the area is low compared to the densely populated Southeast Michigan, it is much higher than many of the counties in Saginaw Bay region.

Since the approval of the 2010 Bay County Hazard Mitigation Plan, all of the major development (outside of residential development) that has occurred in Bay County has been the redevelopment of vacant/abandoned sites, throughout the County. The redevelopment of these sites has not resulted in any additional challenges from the hazards identified in this Plan.

[6] 2017 Job figures were provided by Bay Future, Inc.

Bay County Existing Land Use Map

Map 3.2



FUTURE LAND USE

Bay County does not have a master plan and; therefore, does not have a comprehensive future land use plan for the County. In researching the jurisdictions within the County to possibly utilize their information

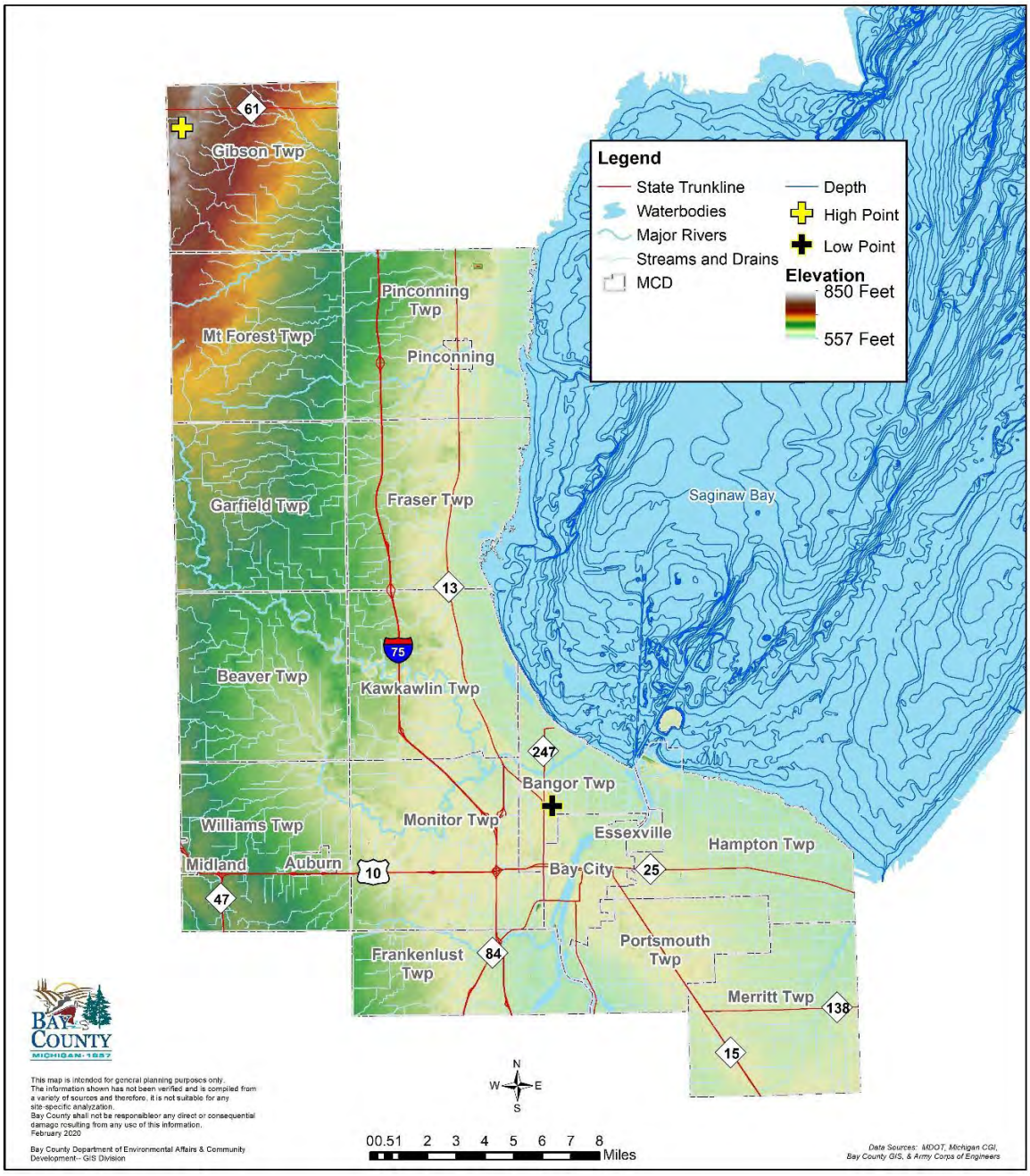
and create a county-wide future land use map it was found that there were inconsistent land use classes on the municipal maps. A county-wide future land use map is not available at this time.

TOPOGRAPHY

Bay County has a minimal change in elevation throughout the County, a total of 300 feet from the highest to lowest points. The highest point, with an elevation is in the northwest corner of the County and the lowest point in the County can be found in Bangor Township. Map 3.3 below shows the gradual change in the elevation in the County, with only northwest corner of the County having more than a moderate change in elevation.

Bay County Topography Map

MAP 3.3



SOILS[7]

Map 3.4 identifies the locations of the soil map units, which are described below. The soil map provides a broad perspective of the soils, but due to the small scale it is not good for site specific soils. Below are the many soil types and their classifications.

The **Adrian** series consists of very deep, very poorly drained soils formed in herbaceous organic materials over sandy deposits on outwash plains, lake plains, lake terraces, flood plains, moraines, and till plains. Slope ranges from 0 to 1 percent.

Arquents are poorly to very poorly drained soils formed in human transported material or on excavated landscapes.

The **Belleville** series consists of very deep, poorly drained, or very poorly drained soils formed in sandy glaciofluvial and glaciolacustrine deposits underlain by loamy glacial or lacustrine deposits at 50 to 100 cm. Belleville soils are on lake plains, till-floored lake plains, and wave-worked till plains. Slope ranges from 0 to 2 percent.

The **Brevort** series consists of very deep, poorly drained, or very poorly drained soils formed in sandy materials underlain by loamy glacial or lacustrine deposits. Slope ranges from 0 to 2 percent.

The **Chesaning** series consists of very deep, somewhat poorly drained soils that formed in loamy alluvial deposits overlying sandy alluvial deposits on flood plains. Slope ranges from 0 to 2 percent.

The **Cohoctah** series consists of very deep, poorly drained, or very poorly drained soils formed in loamy alluvial deposits on flood plains. Slope ranges from 0 to 2 percent.

The **Conover** series consists of very deep, somewhat poorly drained soils that are moderately deep or deep to dense till. These soils formed in loamy till on moraines and till plains. Slope ranges from 0 to 6 percent but is dominantly 0 to 4 percent.

The **Corunna** series consists of very deep, poorly drained soils formed in loamy till and the underlying lacustrine deposits on lake plains and till plains. Slope ranges from 0 to 2 percent.

The **Covert** series consists of very deep, moderately well drained soils formed in sandy drift on ground moraines, outwash plains, lake plains, and dunes. Slope ranges from 0 to 8 percent.

The **Eastport** series consists of very deep, excessively drained soils formed in sandy eolian deposits on vegetated beach ridges, plains near the Great Lakes or stabilized sand dunes. Slope ranges from 0 to 45 percent.

Fluvaquents are primarily the stratified, wet soils on flood plains and deltas of middle and low latitudes. Generally, Fluvaquents are nearly level. Many Fluvaquents support either a deciduous or a coniferous forest.

[7] United States Department of Agriculture

The **Epoufette** series consists of very deep, poorly drained, or very poorly drained soils that formed in stratified sandy and gravelly deposits. These soils are on glacial lake plains, moraines, and outwash plains. Slope ranges from 0 to 2 percent.

The **Essexville** series consists of very deep, poorly drained, or very poorly drained soils that formed in sandy material overlying loamy drift on lake plains and till plains. Slope ranges from 0 to 2 percent.

The **Grattan** series consists of very deep, excessively drained soils formed in sandy drift on lake plains, outwash plains, moraines, and beach ridges. Slope ranges from 0 to 70 percent.

The **Guelph** series consists of very deep, well drained, or moderately well drained soils formed in loamy till on ground moraines and end moraines. Slope ranges from 2 to 35 percent.

The **Iosco** series consists of very deep, somewhat poorly drained soils formed in sandy lacustrine deposits or outwash and the underlying loamy lacustrine deposits or till on ground moraines, outwash plains, and lake plains. Slope ranges from 0 to 6 percent.

The **Kingsville** series consists of very deep, very poorly drained soils formed in glaciolacustrine sediments on Wisconsinan age lake plains. Permeability is rapid. Slope ranges from 0 to 2 percent.

The **Lenawee** series consists of very deep, poorly drained, and very poorly drained soils formed in lacustrine deposits. These soils are on lake plains and in depressions on moraines, outwash plains, and glacial drainageways. Slope ranges from 0 to 2 percent.

The **Londo** series consists of very deep, somewhat poorly drained soils formed in loamy till on moraines, till plains, water-lain moraines, and wave-worked till plains. Slope ranges from 0 to 5 percent.

The **Menominee** series consists of very deep, well drained soils on ground moraines, end moraines, outwash plains, and lake plains. The soils formed in sandy glaciofluvial deposits over loamy till or lacustrine deposits. Slope ranges from 6 to 70 percent.

The **Nester** series consists of very deep, moderately well drained soils formed in till on ground moraines and end moraines. Slope ranges from 0 to 12 percent.

The **Oakville** series consists of very deep, excessively drained soils formed in sandy eolian deposits on dunes and beach ridges on outwash plains, lake plains, and moraines. Slope ranges from 0 to 60 percent.

The **Parkhill** series consists of very deep, poorly drained, and very poorly drained soils that are deep to dense till. These soils formed in loamy till overlying loamy dense till. They are on wave-worked till plains, till plains, water-lain moraines, and moraines. Slope ranges from 0 to 2 percent.

The **Pipestone** series consists of very deep, somewhat poorly drained soils formed in sandy outwash on outwash plains, lake plains, beach ridges, and water-worked till plains. Slope ranges from 0 to 8 percent.

The **Poseyville** series consists of very deep, somewhat poorly drained soils formed in sandy and loamy material less than 61 cm (24 inches) thick overlying loamy till or lacustrine deposits on till plains and lake plains. Slope ranges from 0 to 4 percent.

The **Rapson** series consists of very deep, somewhat poorly drained soils that formed in sandy over loamy glaciolacustrine deposits. Rapson soils are on lake plains, glacial deltas, glacial drainageways, and beach ridges. Slope ranges from 0 to 6 percent.

The **Roscommon** series consists of very deep, poorly drained, and very poorly drained soils formed in sandy deposits on lake plains, outwash plains, lake basins and glacial drainageways. The saturated hydraulic conductivity is rapid. Slopes range from 0 to 2 percent.

The **Rousseau** series consists of very deep, well drained soils formed in sandy eolian deposits on dunes, lake plains, and outwash plains. Slope ranges from 0 to 70 percent.

The **Sanilac** series consists of somewhat poorly drained soils formed in calcareous silty lacustrine or eolian sediments on lake plains. Slope ranges from 0 to 6 percent.

The **Selfridge** series consists of very deep, somewhat poorly drained soils formed in sandy material and the underlying loamy till on moraines, relict nearshore zones, wave-worked till plains, till-floored lake plains, glacial deltas, and low sand dunes. Slope ranges from 0 to 6 percent.

The **Sims** series consists of very deep, poorly drained, or very poorly drained soils that formed in clayey till on till plains and ground moraines. Slope ranges from 0 to 2 percent.

Slickens are the thin layer of extremely fine silt sometimes deposited by flood waters of a stream.

The **Sloan** series consists of very deep, very poorly drained soils formed in loamy alluvium on flood plains. Slope ranges from 0 to 2 percent.

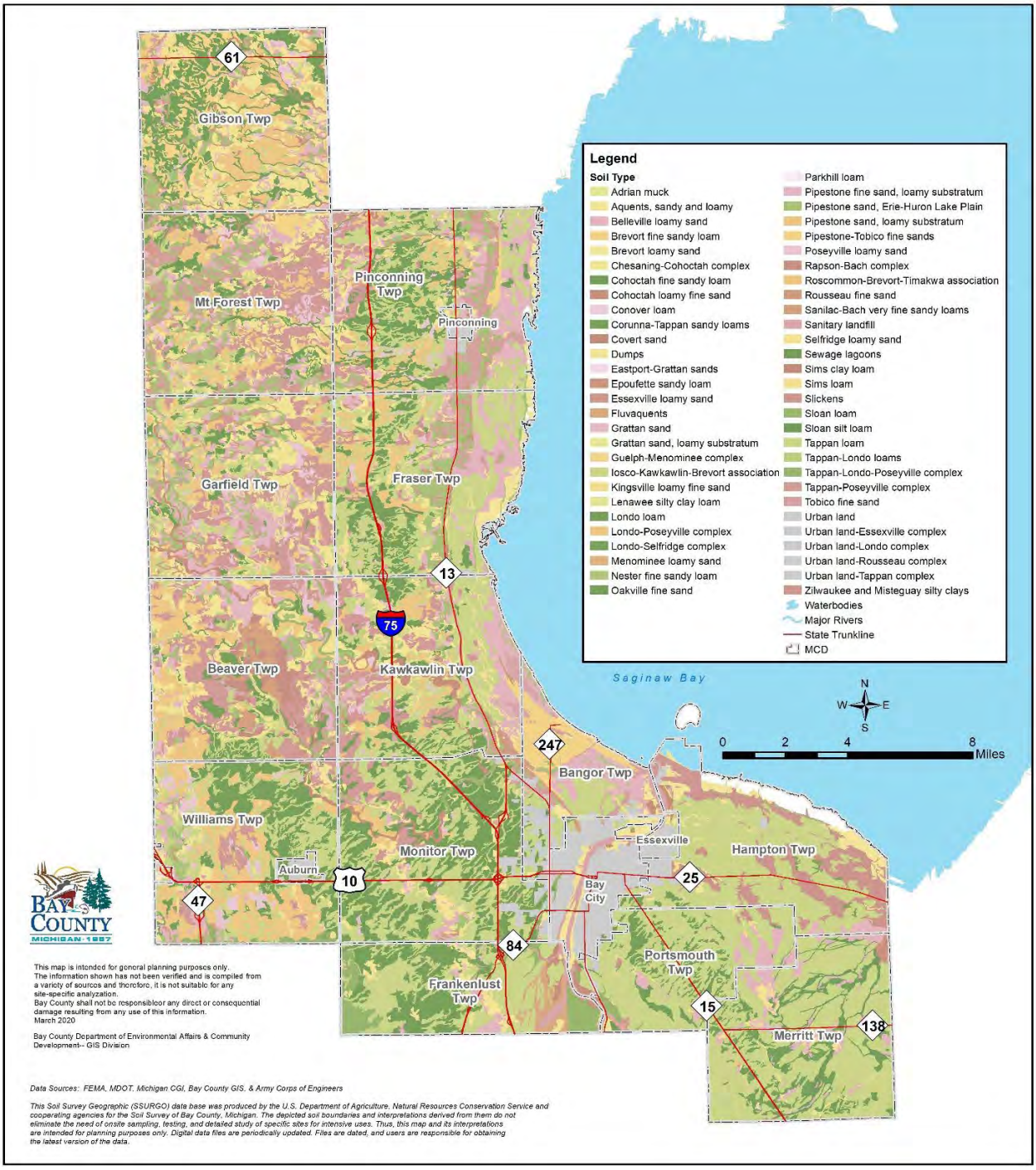
The **Tappan** series consists of very deep, poorly drained soils that are moderately deep or deep to dense till. These soils formed in calcareous loamy till over dense calcareous loamy till. They are on wave-worked till plains and water-lain moraines. Slope ranges from 0 to 2 percent.

The **Tobico** series consists of very deep, poorly drained, or very poorly drained soils formed in sandy materials on outwash plains and lake benches. Slope ranges from 0 to 2 percent.

The **Zilwaukee** series consists of very deep, poorly drained soils on flood plains that occur on lake plains. They formed in clayey alluvium over clayey glaciolacustrine deposits. Slope ranges from 0 to 2 percent.

Bay County Soils Map

MAP 3.4



CLIMATE

Climate has a strong influence on the way of life and the activities of the people of Bay County. In the Koppen climate classification system, Bay County is considered to have a continental type of climate,

which is characterized by having no dry season, and a hot summer. This is similar to many of the counties in the Lower Peninsula of Michigan. Like the rest of the State of Michigan, 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 high and low temperatures for each month along with the monthly average precipitation (rainfall) and snowfall.

Bay County Climate

TABLE: 3.3

Month	Average Temperatures (in degrees)		Monthly Average Rainfall (in inches)	Monthly Average Snowfall (in inches)
	High Average (degrees in Fahrenheit)	Low Average (degrees in Fahrenheit)		
January	29	12	1.5	9.4
February	32	13	1.6	9.1
March	42	22	2.1	5.6
April	56	33	2.4	1.4
May	68	44	3.3	0.1
June	78	55	2.9	0.0
July	82	58	2.7	0.0
August	80	56	3.1	0.0
September	73	49	2.9	0.0
October	60	39	2.6	0.2
November	46	28	2.2	2.6
December	34	20	1.8	8.0
Annual Totals			29.1	36.4

WATER FEATURES AND WETLANDS

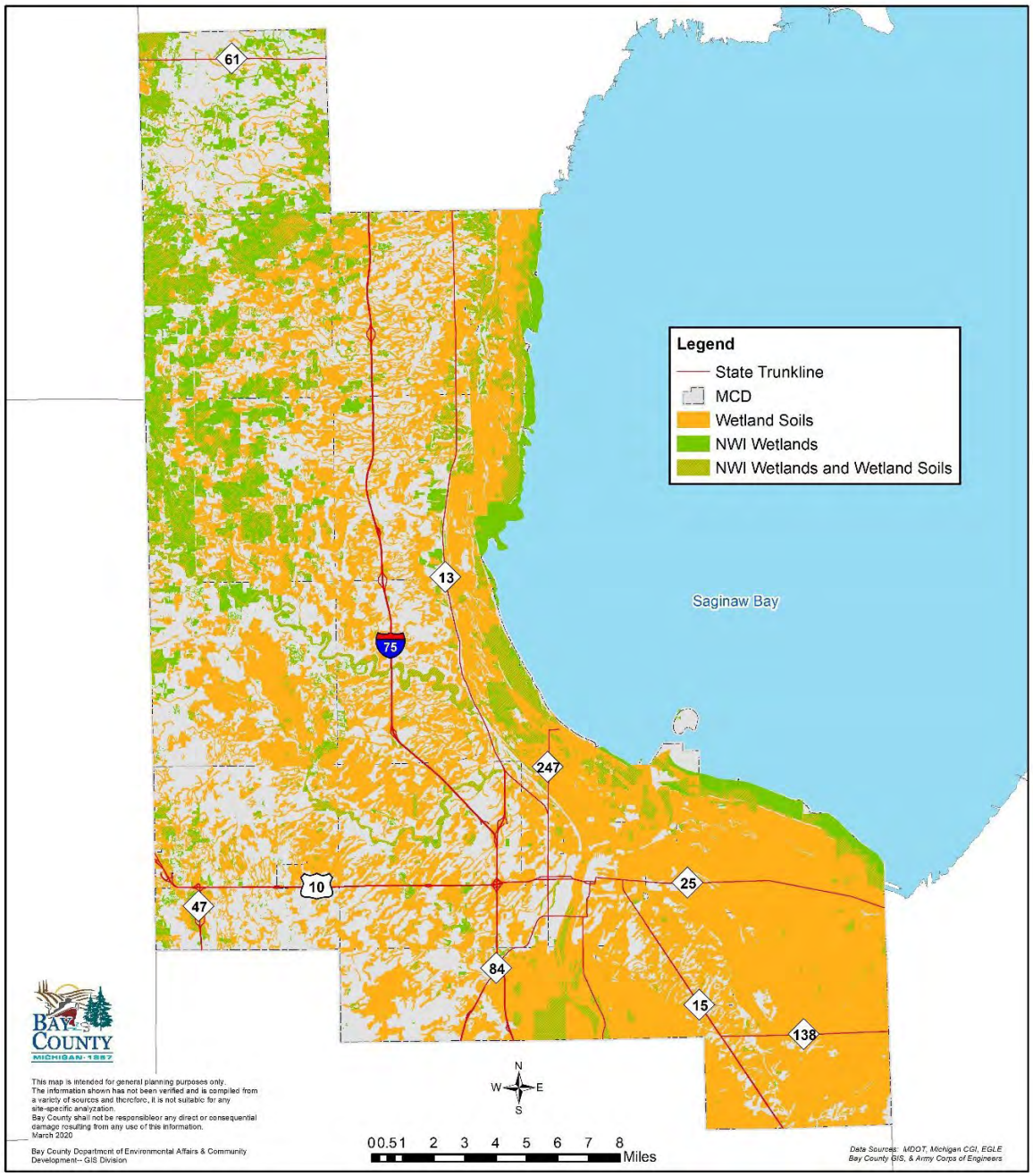
Bay County has a multitude of water resources. It is located on Saginaw Bay, an arm of Lake Huron and is located within the Saginaw River Watersheds. The Watershed empties into Saginaw Bay in Lake Huron.

There are 15 lakes 10 acres or larger, with the two largest lakes each being over 100 acres. Plowdry Unit is located in Portsmouth Township in central Bay County and Tobico Lagoon is located in Bangor Township in east-central Bay County. The other 13 lakes over 10 acres in area range in size from 10 acres to 62 acres. In addition to the inland lakes, Bay County has two rivers than impact the County. Kawkawlin River is approximately 17.5 miles that flows into the Saginaw Bay of Lake Huron. There are two branches of **the** Kawkawlin River, the North Branch, which is the longer branch and the South Branch. The second river, the Saginaw River is approximately 22.4 miles long and flows north into the Saginaw Bay of Lake

Huron. The river is formed with the convergence of the Tittabawassee and the Shiawassee Rivers southwest of the City of Saginaw south of Bay County.

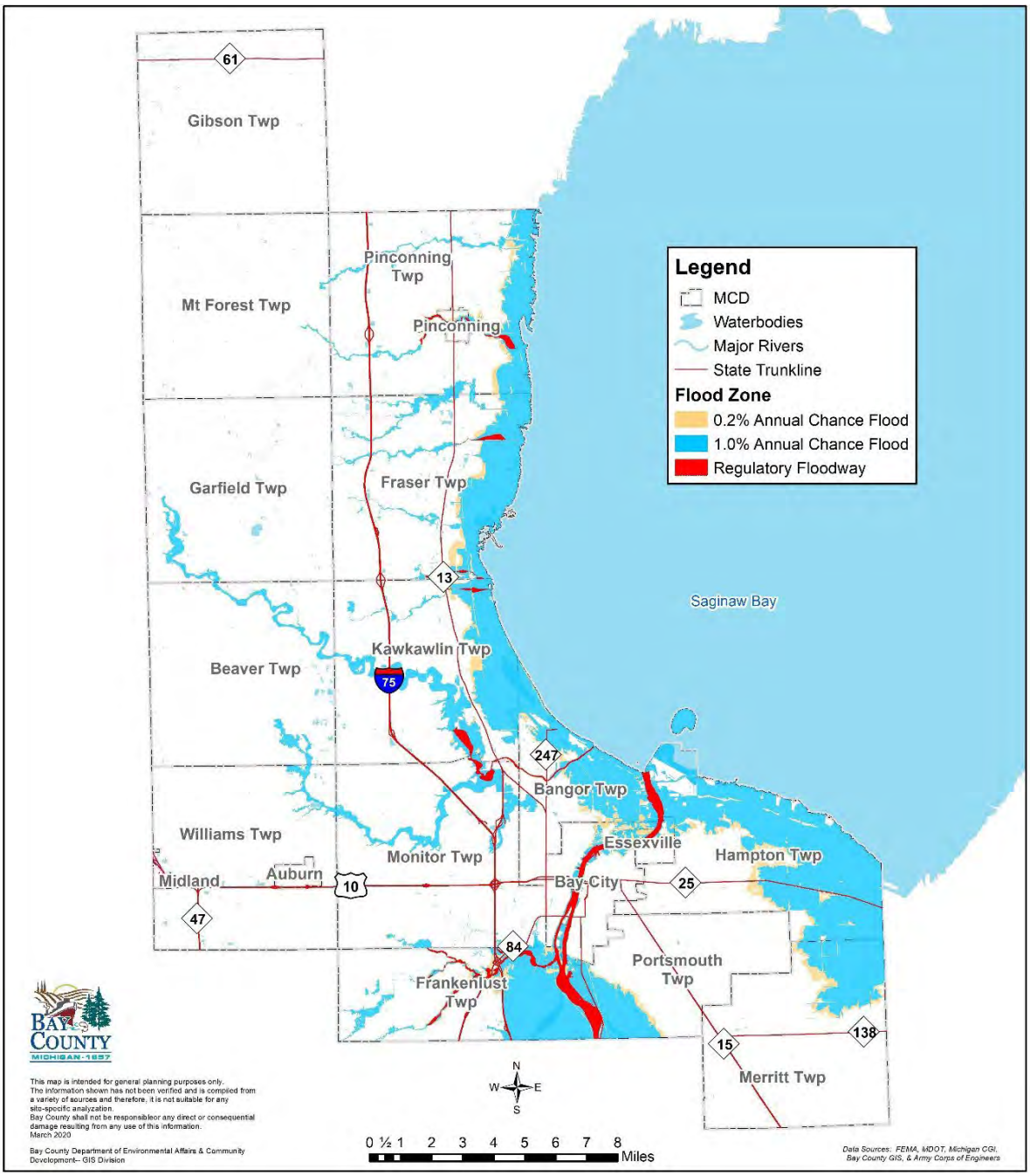
Bay County Wetlands Map

MAP 3.5



Bay County FEMA Flood Zones Map

MAP 3.6



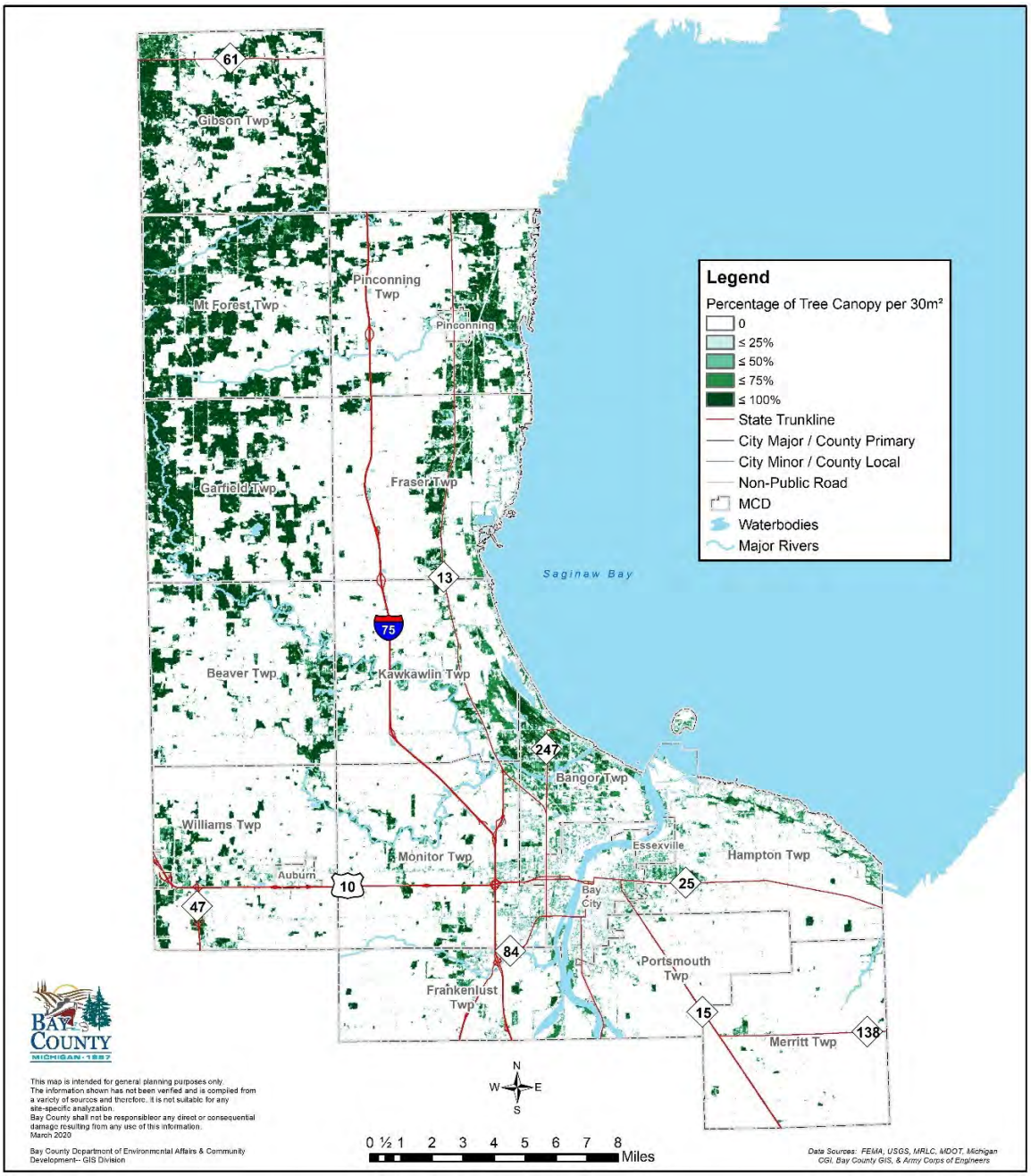
FOREST COVER

Approximately 5.5 percent of Bay County's land area is forested. . Tree species vary depending upon the soils, moisture, and past activities such as logging, fires and land clearing. The most common tree species found in Bay County are red maple, sugar maple, quaking aspen, bigtooth aspen, eastern white pine,

white oak, red oak, eastern cottonwood, black cherry, eastern hemlock, and American beech. Maple forests make up approximately 20 percent of the forest area, followed by aspen forests, which make up an estimated 12 percent, and oak forests, which make up approximately eight percent.

Bay County Forest Cover Map

Map 3.7



COMMUNITY ORGANIZATION AND RESOURCES FOR HAZARD MITIGATION INCLUDING COUNTY AND LOCAL COMMUNITY AGENCIES, DEPARTMENTS, AND ORGANIZATIONS POTENTIALLY RELEVANT FOR HAZARD MITIGATION

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. In addition to the county government, other municipalities in Bay County include 4 cities and 14 townships.

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.

Bay County Office of Emergency Management

1228 Washington Avenue
Bay City, MI 48708
Phone: (989) 895-4112

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 Bay 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 Emergency Medical Services (EMS) agencies, public works departments, the Michigan State Police Emergency Management and Homeland Security Division, the Michigan Department of Environment, Great Lakes, and Energy (EGLE), the Region 3 Homeland Security Board, and the National Weather Service (NWS). Other agencies coordinating with emergency management include the American Red Cross, local and state health departments, local school districts, 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, National Oceanic and Atmospheric Administration (NOAA) Weather alerts, Broadband, Local Emergency Planning Committee (LEPC) Boards, Emergency Operations Center (EOC) Operations and Management, Training and Education programs, and all related Homeland Security matters.

Local Emergency Planning Committees (LEPC)

One of the major provisions of SARA Title III is the establishment of the 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 or at the request of the LEPC or local Fire Department.

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.

County Government Offices and Facilities (Main Office Locations) County

Bay County
Bay County Building
515 Center Ave
Bay City, MI 48708
Phone: 989 895-4133

Cities

City of Auburn
113 E. Elm St.
Auburn, MI 48611
Phone: 989 662-6761

City of Bay City
301 Washington Ave.
Bay City, MI 48708
Phone: 989 894-0704

City of Essexville
Essexville City Hall
1107 Woodside Ave.
Essexville, MI 48732
Phone: 989 893-0772

City of Pinconning
208 Manitou St.
P. O. Box 628
Pinconning, MI 48650
Phone : 989 879-2360

Townships

Bangor Charter Township
180 State Park Drive
Bay City, MI 48706
Phone: 989 684-8041

Beaver Township
1850 Garfield Road
Auburn, MI 48611
Phone: 989 662-4996

Frankenlust Township
2401 Delta Road
Bay City, MI 48706
Phone: 989 686-5300

Fraser Township
1474 Mackinaw Road
Linwood, MI 48634
Phone: 989 647-3820

Garfield Township
1138 W Erickson Road
Linwood, MI 48634
Phone: 989 879-2552

Gibson Township
7214 Main Street
Bentley, MI 48613
Phone: 989 903-5227

Hampton Character Township
801 W. Center Road
Essexville, MI 48732
Phone: 989 893-7541

Kawkawlin Township
1836 Parish Road
Kawkawlin, MI 48631
Phone: 989 686-8710

Merritt Township
PO Box 126
Munger, MI 48747
Phone: 989 659-2136

Monitor Township
2483 Midland Road
Bay City, MI 48706
Phone: 989 684-7203

Mount Forest Township
1705 W Cody Estey Road
Pinconning, MI 48650
Phone: 989 879-7575

Pinconning Township
PO Box 58
Pinconning, MI 48650
Phone: 989 879-4018

Portsmouth Charter Township
1711 Cass Avenue Road
Bay City, MI 48708
Phone: 989 892-7221

Williams Charter Township
1080 W Midland Road
Auburn, MI 48611
Phone: 989 662-4408

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. Communities that have the resource or the capacity within their community have identified that resource with a Y. Those communities that do not have that resource or capacity within their community but have access to the resource through another agency have identified that resource with an asterisk (*).

Bay County Participating Municipality's Resources

TABLE 3.4

Municipality	Resources Available													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Bay County		Y	Y		Y		Y	Y	Y		Y	Y		Y
City of Auburn	Y	Y	Y	Y		*			*	Y	Y		Y	Y
Bay City	Y	Y	Y	Y	Y	*	Y		*	Y	Y	Y	*	Y
City of Essexville	Y	Y	Y	Y	Y	*	Y		*	Y	Y	*	Y	Y
City of Pinconning	Y	Y				*	Y		*	Y			Y	Y
Bangor Township	Y	*	Y	Y	*	*	Y		*	Y	Y	Y		*
Beaver Township				Y		*			*	Y	Y		Y	Y
Frankenlust Township						*			*	Y	Y	Y		
Fraser Township	Y		Y	Y		*			*	Y	Y		Y	Y
Gibson Township	Y		Y	Y		*			*	Y	Y		Y	Y
Hampton Township	Y	Y	Y	Y	Y	*	Y		*	Y	Y	Y	Y	Y
Monitor Township	Y	*	Y	Y	Y	*	Y		*	Y	Y			Y
Mount Forest Township			Y	Y		*	Y		*	Y			Y	Y
Portsmouth Township	Y		Y	Y		*			*	Y	Y			Y
Williams Township	Y	Y	Y	Y		*			*	Y	Y	Y		Y

A-Planning staff
B-Public Works Department
C-Taxing Authority/Annual Budget
D-Building Codes
E-Local Police Department
F-County Sheriff
G--Hospital/Medical Facilities
H- Emergency Management Staff
I-County Emergency Management Staff
J-Land Use Regulatory Capability (Zoning Ordinance/Comprehensive Land Use Plan)
K- Ordinance Authority
L-Fulltime Fire Department/Equipment
M-Volunteer Fire Department/Equipment
N- Emergency Medical Services

Police

Bay County has five police departments within the County including the Sheriff's Department as well as an outpost for the Michigan State Police. In addition to the Bay County Sheriff, Bay City, the City of Essexville, Hampton Township, and Delta College all have public safety departments, which include police and fire personnel. In addition, the Michigan State Police have a satellite office in Bay County.

Bay County Police Departments

Bay County Sheriff's Department
503 3rd St.
Bay City, MI 48708
Phone: 989 895-4050

Bay City Public Safety Department
501 3rd St.
Bay City, MI 48708
Phone: 989 892-8571

Delta College Public Safety Department
1961 Delta Road
University Center, MI 48710
Phone: 989 686-9000

City of Essexville Public Safety Department
1107 Woodside Ave.
Essexville, MI 48732
Phone: 989 892-2541

Hampton Township Public Safety Department
745 W. Center Road
Essexville, MI 48732
Phone: 989 892-7541

Fire

There are sixteen (16) fire departments located in or serving portions of Bay County. The City of Bay City's Fire Operations Division is a division of the Public Safety Department. Bay City is the only department in Bay County that has all full-time employees. The remaining 15 departments have a combination of full-time/part-time/volunteer employees.

Bay County Fire Departments

Auburn/Williams Fire District
1090 W. Midland Road
Auburn, MI 48611
Phone: 989 662-2699

Bangor Township Fire Department
3921 Wheeler Road
Bay City, MI 48706
Phone: 989 684-8504

Bay City Public Safety Fire Division
1401 Center Avenue
Bay City , MI 48708
Phone: 989 892-8601

Beaver Township Fire Department
1850 Garfield Road
Auburn, MI 48611
Phone: 989 662-4996

Essexville Fire Department
1107 Woodside Avenue
Essexville, MI 48732
Phone: 989 892-2541

Frankenlust Township Fire Department
2401 Delta Road
Bay City, MI 48708
Phone: 989 686-5300

Garfield Township Fire Department
1242 W. Erickson Road
Linwood, MI 48634
Phone

Gibson Township Fire Department
8292 Standish Road
Bentley, MI 48613
Phone: 989 846-4777

Hampton Township Fire Department
949 N Wagner Road
Essexville, MI 48732
Phone: 989 895-8811

Kawkawlin Township Fire Department
1836 E Parish Road
Kawkawlin, MI 48631
Phone: 989 686-1120

Merritt Township Fire Department
46 E. Munger Road
Munger, M I 48747
Phone: 989 659-2725

Monitor Township Fire Department
2483 Midland Road
Bay City, MI 48706
Phone: 989 684-6320

Mount Forest Township Fire Department
1705 W Cody Estey Road
Pinconning, MI 48650
Phone: 989 879-3424

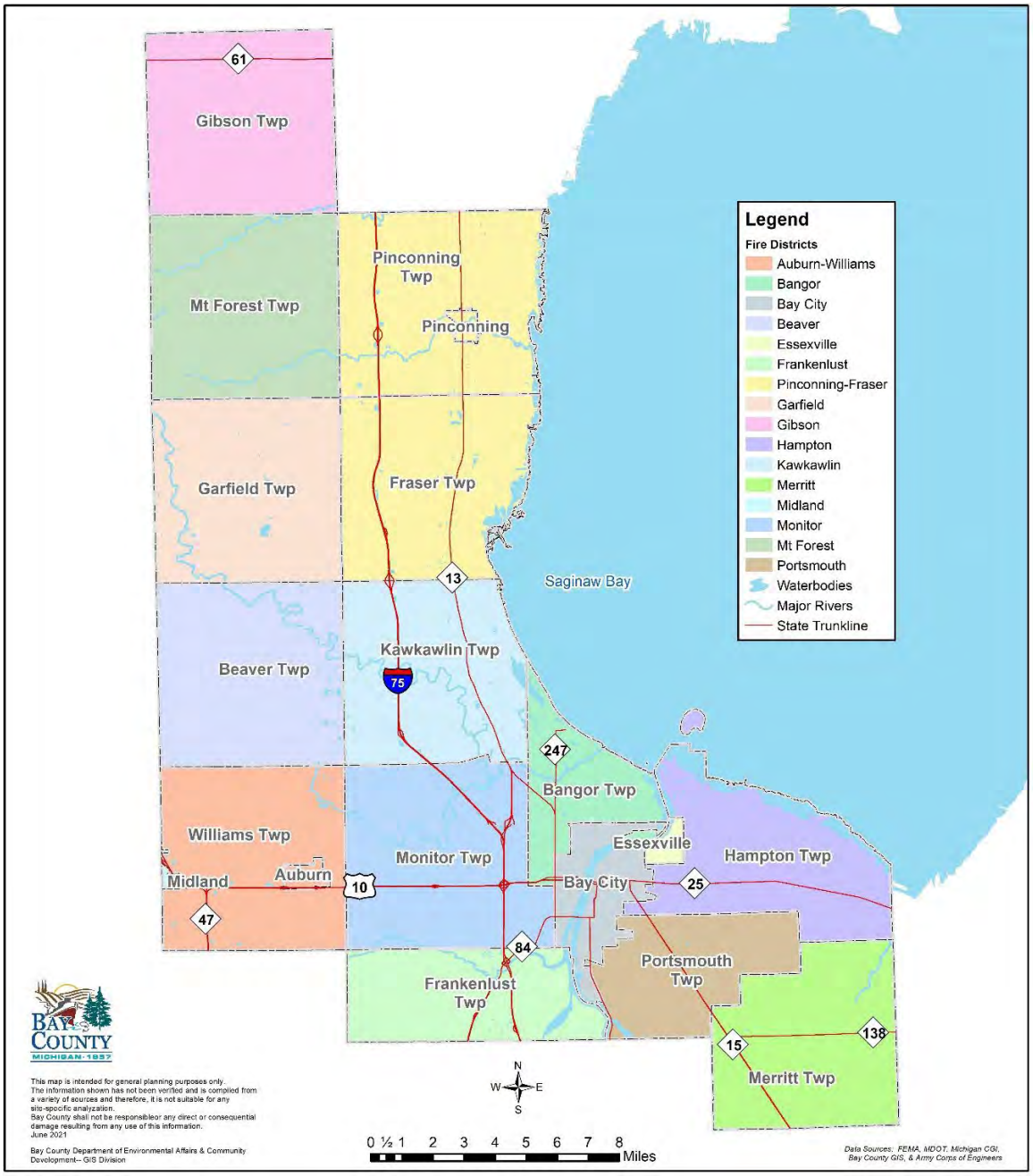
City of Pinconning Fire Department
208 N. Manitou Street
Pinconning, MI 48650
Phone: 879-4018

Pinconning/Fraser Township Fire Department
1501 N Kitchen Rd
Linwood, MI 486234
Phone: 989 697-4576

Portsmouth Township Fire Department
1711 Cass Avenue Road
Bay City, MI 48708
Phone: 989 892-0642

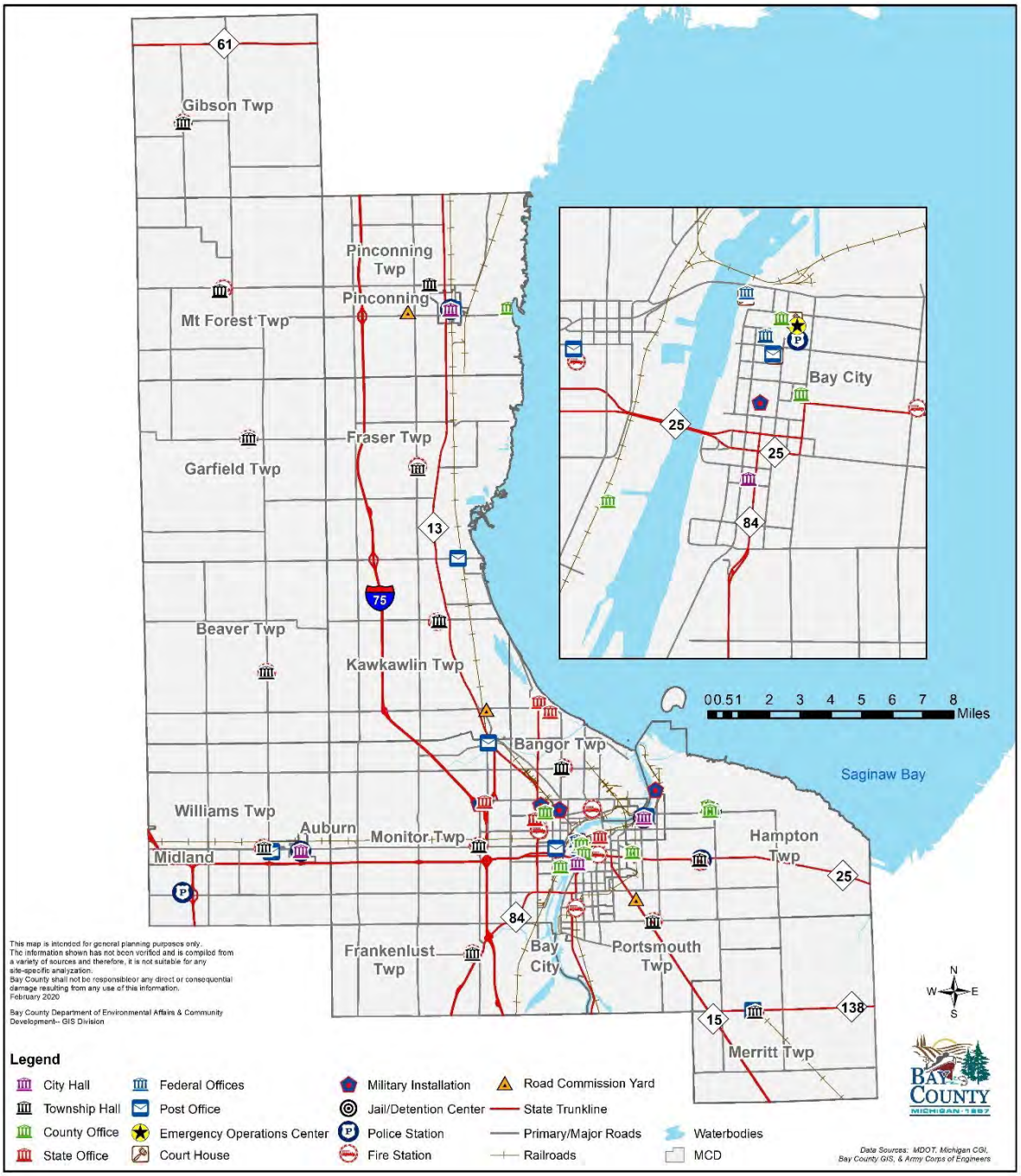
Bay County Fire Departments Map

Map 3.8



Bay County Emergency Services Map

Map 3.9



Public Works

There are city departments of public works, and the county has a wastewater department. These departments are critical to emergency management as they assist in the addressing infrastructure failures as well as the clean up after many hazardous events.

Bay County Public Works Departments

Bay County Department of Water and Sewer
3933 Patterson Road
Bay City, MI 48706
Phone: 989 684-3883

Bay City Department of Public Works
800 S Water Street
Bay City, MI 48708
Phone: 989 894-8316

Essexville Department of Public Works
1500 Pine Street
Essexville, MI 48732
Phone: 989 893-6101

Pinconning Department of Public Works
208 S Manitou
Pinconning, MI 48650
Phone: 989 879-2360

Bay County Sheriff's Office

503 Third Street
Bay City, MI 48708
Phone: 989 895-4050
The Bay County Sheriff's Office is a full-service law enforcement agency serving the citizens of Bay County.

Bay County Drain Commission

515 Center Avenue
Bay City, MI 48708
Phone: 989 895-4290
The drain commission is responsible for the construction, maintenance, and operation of nearly 1,200 miles of storm water drain systems within Bay County. The system is serviced by 28 storm water pumping stations and several regional storm water retention facilities.

Bay County Road Commission

2600 Beaver Road
Kawkawlin, MI 48631
Phone: 989 686-4610
Currently the Bay County Road Commission is responsible for 1036 miles of county roads and 78 bridges having a 20-foot length. In addition to maintaining and preserving all county roads and bridges, the Bay County Road Commission also maintains an additional 435 lane miles of MDOT trunklines through a partnership with the Michigan Department of Transportation.

Bay County Health Department

1200 Washington Avenue
Bay City, MI 48708
Phone: 989 895-4009
The mission of the Bay County Health Department is to protect and promote a healthy community and safe environment by providing quality services through all stages of life. The Bay County Health Department's Emergency Preparedness Division is responsible for collaborating with public and private agencies to assure their response during an emergency is effective in protecting Bay County residents by focusing in the areas of education and training, conducting mass prophylaxis clinics in coordination with Michigan Department of Community Health, and detailing activities to be performed in the event of public health emergencies.

Michigan State University Extension-Bay Branch
515 Center Avenue
Bay City, MI 48708
Phone: 989 895-4026
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.

Bay Area Chamber of Commerce
812 N Water Street
Bay City, MI 48708
Phone: (989) 893-4567
The Bay Area Chamber of Commerce provides information to small businesses as well as having an active legislative program to assist businesses in solving problems and acting as the advocate of the business community.

Bay Area Community Foundation
1000 Adams Street
Bay City, MI 48708
Phone: 989 893-4438
The Bay Area Community Foundation has been in existence for nearly 40 years. The provide grants annually to help create change and assist community to thrive. The annual grant awards total over $1 million.

Ambulance
There are three ambulance companies that serve Bay County. The three companies are: Mobile Medical Response (MMR), MedStar, and Northern Bay Ambulance. MMR is the primary response unit. In addition, many of the firefighters are also trained/certified EMS personnel.

Mobile Medical Response
4305 State Street
Saginaw, MI 48603
Phone: (800) 232-5216

MedStar
380 North Bay
Clinton Township, MI 48036
Phone: 586 468-6510

Northern Bay Ambulance
325 Libby Street
Pinconning, MI 48650
Phone: 989 879-2220

Health Care
There are 19 medical facilities located in Bay County. For the purpose of this plan a medical facility is a place where sick or injured people are given care or treatment, such as a hospital, urgent care, or clinic.

Ascension Medical Group
4040 N. Euclid Ave b50
Bay City, MI 48706
Phone: 989 671-9153

Bay City Orthopedic
204 W. Mundy Ave.
Bay City, MI 48706
Phone: 989 892-0099

Covenant MedExpress
2919 Wilder Rd.
Bay City, MI 48706
Phone: 989 671-5700

Great Lakes Medical Center
2110 6th St.
Bay City, MI 48708
Phone: 989 891-9000

Huron Health Care
618 Mulholland
Bay City, MI 48708
Phone: 989 269-9265

McLaren Bay Special Care
3250 E. Midland Rd
Bay City, MI 48706
Phone: 989 667-6802

MidMIchigan Health Park
3051 Kiesel Rd
Bay City, MI 48706
Phone: 989 695-4950

Pinconning Medical Center
204 West Third St.
Pinconning, MI 48650
Phone: 989 871-3771

Riverview Medical Associates
901 South Henry St.
Bay City, MI 48706
Phone: 989 894-9000

Bay Area Health clinic
3720 Katalin Ct.
Bay City, MI 48706
Phone: 989 686-2800

Bayside Health Center
3884 Monitor Rd.
Bay City, MI 48706
Phone: 989 671-2000

Family Health & Wellness Center
1458 West Center Rd
Essexville, MI 48732
Phone: 989 895-4625

Health Delivery Inc.
3175 West Professional Dr.
Bay City, MI 48708
Phone:

McLaren Bay Region
1900 Columbus Ave.
Bay City, MI 48708
Phone: 989 894-3000

McLaren Occupational Health & Convenient Care
4 Columbus, Ave
Bay City, MI 48708
Phone: 989 393-2850

North Pine Urgent and Family Care
863 N. Pine Rd.
Essexville, MI 48732
Phone: 989 778-1899

RediMed
4175 N. Euclid Ave.
Bay City, MI 48706
Phone: 989 667-0491

Total Family Healthcare
1111 S. Euclid Ave.
Bay City, MI 48706
Phone: 989 439-1235

Valley Allergy Clinic
200 S. Wenona St.
Bay City, MI 48706
Phone: 989 892-0311

Local Emergency Capability:
Procedures in the Emergency Operations Plans address the of problems associated with hazards, including specific functions such as rescue and evacuation. Communities work closely with company officials 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 System
Bay County has a total of 19 sirens, with 17 outdoor public warning sirens and two (2) digital sirens. The warning sirens are standard warning sirens. The digital sirens transmit a signal alerting Waze users that a police vehicle has its lights and siren activated. This device is designed to give drivers more notice to move over when an officer is on-scene or is approaching. The sirens are located in the following municipalities: City of Pinconning (1), Kawkawlin Township (2), Hampton Township (1), Williams Township (2), Bangor Township (2), City of Bay City (11, including the two digital sirens. A map identifying the sirens is located on the following page.

Schools
There are seven (7) school districts that serve the residents of Bay County, with two (2) districts being located out of Bay County and five (5) districts being located in Bay County. All school districts within the County utilize “school of choice”, which allows students living in one school district to attend schools in other districts. In addition, Delta College is also located within the County. Below is information on the seven public school districts.

Bay County School Districts

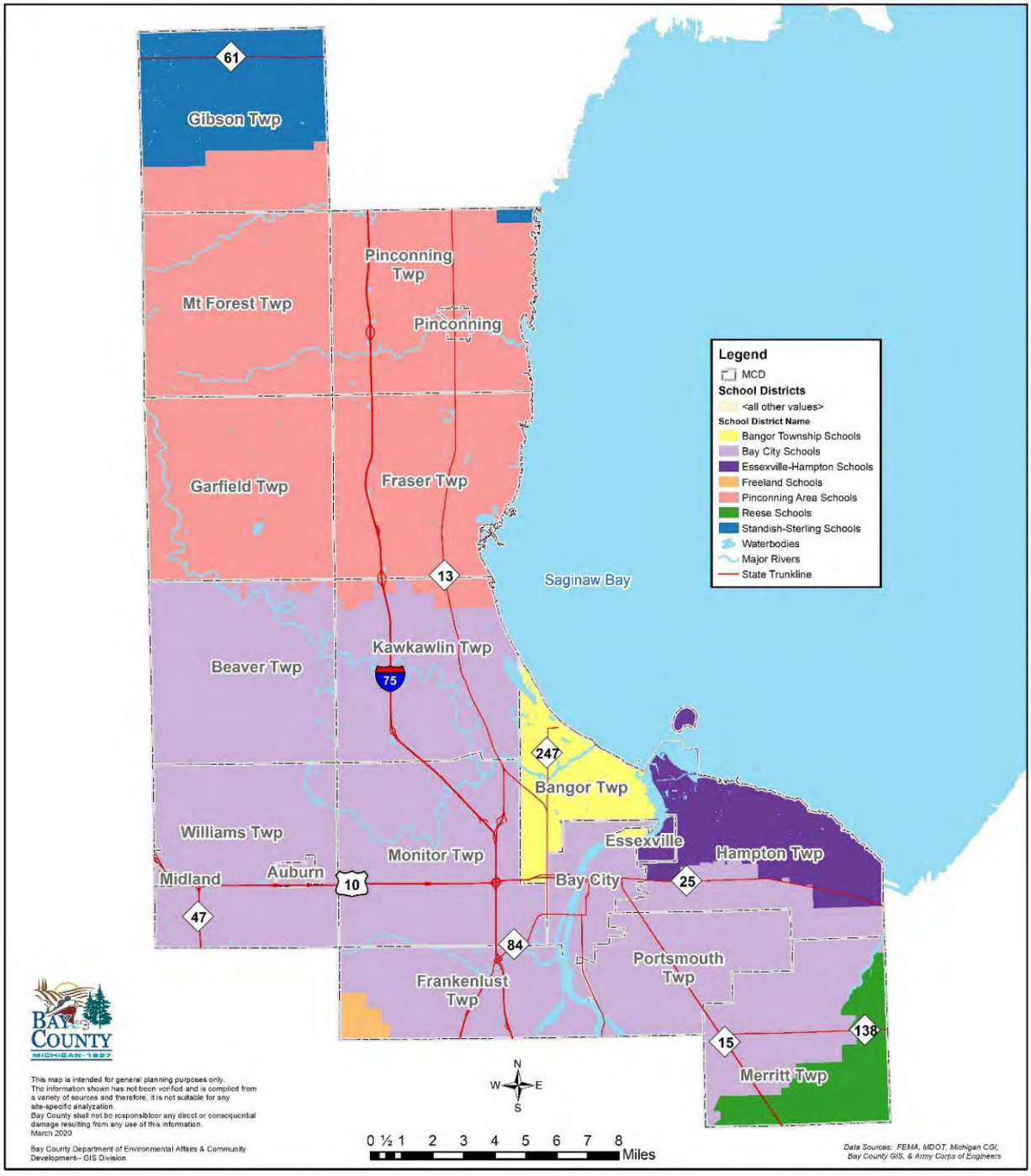
Table 3.5

School District (address)	Number of Students (2019-20)	School District (address)	Number of Students (2019-20)
Bangor Township Schools 3359 E. Midland Rd. Bay City, MI 48706 Phone: (989) 684-8121	2,545	Bay City public Schools 910 Walnut St. Bay City, MI 48706 Phone: (989) 886-9700	7,267
Essexville Hampton Public Schools 306 Pine St. Essexville, MI 48732 Phone: (989) 894-9700	1,680	Freeland Community School District 710 Powley Dr. Freeland, MI 48623 Phone: (989) 695-5527	2,010

Pinconning Area Schools 605 W. 5th St. Pinconning, MI 48650 Phone: (989) 308-0500	1,246	Reese Public Schools 1696 Van Buren Rd. P.O. Box 389 Reese, MI 48457 Phone: (989) 868-9864	760
Standish-Sterling Community Schools 3789 Wyatt Rd. Standish, MI 48658 Phone: (989) 846-3670	1,551	[redacted]	

Bay County School District Map

MAP 3.10



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
Consumers Energy
City of Bay City

Natural Gas
Consumers Energy

Transportation
Roads
Bay County has 669 miles of local roads, 367 miles of primary roads, 435 lane miles of state trunklines, and 78 bridges with a minimum of a 20-foot length.

Bay County is served by three (3) all season Federal/State Trunkline Highways:
I-75 North/South, central Bay County
US-10 East/West, southern Bay County
M-13 North/South, eastern Bay County

Mass Transportation
Bay Metropolitan Transportation Authority operates through much of Bay County. Prior to the COVID-19 pandemic, there were eleven (11) fixed routes in operation, which were temporarily cancelled due to lack of ridership. However, the routes are now back in full operation. In addition, rides are available through the Dial-A-Ride-Transportation (DART), which was originally targeted to provide rides for people 60+ years old or individuals with a disability. This was also available throughout the COVID-19 pandemic.

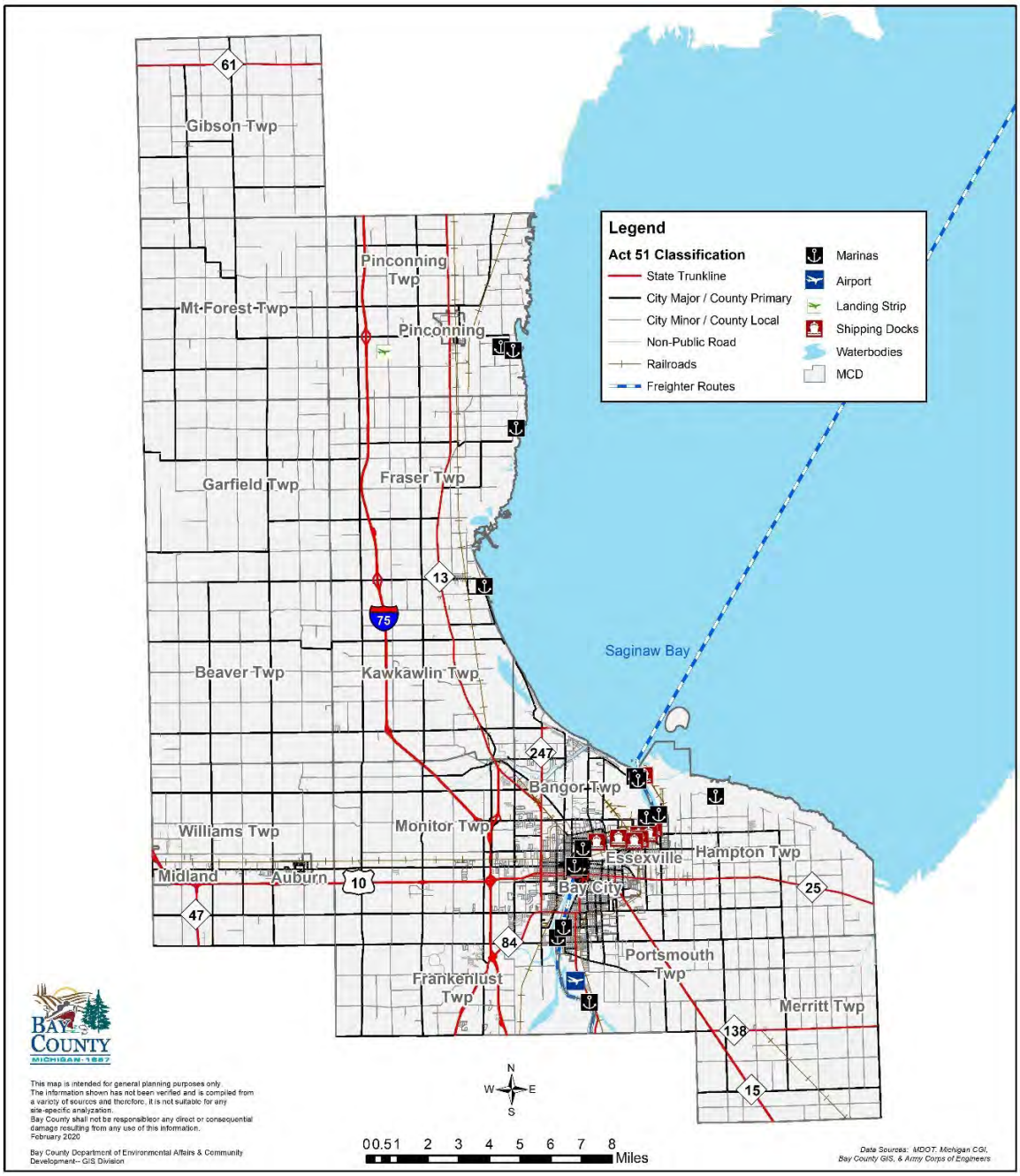
Railroads
Bay County is served by two rail lines: Huron and Eastern Railroad and Lake State Railroad**.**

Airports
Bay County has two airports. James Clements Airport, located in Bay City, is a publicly-owned airport and Carl A Gross Airport, located in Pinconning and is a member-owned public airport.

Bridges
Liberty and Independence Bridges in Bay City are Public/Private owned Bascule Bridges. More information is available at www.baycitybridgepartners.com.

Bay County Transportation Map

MAP 3.11



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.

51st (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; and 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 bioterrorism 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 (SNS)-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 is made to the Center for Disease Control and Prevention (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 material 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. Alcona County, having a recognized PA 390 program is the most northern permanent member of the Region 3 Homeland Security Planning Board. City of Midland is currently the designated fiduciary and is responsible for management and administration of the Region 3 Homeland Security Grant Program funds. The Region 3 Homeland Security Planning Board consists of voting representation from the following counties: Alcona, Arenac, Bay, Genesee, Gladwin, Huron, Iosco, Lapeer, Midland, Ogemaw, Oscoda, Saginaw, Sanilac, and Tuscola.

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.

Goal 1: Improve response readiness within Region
Goal 2: Develop Region-Wide Interoperable Communications
Goal 3: Improve Critical Infrastructure and Key Resources
Goal 4: Communities within Region 3 will build intraregional public and private partnerships to be capable of being self-sufficient for a minimum of 72 hours after the onset of All Threats and Hazards.
Goal 5: Develop a Regional Homeland Security Strategy (RHSS)
Goal 6: Enhance intelligence and information sharing among public and private stakeholders.

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 preparedness. 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 allows for local jurisdictions to determine required capabilities already identified using pre-developed scenarios.

FEMA Grant Programs

FEMA has several grant programs to assist in the mitigation of hazard damages. These grants are available annually or after a federally declared disaster. The grant programs are the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), and Building Resilient Infrastructure and Communities (BRIC). The HMGP provides funding to state, local, tribal, and territorial governments after a presidentially declared disaster, so that they can rebuild in a way that reduces or mitigates future disaster losses. FMA is a competitive grant programs to reduce or eliminate repetitive flood damage to buildings insured by the NFIP. Grants are available to states, local communities, federally recognized tribes, and territories. BRIC is available annually to states, local municipalities, tribes, and territories to undertake mitigation projects that reduce damages resulting from hazards and natural disasters.

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. Prior to that date, a school that operated any of grades kindergarten through 12 must have had at least six fire drills and two "lockdown" drills during each school year. The bill required 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 requires 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, 2014, 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 cardiopulmonary resuscitation (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 NWS 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. The 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). Public warning is provided through the Emergency Alert System (EAS), and Integrated Public Alert Warning System (IPAWS). The NWS 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 NWS 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 NWS 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.

The 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). Public warning is provided through the Emergency Alert System (EAS), (IPAWS), and Commercial Mobile Alert System (CMAS) 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, Integrated Public Alert & Warning System (IPAWS), and Nixle to supplement or supplant outdoor warning siren systems. Some rural areas of Bay County are still in poor NOAA radio reception areas and

limited cellular network coverage, these areas are encouraged to supplant with monitoring of local TV and Radio Broadcasts.

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.

Fire Safety Rules for Michigan Dormitories

Even before the Seton Hall University dormitory fire in January 2000, the State Fire Safety Board took action to enhance the fire and life safety protection of Michigan's college and university dormitories. On December 21, 1999, two new sets of rules took effect governing the construction, operation, and maintenance of school, college and university instructional facilities and dormitories. These sets of rules were updated to meet the most current nationally recognized standards from the National Fire Protection Association. The new rules adopted the 1997 edition of NFPA 101, Life Safety Code. NFPA standards provide the minimum requirements necessary to establish a reasonable level of fire and life safety and property protection from hazards created by fire and explosion.

The new rules require, among other things, that fire sprinklers be installed in newly constructed dormitories or those undergoing major renovations. However, existing dormitories don't fall under the new rules and therefore do not have to be retrofitted unless they are being renovated.

Wildfires

Because the vast majority of wildfires are caused by human activity, the Michigan Department of Natural Resources (MDNR) 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) United States Department of Agriculture (USDA) Forest Service - Huron Manistee, Hiawatha, and Ottawa National Forests; 3) United States Department of Interior (DOI) ~~USDI~~ National Park Service - Pictured Rocks and Sleeping Bear Dunes National Lakeshores; 4) DOI ~~USDI~~ Fish and Wildlife Service – Seney National Wildlife Refuge; 5) DOI ~~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. Bay County can reduce its vulnerability to wildfires by ~~1)~~ participating in multi-state and interagency mitigation efforts. Bay County has a (Designated Zone 4) Wildfire potential area designated

by the MDNR and both State and Local Agencies have specific plans in place addressing this zone which is located in the Northwest section of Bay County.

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 Bay County are recognized by FEMA as participants in the National Flood Insurance Program: City of Auburn, City of Bay City, City of Essexville, City of Midland, City of Pinconning, Bangor Township, Beaver Township, Frankenlust Township, Fraser Township, Garfield Township, Hampton Township, Kawkawlin Township, Merritt Township, Monitor Township, Pinconning Township Portsmouth Township, and Williams Township. These communities have all had their floodplain areas officially mapped and are in compliance with the NFIP. The remaining villages and townships have not participated 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.

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 ***EGLE***, 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 EGLE 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 EGLE for any dredging, filling, draining or alteration of a wetland. This permitting process helps preserve, manages, 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 EGLE Land and Water Management Division, 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. EGLE 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 EGLE. 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. EGLE 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 MDEQ will provide information on land and water “interface” permit requirements and on building requirements relating to construction in flood hazard areas.

Dams

Both the MDEQ and the Federal Energy Regulatory Commission (FERC) classify and regulate dams in Michigan. Under state and federal legislation, certain dam owners are required to develop a survey of the downriver area, develop flood-prone area maps, and develop emergency action plans (EAPs). Furthermore, the FERC requires the owners of such dams to exercise these plans; the MDEQ has initiated an effort to encourage owners of state-regulated dams to voluntarily perform exercises of their EAPs. In Michigan, well over 100 dams are covered by Emergency Action Plans. Dams in Michigan are regulated by Part 315 of The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Part 315, Dam Safety provides for the inspection of dams. This statute requires the MDEQ to rate each dam as either "high," "significant," or "low" hazard potential, according to the potential downstream impact if the dam were to fail (not according to the physical condition of the dam). The MDEQ has identified and rated over 2,400 dams. Dams over 6 feet in height that create an impoundment with a surface area of 5 acres or more are regulated by this statute. Dam owners are required to maintain an EAP for "high" and "significant" hazard potential dams. Owners are also required to coordinate with local emergency management officials to assure consistency with local emergency operations plans. Dams regulated by FERC, such as hydroelectric power dams, are generally exempt from this statute. The FERC licenses waterpower projects (including dams) that are developed by non-federal entities, including individuals, private firms, states and municipalities. Under provisions of the Federal Power Act and federal regulations, the licensee of the project must prepare an EAP. This plan must include a description of actions to be taken by the licensee in case of an emergency. Inundation maps showing approximate expected inundation areas must also be prepared. Licensees must conduct a functional exercise at certain projects, in cooperation with local emergency management officials. Bay County Emergency Management currently has one dam within the County, which has been identified as a Low Hazard Dam.

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 phenomenon is called a storm surge and can drive lake water inland over large areas. In recent years, the Great Lakes and specifically Lake Huron are experiencing a period of high water.

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.

In the 2019, several counties bordering on Lake Huron or Saginaw Bay in Lake Huron have met with state and federal officials to discuss the impact of the high water and the dangers that have occurred. In Bay County the discussion centered around the infrastructure along Saginaw Bay and the need to update it to reduce future flooding events.

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

Hazardous Materials

Superfund Amendments and Reauthorization Act (SARA), Title III
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.

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 Wells

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

Pipelines (Petroleum and Natural Gas)

MPSC Pipeline Safety Inspections

Safety engineers from the Michigan Public Service Commission (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 (MDEQ/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 3.6

Pipeline Type	Jurisdiction	Applicable Code	Inspected by
Inter-state natural gas	USDOT/OPS	49 CFR Part 192	MPSC Gas Safety Intrastate
Inter-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*	MDEQ/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

Nuclear Power Plants

Bay County is not located within the Emergency Planning Zone of any nuclear power plant. 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 Systems

Water/Electrical Infrastructure

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 Bay County EMD and ITC Power Transmission Corporation continues, and materials are updated annually and shared 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 Bay 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 intercounty 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 (MDEQ), 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).

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, including Bay County have, in conjunction with EGLE developed water system master plans that conform to the requirements of the Michigan Safe Drinking Water Act. From a hazard mitigation standpoint, which 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 plans 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

In January of 2020, COVID-19, entered the U.S. according to the Centers for Disease Control and Prevention (CDC). It is believed it that the disease came from a single unidentified case from China. After going undetected for a period of time, in late February several cases were found in various points throughout the country. By March the virus was being considered a pandemic and many states throughout the U.S., including Michigan, began to establish various forms of quarantines. The CDC established protocols to use, including the wearing of mask, social distancing (a minimum of 6 feet), and washing one's hands to limit exposure to the pandemic. However, as this was not agreed upon by all the elected officials, these recommendations were not implemented by everyone. As a result, the pandemic raged on throughout the U.S into 2022.

By mid-December 2020, the CDC was reporting that over 2,000 people were dying daily in the U.S. The first vaccine was approved in December 2020, with a second vaccine approved within weeks of the first. These vaccines required two shots to work accordingly, with the second shot needing to occur within 3-4 of the first vaccine. The vaccines were not a cure for COVID-19 but would lessen its symptoms. By mid-October 2021~~,~~ over 720,000 deaths had occurred in the U. S. and over 4.8 million deaths had occurred worldwide.

Transportation

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.

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

At the first meeting of the Bay County Hazard Advisory Committee (BCHAC), the BCHAC identified hazards that potentially, negatively impact the Bay County residents and their property. During the next several meetings, risk and vulnerability assessments were completed along with an overall hazard priority determination. (During these assessments and prioritization, similar hazards were combined to eliminate redundancies.) The prioritization ratings are found below on Table 4.1.

The prioritization table utilized three criteria to determine the overall risk to Bay County and its residents. 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. Ability of hazard to be mitigated had a point value from 0 to 10 with 10 being an event that could not be mitigated in any capacity and 0 being an event that restoration being completed within a year. Using the three criteria, the BCHAC then identified an overall priority to address each of the hazards. There is no ranking within each of the priority categories.

HAZARD PRIORITIZATION

Table 4.1

Event	Risk Assessment	Vulnerability Assessment	Ability of Hazard to be Mitigated	Overall Priority
Energy Emergencies	High	High	3	High
Infrastructure Failures	High	High	3	High
Riverine and Surface Flooding	High	Medium	9	High
Severe Weather[1]	High	High	6	High
Shoreline Incidents[2]	Medium	High	9	High
Cyber Crimes	High	High	5	Medium
Hazard Materials Incidents[3]	Medium	High	3	Medium
Terrorism/Sabotage	Medium	High	3	Medium
Tornadoes	Medium	High	9	Medium
Transportation Accidents	Medium	High	8	Medium
Well/Pipeline Incidents[4]	Medium	High	2	Medium
Extreme Temperatures[5]	Medium	High	2	Moderate
Invasive Species	High	Medium	6	Moderate
Population Changes/ Special Events	Medium	Medium	0	Moderate
Public Health Emergency	High	Medium	5	Moderate
Structural Fires	High	High	2	Low
Wildfires	Medium	Medium	2	Low
Drought	Low	Medium	8	Low
Civil Disturbances	Low	Low	9	Low
Scrap Tire Fires	Low	Low	1	Low

1-Severe Weather: thunderstorms (hail, lightning, and severe winds), ice/sleet storms, and snowstorms
2-Shoreline Incidents: shoreline erosion, shoreline flooding, and wind-blown ice floes
3-Hazard Material Incidents: hazard material fixed site and hazard material transportation
4-Well/Pipeline Incidents: oil/gas well incidents and petroleum/gas pipeline incidents
5-Extreme Temperatures: extreme hot temperature and extreme cold temperatures

During the update process, each municipality was asked to identify the potential impact of each hazard for their community. Table 4.2 identifies each municipality's hazards by their potential impact. Below the table is the identification key for the hazards.

On the following pages are the hazards, categorized as High, Medium, Moderate Priority. These hazards have been prioritized by the BCHAC as potential threats to the citizens of Bay County. They are not in any particular order within each category. Following the Moderate Priority Hazards are other hazards identified by the State of Michigan that were not identified as a threat to the citizens of Bay County. These are included only to show that there is no imminent danger to Bay County residents.

HIGH PRIORITY HAZARDS

ENERGY EMERGENCIES

An actual or potential shortage of gasoline, electrical power, natural gas, fuel oil, or propane, of sufficient magnitude and duration to potentially threaten public health and safety, and/or economic and social stability.

Hazard Description

Michigan's citizens are dependent on multiple energy sources to provide the power to operate the multiple systems in their homes or businesses, such as the lighting, cooking, and heating and cooling systems. Energy is also needed to operate motorized vehicles and allow the citizens of Michigan to move from place to place throughout the state, country, and possibly further. When one or more of these independent, yet interrelated energy sources 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 mitigative action is not taken within sufficient time. When power is lost 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 energy emergencies 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 energy emergency. If the emergency involves more than one source, or is large enough in scope and magnitude, whole communities and possibly even regions can be severely impacted, such as the gas shortages that have occurred in the past 30 years.

Energy Emergencies in Bay County

On 8/14/03 portions of the northeastern U.S. covering eight states suffered a power outage. This included metro Detroit. While the outage did not affect Bay County directly, there was a major exodus from metro Detroit resulting in a large influx of visitors to the northern counties, including Bay County.

Energy Emergencies Overview

Most of Bay County's energy emergencies are secondary hazards caused by other major events such as floods, windstorms, snow and ice storms. The main energy emergencies are power outages, which normally can be restored in a matter of hours. County EMC maintains short term shelter agreements with multiple agencies. 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.

INFRASTRUCTURE FAILURES

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 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.

Infrastructure Failures in Bay County

On 8/14/03 portions of the northeastern U.S. covering eight states suffered a power outage. This included metro Detroit. While the outage did not affect Bay County directly, there was a major exodus from metro Detroit resulting in a large influx of visitors to the northern counties, including Bay County.

Infrastructure Failures Overview

There have been numerous infrastructure failures in recent years as most of Bay County's infrastructure failures are secondary hazards caused by other major events such as floods, severe winds, snow and ice storms. One main infrastructure failure is power outages, which are caused by downed power lines and are normally restored in a matter of hours. Another major infrastructure failure is the closure of roads as a result of flooding.

RIVERINE (FLUVIAL)/SURFACE (PLUVIAL) FLOODING

Riverine (fluvial) flooding is the overflowing of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt, ice, or high winds.

Surface (pluvial) flooding is the accumulation of water in low-lying and inadequately drained areas, following heavy precipitation events, including structural or power failures in municipal sewage systems, causing water to flood or back-up into houses, other structures, and infrastructure. Caused when heavy rainfall creates a flood event independent of an overflowing water body.

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.

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 experienced in Bay County can produce thick river ice and the potential for ice jams. An ice jam develops when pieces of snow and ice buildup 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 in Bay County
2008-2019
TABLE 4.2

Month	Rainfall	Snowfall
January	1.7”	12.1”
February	1.6”	8.6”
March	1.9”	6.1”
April	3.1”	1.2”
May	3.3”	0.0”
June	3.4”	0.0”
July	2.7”	0.0”
August	3.4”	0.0”
September	3.9”	0.0”
October	2.8”	0.2”
November	2.8”	2.4”
December	1.9”	11.1”
Annual Average	32.3”	41.6”

Source: National Weather Service

Riverine and Surface Flooding in Bay County

According to the 2019 Michigan State Hazard Mitigation Plan, from Jan 1996 to April 2017 Bay County experienced 10 flood (non-shoreline) events. (A review of the NCEI records identified a total of 11 non-shoreline flood events between 1996 and 2020 and are found in the table below.) It should be noted that those floods that have been identified as being located in Bay County are floods that included both riverine and surface flooding, based on heavy rains that preceded the floods. Following the table are the most significant events in recent years, including the flood from 1986, which was the worst flood for the region in over 50 years.

Flood Events in Bay County

Table 4.3

Location	Date	Type	Death	Injuries	Property Damage	Crop Damage
Southern Bay County	06/21/1996	Flash Flood	1	0	$2,200,000	$0
County-wide	02/21/1997	Flash Flood	0	0	$0	$0
County-wide	03/05/2004	Flood	0	0	$0	$0
County-wide	05/23/2004	Flood	0	0	$0	$0
Mt. Forest	06/10/2005	Flash Flood	0	0	$0	$0
Kawkawlin	07/22/2008	Flash Flood	0	0	$50,000	$0
County-wide	08/11/2012	Flood	0	0	$500,000	$0
County-wide	04/10/2013	Flood	0	0	$100,000	$0
Aplin Beach	08/11/2014	Flash Flood	0	0	$0	$0
Mt Forest	06/22/2017	Flash Flood	0	0	$3,000,000	$0
County-wide	05/18/2020	Flood	0	0	$1,000,000	$0

From 9/09/1986 to 9/12/1986 a slow-moving, low-pressure system moved into the Lower Peninsula. During this time, an intense storm produced rainfall ranging from 8 inches to 20+ inches. In Central Michigan, there was an estimated $500 million in damages, with 6 deaths and 89 injuries resulting from the storm. A presidential declaration was issued due to the heavy flooding.

On 06/21/1996 over four inches of rain fell over a short period of time, resulting in flooding though much of the southern half of Bay County. In addition to the property damages, estimated at $$2,200,000, an elderly gentleman was killed in the flash flood.

On 06/22/2017 five to eight inches of rain fell on Bay County. Widespread flooding resulted in significant flooding with over 140 homes having some damage. Roads and bridges were also damaged or destroyed. Due to the heavy flooding, a presidential declaration was issued for Bay County along with three other counties.

On 05/18/2020 a low pressure system hung over Michigan bringing rainfall up to 6 inches in parts of central Michigan. Significant flooding in the region occurred causing the closure of over 100 roads in the region. Damages were estimated to be over $1,000,000 in Bay County.

Riverine and Surface Flooding Overview

There have been 11 non shoreline events from 1996 to 2020, which is about one event every 2.3 years or a 44% chance of a flood occurring in any given year. With the changing weather patterns, more floods may be anticipated due to the heavier more potent rains. Currently there are 16 municipalities, including all four cities and 12 of the 14 townships in Bay County, participating in the National Flood Insurance Program (NFIP). In order to maintain their participation in the NFIP, ordinances have been adopted that prohibit new construction within floodplains. Modifications to existing buildings within floodplains have to be approved by a certified floodplain manager within the County. To further reduce their vulnerability, municipalities must maintain culverts and drainage ditches throughout the county as well as keep them clear of all debris. While this will not eliminate flooding, it will reduce the flooding from the less powerful

storms. There are no properties officially designated by the NFIP as "repetitive loss properties"; however, the Bay County Advisory Committee has identified several projects to mitigate damages to any properties that has been damaged on multiple occasions due to flooding.

SEVERE WEATHER

HAIL

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 Bay County

According to the National Centers for Environmental Information (NCEI) and the 2019 Michigan Hazard Mitigation Plan, Bay County, Michigan had 92 events on 34 different dates from 1996-2020. There were 15 reported events that produced damages, with a total of $20,050,000 in property/crop damages and one event that resulted in injuring two people. (It should be noted that all of events with damages were the result of one storm, with multiple damage reports.) The table below identifies all 16 events. No deaths were reported as a result of these storms. However, the data from these events may be incomplete as not all damages that occurred have been reported. It should be noted that no storms predating 1996 were included in the records of the NCEI.

Hail Events in Bay County

Table 4.4

Location	Date	Diameter of Hail	Death	Injuries	Property Damage	Crop Damage
Bay City	07/24/1999	1.75 in.	0	2	$0	$0
Willard	07/27/2014	2.50 in.	0	0	$2,000,000	$0
Willard	07/27/2014	2.00 in.	0	0	$2,000,000	$0
Willard	07/27/2014	1.75 in.	0	0	$500,000	$0
Kawkawlin	07/27/2014	2.00 in.	0	0	$1,500,000	$0
Kawkawlin	07/27/2014	2.00 in.	0	0	$2,000,000	$0
Tobico	07/27/2014	1.75 in.	0	0	$1,000,000	$0
Kawkawlin	07/27/2014	1.75 in.	0	0	$1,000,000	$0
Kawkawlin	07/27/2014	2.00 in.	0	0	$2,000,000	$0
Bangor Township	07/27/2014	2.50 in.	0	0	$3,000,000	$0
Bangor Township	07/27/2014	1.75 in.	0	0	$1,000,000	$0
Bangor Township	07/27/2014	1.75 in.	0	0	$1,000,000	$0

Linwood	07/27/2014	1.50 in.	0	0	$1,000,000	$0
Tobico	07/27/2014	1.75 in.	0	0	$1,000,000	$0
Kawkawlin	07/27/2014	1.75 in.	0	0	$1,000,000	$0
Pinconning	07/27/2014	200 in.	0	0	$50,000	$0

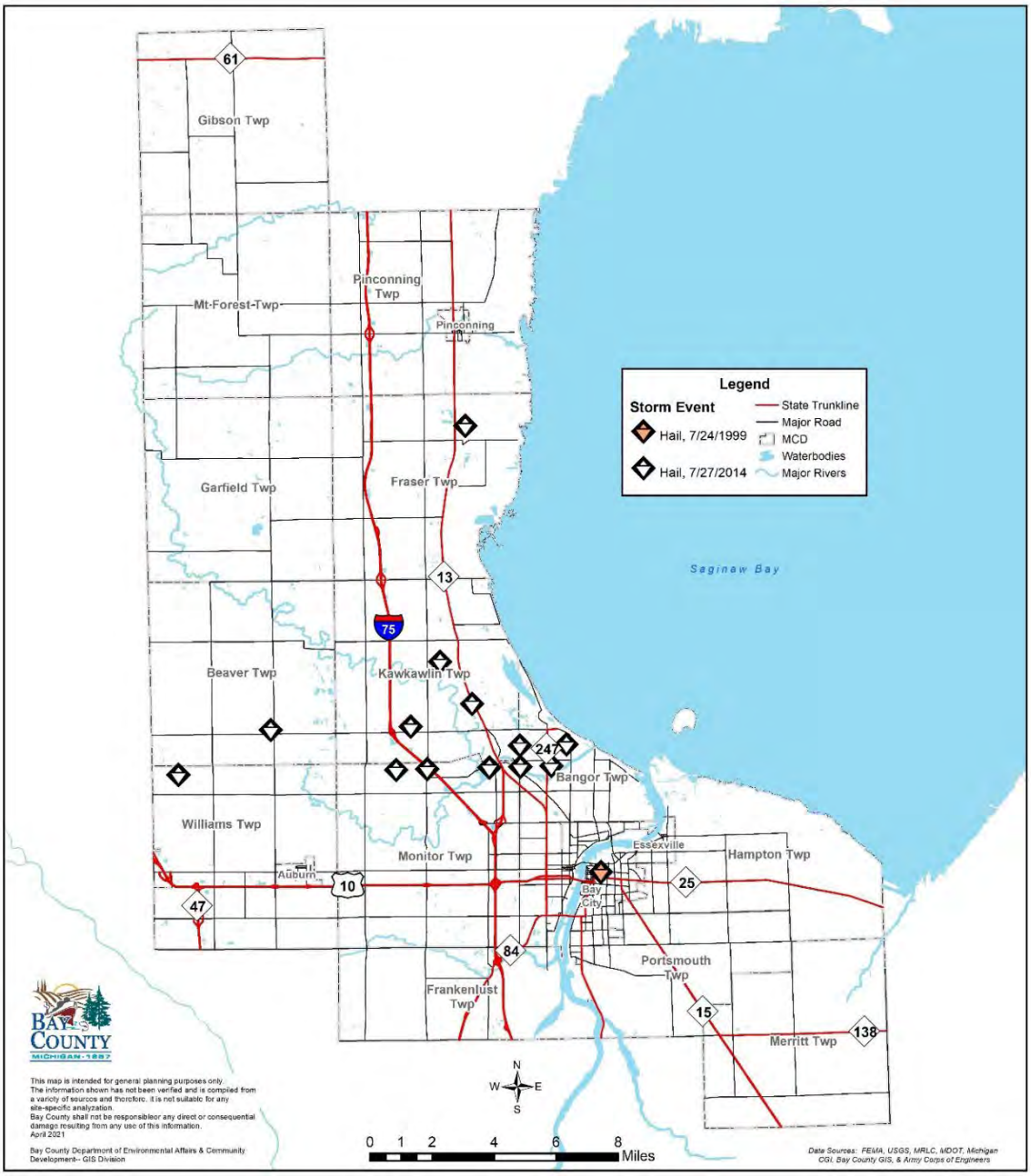
Identified below is more detail on several events on the previous page.

On 07/24/99 a disturbance in the upper level created a thunderstorm. This thunderstorm turned into a squall line as it moved across the southeast Michigan. In addition to golf ball sized hail being reported in Kawkawlin and Bay City, trees and power lines were damaged from high winds, which also caused the capsizing of nearly a dozen sailboats after a sailing competition. In Bay City, large hail fell on two sailors causing welts and bruises from the golf ball-sized hail.

On 07/27/2014 a low pressure system entered the Great Lakes region creating powerful thunderstorms. From 1;21 pm to 2:10 pm multiple reports of damages due to hail were reported in Bay County and throughout southeast Michigan. Hail as large as 3.5 inches in diameter was reported and damages in excess of $20 million were estimated in Bay County alone. Damages in excess of $100 million were estimated for the State of Michigan.

Bay County Significant Hail Events Map

MAP 4.1



Hail Overview

From 1996 to 2020, Bay County had 92 hail events on 34 days, which is or about 3.7 events on 1.4 days per year, based on the data from NCEI and the 2019 Michigan State Hazard Mitigation Plan. This would leave an estimated probability of 100% that a hail event could occur in any given year. Of these events, only one event resulted in personal injury (2), and only 15 of the 92 events, resulted in damages to property and/or crops totaling $20.05 million. However, it should be noted that all of the damaged related events were the result on one storm on 7/27/14. NCEI did not identify any specific damages

resulting from these events. Bay County is a moderate risk county for these events to be impactful, but the event is considered to be a severe weather activity which was given a high priority to address. Due to the nature of hailstorms and their minimal damages that normally occur, no action has been taken by the local governments to reduce property damage vulnerability or even human vulnerability to hailstorms.

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 Bay County

According to the National Centers for Environmental Information (NCEI) and the 2019 Michigan Hazard Mitigation Plan, Bay County, Michigan had five events on four different dates from 1996-2020. Three of the events produced damages, with a total of $63,000 in property damages. There were no deaths, injuries, or reported crop damages during this period. The table below identifies all the events. The data from these events may be incomplete as not all damages that occurred have been reported.

Lightning Events in Bay County

Table 4.5

Location	Date	Time	Death	Injuries	Property Damage	Crop Damage
Bay City	06/05/2005	3:35 pm	0	0	$0	$0
Bay City	06/05/2005	3:35 pm	0	0	$0	$0
Hampton Township	07/24/2005	8:00 am	0	0	$50,000	$0
Bangor Township	05/30/2006	6:00 pm	0	0	$10,000	$0
Bay City	10/04/2006	7:15 am	0	0	$3,000	$0

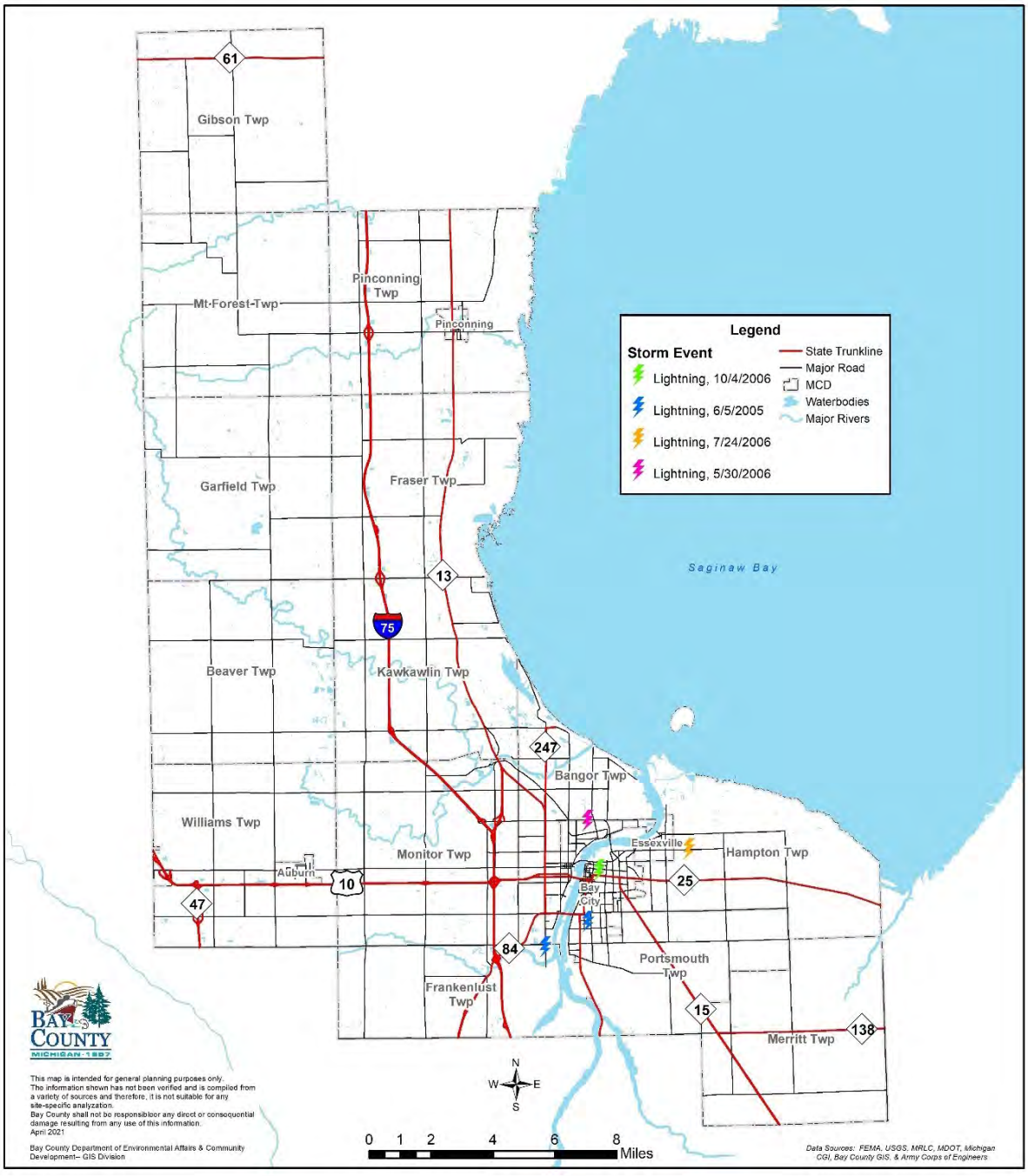
On 07/24/2005 lightning struck a home in Hampton Township resulting in a fire, The fire did extensive damage to the second floor as well as to the exterior of the home. Estimated damages were $50,000.

On 05/30/2006 lightning struck a tree that channeled to the house damaging a window and destroyed most of the electrical equipment. Estimated damages were $10,000.

On 10/01/2006 Lightning struck a home in Bay City. Smoke was reported around the roofline of the home, with damages estimated at $3,000.

Bay County Significant Lightning Events Map

MAP 4.2



Lightning Overview

There have been five lightning events reported locally in Bay County from 1996 to 2020 have been recorded by the NCEI or about one event every five years. The probability of an event occurring in any given year is approximately 20 percent. Bay County is considered to be a moderate risk area for lightning events. Even though there have been limited lightning strikes, many of the municipalities have installed lightning protection devices on many of the municipal facilities to protect against these strikes. Lightning

strikes are considered to be a severe weather activity, which was given a high priority to address. The installation of these devices has reduced the county's vulnerability to these events somewhat, as the communication infrastructure should be protected from lightning. Residents should also be less vulnerable with many different means to notify the public of dangerous weather systems, thus allowing them to get in a safer environment during the event. However, the structures themselves are still vulnerable to lightning.

SEVERE WINDS

Non-tornadic winds 58 miles per hour (mph) 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 knots) 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.

Severe Wind Events in Bay County

According to the National Centers for Environmental Information (NCEI) and the 2019 Michigan Hazard Mitigation Plan, Bay County, Michigan there were 131 events from 1996 to 2020. The total reported damages resulting from the events was estimated at $14,951,000. Below is a table of the 13 events with more than $100,000 in property, including the one event that included a death. In the table, magnitude represents wind speed, with kts. being knots, and kts. EG being knots with Estimated Gusts. Following the table are specifics on the several most significant events.

Severe Wind Events in Bay County

Table 4.6

Location	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Bay City	06/21/1996	75 kts.	0	0	$400,000	$0
Auburn	05/31/1998	70 kts.	0	0	$200,000	$0
Pinconning	05/31/1998	70 kts.	1	0	$100,000	$0
Bay City	05/31/1998	70 kts.	0	0	$1,000,000	$0
Bay County	11/12/2003	52 kts. EG	0	0	$700,000	$0
Bay County	10/30/2004	54 kts. EG	0	0	$200,000	$0
Bay County	11/15/2005	48 kts EG	0	0	$450,000	$0
Hampton Township	05/15/2007	70 kts EG	0	0	$1,500,000	$0
Bay County	11/17/2013	50 kts. EG	0	0	$1,000,000	$0
Bay County	03/08/2017	56 kts. EG	0	0	$7,000,000	$0
Bay County	05/04/2018	52 kts. EG	0	0	$1,250,000	$0
Bay County	02/24/2019	52 kts. EG	0	0	$500,000	$0
Bay County	11/15/2020	52 kts. EG	0	0	$200,000	$0

On 05/31/1998 winds swept through Michigan at 65 mph less than a half mile above ground. One fatality occurred as a woman in Pinconning died when a tree fell on her house while she slept. In Bay City, many trees were downed, and a gas main was broken. A clock tower had a face torn off, and a drawbridge across the Saginaw River has the four gates broken. Damages were estimated at $1,000,000 with over $600,000 in public damages. Due to the extensive damage, President Clinton declared Bay County a Federal Disaster Area.

On 11/12/2003 a low pressure moved into Michigan from then north with accompanying winds reported between 60 and 88 mph. Power lines and trees were downed throughout the region with as many as 250,000 customers were without power. Damages were estimated at $700,000.

On 05/15/2007 a coal stacker a the Karn-Weadock power plan was destroyed after being blown down by winds estimated at 80 mph. Damages were estimated at $1,500,000.

On 11/17/2013 Storms raged through Michigan bringing winds and thunderstorms. Winds gusted to 55 to 65 mph during the evening damaging trees and power lines. Over 400,000 customers were without power with damages were approximated at $1,000,000.

On 03/08/2017 winds gusting in excess of 60 mph took down trees and power lines with reports of structural damages to buildings throughout the region. Approximately 1 million customers of DTE and Consumers were without power, some for days. Damages in Bay County were estimated at $7,000,000 and nearly $300,000,000 for Michigan.

Severe Winds Overview

Bay County has experienced 131 severe wind events from 1996 to 2020, which is slightly more than five events per year, or a 100% chance that an event could occur in any year. On an average, severe wind

events can be expected 4-5 times per year in the northern Lower Peninsula. These figures refer to winds from thunderstorms and other forms of severe weather, not including tornadoes. Severe winds are considered to be a severe weather activity, which was given a high priority to address. With the additional means to warn residents of County prior to these events, the County should be less vulnerable to injuries and deaths. However, due to the destructive nature of these events, physical damages from these events will still occur, leaving the County vulnerable to the severe winds in the immediate future.

ICE/SLEET STORMS

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 Bay County

A total of nine ice/sleet storms were reported by the NCEI for Bay County, Michigan between 1996 and 2020. Damages were estimated to be $50,000 as a result of these storms; however, the data from these events is incomplete as not all damages that may have occurred have been reported. (Damages are estimated, based on reports from insurance companies. If damages are not reported to insurance companies, this information becomes incomplete.) No deaths or injuries were reported as a result of these storms.

Ice/Sleet Storms in Bay County

Table 4.7

Location	Date	Death	Injuries	Property Damage	Crop Damage
Bay County	03/13/1997	0	0	$0	$0
Bay County	01/07/1998	0	0	$0	$0
Bay County	02/07/2001	0	0	$0	$0
Bay County	12/18/2002	0	0	$0	$0
Bay County	04/03/2003	0	0	$0	$0
Bay County	02/14/2005	0	0	$0	$0
Bay County	02/16/2006	0	0	$0	$0
Bay County	12/01/2019	0	0	$50,000	$0
Bay County	01/11/2020	0	0	$0	$0

On 12/01/2019 a quarter inch of ice fell on Bay County followed by 1-2 inches of snow. The ice, snow, and strong easterly winds resulted in downed trees creating power outages throughout the County. Damages were estimated at $50,000.

Ice and Sleet Storms Overview

There have been nine reported ice storms from 1996 to 2020, or about one every 2.8 years. These events were not restricted to a community, but extended through much of Bay County, and beyond. The probability of an event to occur annually is about 36%. One of the biggest problems resulting from ice and sleet storms is the downing of trees and power lines, resulting in the 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 and 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. Historically, approximately 80% 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.

SNOWSTORMS/BLIZZARDS

A **snowstorm** is a period of rapid accumulation of snow often accompanied by high winds, cold temperatures, and low visibility.

A **blizzard** includes strong winds (over 35 mph), drifting snow, low temperatures, and blowing snow that reduces 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.

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/Blizzards in Bay County

There has been a total of 51 events in the snowstorm category (blizzards, heavy snows, winter storms, and winter weather) as identified by NCEI from 1/1/1996 to 12/31/2020. Storms of this nature are wide reaching and are not restricted to a specific municipality. In fact, many of the events identified below extend beyond the borders of Bay County. No injuries or deaths were reported as a result of these storms; however, the estimated damages from these events was $2,025,000. It should be noted that data from these events is incomplete as not all damages that may have occurred were reported. Below is a table that identifies both of the events reporting damages as identified by the NCEI. It should be noted that no storms predating 1996 were recorded by the NCEI. Following the table is information on some of the more significant snowstorms that have impacted the County.

Snowstorms in Bay County

Table 4.8

Location	Date	Death	Injuries	Property Damage	Crop Damage
County-wide (heavy snow)	12/17/2000	0	0	$25,000	$0
County-wide (winter storm)	04/14/2018	0	0	$2,000,000	$0

Following are examples of the different types of snowstorms in this category that have affected the County.

Blizzard-On 02/02/2011 a major winter storm dropped between 8 and 12 inches of snow throughout the region. Wind gusts between 25 and 35 mph came off of Lake Huron/Saginaw Bay creating blizzard-like conditions.

Winter Weather-From 04/14 to 04/15/2018 a complex low-pressure system entered the Great Lakes region. The system brough two main periods of precipitation, the first being rain in the amount of 1-2 inches, and the second being 2-3 inches of snow and sleet. Widespread tree damages resulting in power outages resulted in the region causing nearly 500,000 DTE and Consumers Energy customers to lose power. Additionally, strong winds lead to lake shore flooding around Saginaw Bay. Damages were estimated at $2,000,000 in Bay County and over $40,000,000 throughout the State of Michigan.

Winter Storm-On 01/14 to 01/15/2007 a low-pressure system traveled into Michigan. Cold air from the north mixing with the warm air from the south resulted in precipitation across the Lower Peninsula. Snowfalls of 4-5 inches and minor icing was recorded throughout Bay County.

Winter Weather-On 03/02/2002 a storm system developed and moved into central Michigan. A band of heavy snow affected the tri-city region of Midland-Bay City-Saginaw. Snowfalls ranged from 8 to 10 inches throughout Bay County.

Heavy Snow-On 01/02/1999 a low pressure system brought heavy snow across lower Michigan. Blowing wind made travel difficult throughout the state. Snowfalls of 11 inches in Pinconning, and 9 inches in Linwood and Bay City were recorded.

Heavy Snow- on 12/17/2000 a third heavy snow in a seven-day period resulted adding as much as seven inches to the existing snowfalls earlier in the week. The heavy snow resulted in breaking tree limbs and downing power lines. Many homes throughout the region were without power. Due to the large amount of accumulated snow, removal of it was difficult as there was no place to put it.

Winter Weather-From 04/04 to 04/05/2007 snow squalls fell intermittently across mid-Michigan. Accompanied by wind gusts of 40 mph, near whiteout conditions were created. Numerous accidents were recorded in the region with 14 accidents reported in Bay County due to the storm.

Snowstorms/Blizzards Overview

There have been 51 reported snowstorms in Bay County from 1996 to 2020, or about 2 events per year. There is about a 99.9% chance of a storm occurring each and every year. With the changing weather patterns that include more frequent heavy storms (rain and snow), this trend of multiple annual events is expected to continue. Severe snowstorms affect every Michigan community. While the number of events has not resulted in a large number of deaths/injuries in Bay County to date, that does not guarantee that injuries or deaths could not occur in the future. Due to the nature of these events, snowstorms are considered to be severe weather events, which were given a high priority to address. Also, while the means to notify the public of these events has improved in recent years, thereby allowing residents to remain in a warm, safe environment, the nature of these events still put the residents in a vulnerable position with respect to travel conditions and power outages resulting from these events.

GREAT LAKES 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, storm surges, meteotsunamis, rip currents, shoreline erosion, and recession.[8]

Hazard Description

Shoreline flooding and erosion are natural processes that can occur at high, average, and even low water levels in the Great Lakes. Flooding and erosion are most obvious during the high-water levels, when flooding is most destructive. Low levels pose additional concerns erosion and pollution entering into the lakes. Ice floes (surges) occurring in the winter/spring months can be just as impactful, especially with the recent developments along the Saginaw Bay/Lake Huron areas. The developments can impact the ebb and flow of the water movement as they are located right on the shoreline.

Shoreline Hazards in Bay County

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.

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 floodand 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.

[8] Michigan Hazard Mitigation Plan, 2019 edition

Many structures are built on or near the shoreline in Bay County. Shoreline residents in the townships of Bangor, Fraser, Hampton, Kawkawlin, and Pinconning and the community of Essexville 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. 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.

In 2019 local officials met with representatives from the Michigan State Police Emergency Management/ Hazard Mitigation Division, Senator Debbie Stabenow's Office, and Army Corps of Engineers to discuss the shoreline concerns and damages resulting from recent ice floes. With the steady rise of water levels in Saginaw Bay/Lake Huron, damages to local infrastructure have increased resulting in private property damages and increased flooding along the shoreline.

Shoreline Events in Bay County

There has been a total of six shoreline as identified by NCEI from 1/1/1996 to 12/31/2020. Events of this nature are wide reaching and are not restricted to a specific municipality. In fact, many of the events identified below extend beyond the borders of Bay County. No injuries or deaths were reported as a result of these storms; however, the estimated damages from these events was $4,200,000. It should be noted that data from these events is incomplete as not all damages that may have occurred were reported. Below is a table that identifies all the events noted by the NCEI. It should be noted that no storms predating 1996 were recorded by the NCEI. Below is a table of the events resulting in damages. Following the table is information on the significant snowstorms that resulted in reported damages.

Shoreline Events in Bay County

Table 4.9

Location	Date	Death	Injuries	Property Damage	Crop Damage
County-wide	04/15/2018	0	0	$2,000,000	$0
County-wide	01/11/2020	0	0	$200,000	$0
County-wide	05/18/2020	0	0	$2,000,000	$0

On 04/15/2018 a large low-pressure system brought in rain, snow, freezing rain, and sleet over a 3-day period. Strong and steady winds from the northeast lead to lakeshore flooding along Saginaw Bay. Wind gusts of 50 mph were reported. Multiple homes in Bangor Township reported flooding.

On 1/11/2000 a storm system brought heavy rain and about an inch of ice to the region resulting in numerous spin outs and accidents. In addition, strong northeast winds lead to high water levels causing significant flooding and erosion. The water level at Essexville reached a new high since records were being kept. The Wenona Estates trailer park had to evacuate due to the flood.

On 05/18/2020 in addition to the heavy rainfall, low pressure further exacerbated the Great Lakes water levels resulting in flooding along Saginaw Bay.

Shoreline Hazards Overview

The six recorded events were identified since 2017. With the Great Lakes water levels remaining high and storms continue to be heavy and frequent, it is likely that flooding will continue to occur along the Saginaw Bay shoreline. To address this issue, local authorities met with state and federal officials to discuss measures to address the matter. Upgrading and replacement of the equipment will have to be completed and will provide for a better notification system of high-water levels and systematically pump the water out to the Bay.

MEDIUM PRIORITY HAZARDS

CYBERTERRORISM

Unlawful attacks and threats of attack against computers, networks, and the information stored therein when done to intimidate or coerce a government or its people in furtherance of political or social objectives.

Hazard Description

Cyberterrorism is an attack that can result in violence against a person, or property, or at least cause enough harm to generate fear. Attacks that lead to death, or bodily injury, property damage, disruption of services, or actual/potential economic loss would be examples.

Cyberterrorism Events in Bay County

Cyberterrorism occurs daily through fraudulent phone calls, generally to the elderly.

Cyberterrorism Overview

While some forms of cyberterrorism attack occur every day, cyberterrorism for county officials can be two-fold. The first concern is at the county level and is a large-scale event or events that can be inflicted on local banking or other financial/economic institution causing widespread hardship in our population. The second concern are telephone calls that use misrepresentation and prey upon the general public, specifically the elderly or lower income households as County's demographic includes a large population of lower income and retired households. A disruption in monthly payment or replenishment would have severe financial hardships and could result in civil disobedience that could quickly overwhelm local resources. With most banking and financial transactions done electronically and are web-based, this is a threat that we have identified as a known hazard.

Recent examples that have occurred have been IRS Tax Fraud Schemes via email and telephone, Gas Credit Card and ATM Skimmer operations that have resulted in theft of credit card number causing misuse of credit cards and lost funds and customer confidence issues that have resulted in lost revenue to local businesses. Bay County Law Enforcement, and Emergency Management and Homeland Security Division continue to monitor critical infrastructure sites and Government facilities for cyber intrusions. County Emergency Management and Homeland Security continue to educate businesses, community leaders, and general populations to all aspects of cyber related activities. This also includes a recent grant awarded to further educate the senior population.

HAZARDOUS MATERIAL INCIDENTS

FIXED SITE AND PROPANE STORAGE SITES

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-to-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.

Superfund Amendments and Reauthorization Act (SARA), Title II

There are currently 5 Sites in 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 County have an emergency plan on file with the Local Emergency Planning Committee and their individual Fire Departments.

At the meetings held in the county, attendees and the Emergency Management Coordinator 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 Incidents/Industrial Accidents in Bay County

On 09/16/90 the Jupiter, a tanker carrying unleaded gasoline broke away from its moorings in Bay City on the Saginaw River just as the Buffalo, a freighter twice the size of the Jupiter, passed by. A collision occurred resulting in the discharge of 2.3 million gallons of unleaded gasoline into the river and also resulting in electric cables breaking away, which resulted in a fire. The fire burned for over 29 hours, causing 1 death, 12 injured, all sailors on the Jupiter, and over $6 million in costs, including the cost of the Jupiter and overtime costs for the local agencies.

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 four deadly explosions that occurred in 1998 and 1999, are relatively rare.

TRANSPORTATION

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 in Bay County

On 09/16/90 the Jupiter, a tanker carrying unleaded gasoline broke away from its moorings in Bay City on the Saginaw River just as the Buffalo, a freighter twice the size of the Jupiter, passed by. A collision occurred resulting in the discharge of 2.3 million gallons of unleaded gasoline into the river and also resulting in electric cables breaking away, which resulted in a fire. The fire burned for over 29 hours, causing 1 death, 12 injured, all sailors on the Jupiter, and over $6 million in costs, including the cost of the Jupiter and overtime costs for the local agencies.

Hazardous Material Incidents: Transportation Overview

Although there have not been any significant hazardous materials transportation incidents, there have been minor petroleum and hazardous materials spills throughout the years. Major transportation corridors are primarily two lanes. These routes are heavily congested in the summer months and often icy or impassible 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.

TERRORISM/ SABOTAGE

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. 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 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/Terrorism Events in Bay County

There have been no recent sabotage/terrorism events in Bay County.

Sabotage/Terrorism Overview

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

TORNADOS

A violent whirling column of air extending downward to the ground from a cumulonimbus cloud. (The wind speed of a tornado is 65 mph or greater.)

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 Enhanced Fujita Scale, which examines the damage caused by a tornado on homes, commercial buildings, and other man-made structures. The Enhanced 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 scale below).

The Enhanced Fujita Scale of Tornado Intensity

TABLE 4.10

EF-Scale Number	Intensity Description	Wind Speed (mph)	Type/Intensity of Damage
EF-0	Gale tornado	65-85 mph	**Light damage**. 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	**Moderate damage.** 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	**Considerable damage.** 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	**Severe damage.** 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	**Devastating damage.** Well-constructed houses and whole frame houses completely leveled; cars thrown, and small missiles generated.
EF-5	Incredible Tornado	200 mph+	**Incredible damage**. 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 Bay County

Table 4.11

Location	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Bay City	10/24/2001	F1	0	0	$60,000	$0
Bay City	08/04/2003	F0	0	0	$0	$0
City of Auburn	06/13/2004	F0	0	0	$10,000	$0
Beaver Township	05/31/2011	EF1	0	0	$100,000	$0
Pinconning Township	07/08/2016	EF0	0	0	$10,000	$0

Tornado Events in Bay County

A total of five (5) tornadoes on five days were reported in Bay County, Michigan between 01/01/1996 and 12/31/2020. Of these 5 tornadoes, two tornadoes had F1/EF1 ratings, and the remaining 3 had F0/EF0 ratings. The table above identifies those five tornadoes that have occurred in the past 25years. Reported damages resulting from the four tornadoes totaled more than $180,000 with no deaths or injuries being reported. Below is a brief statement on the four tornadoes that caused damages.

Prior to 1996, on 06/12/1984 an F3 tornado went through Bay County downing thousands of trees, destroying 4 houses, 21 barns, 5 silos, 12 outbuildings, 2 mobile home, and 3 pieces of farm equipment totaling more than $2,000,000 in damages. Two men were also injured from the flying glass.

On 10/24/2001 a tornado touched down about 13.5 miles southeast of Bay City and struck a farmstead. Damages included complete destruction of a small barn and garage, a grain silo being lifted off of its foundation, and minor damage to the exterior of the main house.

On 06/13/2004 a weak tornado touched down near 11 mile and Salzburg Roads knocking down trees and power lines. A camper was also overturned.

On 05/13/2011 an EF1 tornado with a maximum wind speed of 95vmph tore path 200 feet wide and 8.4 miles long. The tornado started near Parish Road and 11 Mile Road moved northeast through the south part of Linwood and out into Saginaw Bay. A barn was destroyed with multiple roofs of houses and garages receiving damages.

On 07/08/2016 the tornado started at the northern end of Elevator Road, where it uprooted pines and knocked down large tree limbs parallel to Lapan Road. A house sustained broken windows and a damaged roof. Winds were estimated to peak at 70 mph.

Bay County Significant Tornado Events Map

MAP 4.3

Tornadoes Overview

County has experienced five tornadoes sightings on five days over the past 25 years or about one every five years. At this current rate, there is a 20% chance of a tornado causing damage to occur in any given year. With the changing climate, the number of tornadoes may be expected to continue if not increase at a greater rate. Tornadoes are considered to be a severe weather activity, which was given a high

priority to address. Recent technological advances have provided additional warning time for these events; however, even with these advances the residents of Bay County remain vulnerable to tornados. The additional warning time that can be and often is provided can lessen the vulnerability of injuries and deaths as people can take shelter earlier. To lessen the impact of these events residents and businesses should also consider installing safe rooms or shelters, anchoring mobile homes, structural bracing, and the use of wind-resistant glass.

TRANSPORTATION ACCIDENTS

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) 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 County transportation map is included in Chapter 3.)

Transportation Accidents in Bay County

On 09/16/90 the Jupiter, a tanker carrying unleaded gasoline broke away from its moorings in Bay City on the Saginaw River just as the Buffalo, a freighter twice the size of the Jupiter, passed by. A collision occurred resulting in the discharge of 2.3 million gallons of unleaded gasoline into the river and also resulting in electric cables breaking away, which resulted in a fire. The fire burned for over 29 hours, causing 1 death, 12 injured, all sailors on the Jupiter, and over $6 million in costs, including the cost of the Jupiter and overtime costs for the local agencies.

Transportation Accidents Overview

Bay County has two railroad lines, the Mid-Michigan Railroad and the Great Lakes Central Railroad, an Interstate Highway US-127, and two Michigan Highways, M-46 and M-57m and is located on Saginaw Bay, an extension of Lake Huron. Even with limited commercial accidents in recent years, transportation has been identified has a high priority due to the amount of rail, federal highway, state highway miles, and the adjacent lake located within Bay County.

WELL/PIPELINE INCIDENTS

OIL/GAS WELL INCIDENTS

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 (H2S) 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 H2S 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 150 ppm, 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_2S

TABLE 4.12

Particles	Response
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 443 oil and natural gas wells in Bay County along with 35.2 miles of gas pipeline. This is a relatively small quantity when compared with state leader, Otsego County, with over 5700 wells. Of almost as great a concern is the fact that a combination of multiple organizations and individuals own the 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 HS2 and must have a working knowledge of these wells that are in their areas of responsibility.

PETROLEUM AND NATURAL GAS PIPELINE ACCIDENTS

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 11th in the nation in production of natural gas and ranks 6th in consumption at 937.2 billion cubic feet. Michigan's petroleum product consumption in 1997 was 189 million barrels, ranking it 10th 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_2S) 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 Bay County

There were no petroleum or gas pipeline accidents in Bay County.

Petroleum and Natural Gas Pipeline Accidents Overview

There are several petroleum and natural gas pipelines running throughout the County. Bay County has several compressor stations and storage fields in the area. In the Emergency Operations Center 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.

MODERATE PRIORITY HAZARDS

EXTREME TEMPERATURES

HOT

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.

Bay 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 Bay 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, stuporous, 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 Bay County

Two extreme heat events were reported by the NCEI for Bay County, Michigan. Extreme heat events are usually found to occur over a larger expanse of a region and are not specific site based. The 2019 State of Michigan Hazard Mitigation Plan has identified 11 extreme heat events during the same time period, with one reported injury. (There is no information available on the reported injury.)

In the summer of 1988, a season-long heatwave/drought impacted the central and eastern US. Michigan was impacted by the event. An estimated $40 billion in losses was sustained due to crop loss, revenue loss from the shipping industry, wildfires, water shortages, and other economic losses.

On 03/08/2000 an unusual warm spell began in February through March 9th. The warm spell included temperatures as high as 50 degrees F. above normal temperature. In addition to the heat, the weather was also dry, which resulted in brush fires throughout the Saginaw Bay region.

From 7/17 to 7/22/2011 a mid-summer heat wave swept through Michigan. Record heats were recorded throughout the state. There were no deaths or injuries reported in Bay County as a result of the heat wave; however, several heat-related illnesses were documented and several deaths throughout the state were attributed to the heat wave. Nine (9) Central Michigan experienced record high temperatures. Heat advisories and heat warnings were issued in the Central Michigan area. County Emergency Management coordinated the opening of several cooling centers throughout the County. Heat indexes were reported to be as high as 110 degrees.

Extreme Heat Overview

According to the NCEI there have been two recorded events from 1996 to 2020 or one in every 12.5 years. There is approximately an 8% chance that an event could occur in any given year. However, based on the 2019 State of Michigan Hazard Mitigation Plan, 11 events occurred during the same time frame or about one event every 2.3 years, leaving approximately a 44% chance of an event occurring in any year. With many severe weather events occurring in recent years, climate change can be identified as a possible reason for these events to occur more frequently. Should the trend continue, more frequent severe weather events, and extreme heat events are anticipated to occur. Excessive heat conditions heat events occur annually in Bay County and are a risk to the residents 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, 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.

COLD

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.

Bay 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 Bay 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 Bay County

There were five (5) extreme cold events were reported by the NCEI for County, Michigan between 1/1/1996 and 12/31/2020. No deaths injuries or damages were reported as a result of these extreme cold temperatures. The 2019 State of Michigan Hazard Mitigation Plan has identified 13 such events with damages of $1,300,000 in related crop damages. Those events in the state plan include late freezes that have impacted crops but were not considered to be too cold to put humans at risk. Below are several examples of extreme cold. It should be noted that extreme temperatures are regional in nature and not site specific.

On 03/09/1998 during a cold spell, a gentleman died from hypothermia as he walked home from a night out in Kawkawlin.

From 02/14 to 02/24/2015 the Lower Peninsula endured cold spells on three separate occasions with temperatures ranging from 0 to -12 degrees F. and windchills of -20 to -30 degrees F.
From 01/2/8 to 02/02/2019 a series of heavy snowfall was followed by falling temperatures of subzero weather. With the snowfall being over a foot deep in numerous locations, high winds, and falling temperatures, schools were closed for nearly a week throughout the state.

Extreme Cold Overview

There were five extreme cold events identified by the NCEI from 1996 to 2020. In addition, the State of Michigan's Hazard Mitigation Plan identified 13 such events or about one event every 1.9 years or about a 52% chance of an event occurring in any given year. However, it should be noted that a majority of these events have occurred since 2015. During these events, many of those most vulnerable to this hazard (children, elderly, 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. With multiple means to notify the general public of these cold events, the public does have ample time to seek shelter, thus reducing their vulnerability to these events.

INVASIVE SPECIES

A species whose introduction to a location (Michigan) causes or is likely to cause economic or environmental harm, or harm to human health, to an extent that outweighs the species' known benefits.

Hazard Description

Invasive species can be transported in many ways, such as on animals, vehicles, ships, commercial goods, produce, and clothing. Although non-native species are the foundation of U.S. agriculture, and also are used to prevent erosion, to provide fishing and hunting opportunities, and as ornamental plants and pets, occasionally a non-native organism flourishes too well and causes unwanted economic, ecological, or human health impacts. The terms "invasive" or "nuisance" are used to describe such species.

Hazard Analysis

Hundreds of new species from other countries are introduced intentionally or accidentally into the United States each year. These invasive species may arrive on our shores in a variety of ways. Transportation efficiencies that make it possible to travel around the globe in hours rather than weeks make it possible for organisms to survive transportation from one continent to another. As more adaptable and generalized species are introduced to environments already impacted adversely by human activities, native species are often at a disadvantage to survive in what was previously a balanced ecosystem.

Invasive Species in Bay County

The LPT has identified the following invasive species as concerns due to their impact or potential impact to the residents, livestock, vegetation located in County. Insects: Asian Long-Horned Beetle, Emerald Ash Borer, Gypsy Moth, and Khapra Beetle. Microbes: Dutch Elm Disease. Water Species: Asian Carp, Sea Lamprey, and Dreissenid Mussels. Terrestrial Animals: Boar. Livestock Diseases: foot and Mouth Disease. Wildlife Diseases: Chronic Wasting Disease. Plant Species: Autumn Olive, Baby's Breath, Black Alder, Black Locust, Common Buckthorn, Dame's Rocket, Flowering Rush, Garlic Mustard, Glossy Buckthorn, Hogweed, Honeysuckle, Common Privet, Japanese Barberry, Lyme Grass, Multiflora Rose, Ornamental Grasses, Narrow-leaved Cattail, Oriental Bittersweet, Phragmites, Purple Loosestrife, Reed Canary Grass, Spotted Knapweed, Swallow-wort, Teasel, Thistles, Wild Parsnip.

Invasive Species Events in Bay County[9]

In 2007 the Emerald Ash Borer (EAB) was first confirmed in Bay County. In 2011 Bay County began treating publicly-owned ash trees to stop the spread of the EAB. The County continues to treat publicly-owned trees through the Gypsy Moth Suppression Program and in 2021 971 trees will be treated.

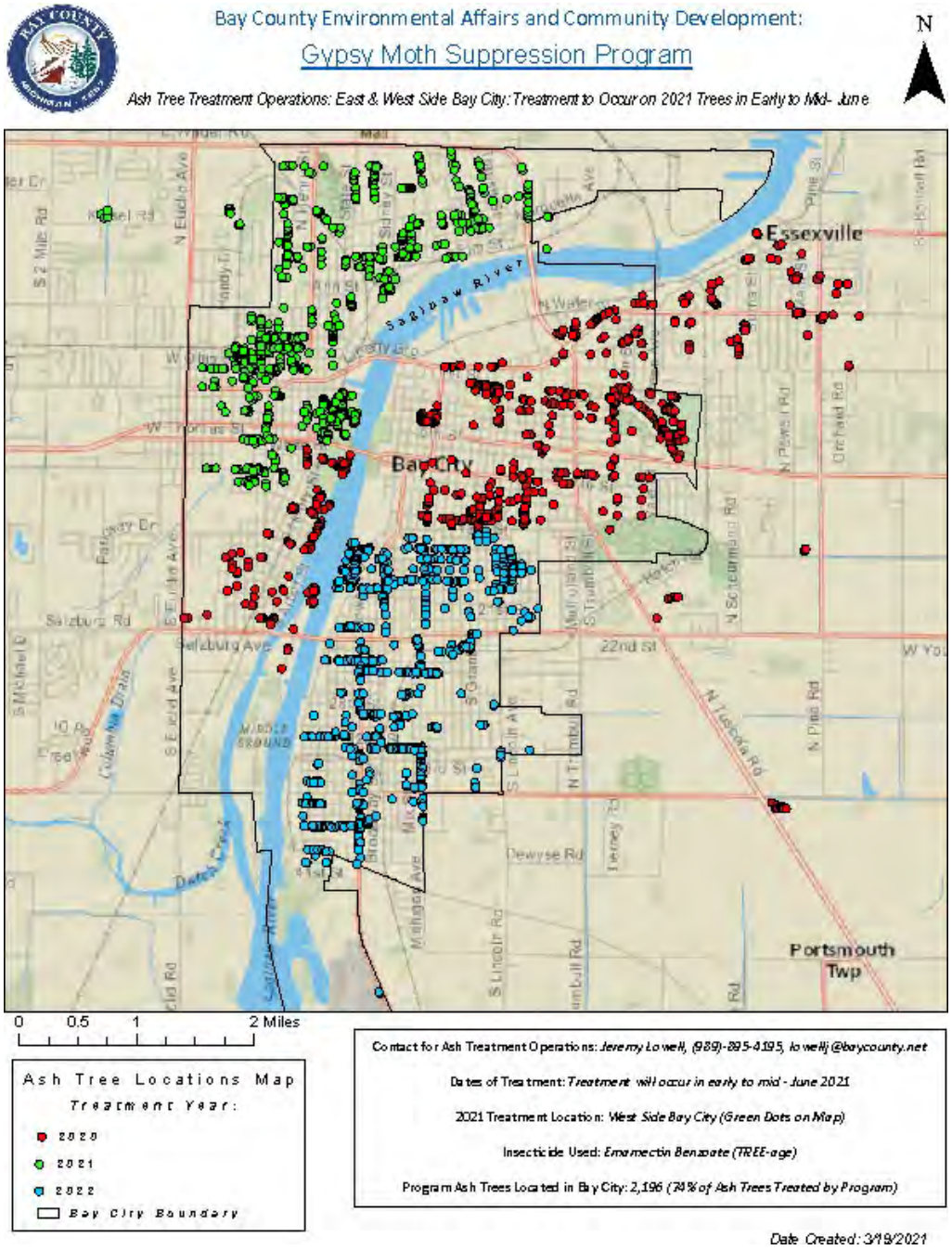
The Gypsy Moth Suppression Program was established in 1989 to address the gypsy moth population by controlling them before they reach outbreak proportions. The gypsy moth caterpillar can defoliate a number of tree species, including birch, oak, poplar, willow, spruce, pine, and apple trees. The Program will treat 1881 wooded acres of land from the gypsy moth caterpillars in 2021.

Phragmites has infested areas of the Saginaw Bay shoreline as well as other water-adjacent land. This plant first entered the United States in the late 19th century and spread through the development of roadways, railroads, and shoreline development. Phragmites engulfs shorelines and overtakes native plant species, providing little or no food or habitat for native animals, and obscures views for landowners and visitors.

[9] Information was provided by the Bay County Environmental staff.

2021 Bay County Ash Borer Suppression Program Map

MAP 4.4



Invasive Species Overview

County continues to address several invasive species such as phragmites, emerald ash borer, gypsy moths, and Dutch elm disease on a limited basis. Due to the exorbitant costs to eliminate any single one species, they can only address these species in limited fashion. In addition, there is a concern that any or all of these species could be out of control at any given time, such as the case with the emerald ash borer,

whose effects are still being felt and the gypsy moth, which has been highly prevalent in this section of the state in recent years.

SEASONAL POPULATION CHANGES/SPECIAL EVENTS

SEASONAL POPULATION CHANGE

A population change for an extended time period in the county, beyond the normal level of people to which resources are allocated.

SPECIAL EVENTS

Entertainment-based activities that attract people from outside the immediate area.

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 may continue to slowly grow.

Many stresses are put on local governmental agencies such as fire departments, police departments, as well as hospitals, road commissions, 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 to the needs of the population.

Bay County is no exception to seasonal population spikes in the summer, deer season, and to a lesser extent, the winter months for winter events, such as ice fishing and snowmobiling.

Seasonal Population Increases in Bay County

With the power outages across the country in the summer of 2003, Bay County experienced a high influx of people from the Detroit area going to their seasonal homes. The emergency management office reported that there were low supplies of food and stresses on emergency services in Bay County.

Seasonal Population Increase Overview

Seasonal population increase will continue to be a concern in Bay County, located along the shores of Saginaw Bay on Lake Huron in the Lower Peninsula unless there are preventative measures taken to solve it. This summer population is based on numerous visitors of the four campgrounds located throughout the County. Many of the visitors stay throughout the summer, while others have varied “residence” times.

The population of Bay County is projected to steadily decrease and with budget cuts, Bay 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 throughout Michigan can be a factor that directly affects Bay County.

Population Increases Due to Large Venue Planned Events

Bay County communities experience large population increases during summer seasonal months due to “Snowbirds” that winter in warmer climates. However, the County also has large population influxes due

to holidays and large venue events. During the summer months there are festivals, concerts, and special events. These events bring in tens or even hundreds of thousands of visitors into confined areas. Due to the lack of overall resources, these events strain the local emergency services. More comprehensive planning is utilized, including the use of Michigan State Police Large Venue Planning is administered by the MSP/EMHSD Local Emergency Management and Homeland Security Division. This planning process encompasses both local and external threat matrices, local emergency services, weather related and evacuation planning.

All of these events draw large crowds of people into smaller community venues, taxing local resources and making them vulnerable to unexpected occurrences such as Severe Weather, Civil Disturbance, or Acts of Terrorism.

PUBLIC HEALTH EMERGENCIES

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 threat would be the intentional release of a radiological, chemical, or biological agent 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 Bay 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. Another common public health emergency is elevated levels of lead in the blood. This can be a result of lead-based water service lines, which were common in the 20th century.

In May 2019 EGLE issued a factsheet for Midland and the downstream areas (which includes parts of Bay County), along the Tittabawassee and Saginaw Rivers where flooding occurs, advising the public to not eat livestock or chickens, including eggs. In Midland and along the Tittabawassee and Saginaw Rivers, dioxins got into the soil and river sediment because of old waste handling practices at The Dow Chemical Company. The waste that was burned put dioxins into the air and they came down around the City of Midland, The waste that was discharged to the river moved downstream and settled on the bottom.

When the rivers flood, the water picks up the sediment and dioxins and moves it onto the land. The Michigan Department of Environment, Great Lakes, and Energy has measured high amounts of dioxins in the soil in some of these areas. Although Dow is no longer releasing these chemicals, dioxins stay in the environment for a very long time.[10]

In 2009 Bay County experienced an outbreak of the Swine Flu (H1N1 Flu Virus). While there were no reported deaths as a result of the Flu, from October 2009 to May 2010 there were 5352 vaccinations administered to combat the flu.

In January 2020, the COVID-19 pandemic was identified to be in the United States. The vaccine for COVID-19 was available to the general public by early 2021 from several sources. While the vaccine did not prevent COVID-19, it did lessen the effects along with the possibility of death. By October 2021, a booster shot was available to the general public to further restrict the spread of the disease. As of Mid-October 2021, Bay County had confirmed 13,153 cases within the County and 351 deaths. The number of doses administered withing Bay County was 107,194.

Public Health Emergency Overview

Public health emergencies have come in many different forms in recent years, from elevated lead levels in the blood system to pandemic outbreaks. While the County has an existing heath department to advise the public of these situations, the public must be willing to heed the advice of the public officials in order to minimize the impact of these events.

LOW PRIORITY HAZARDS

STRUCTURAL FIRES

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. 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.[11] This is especially critical in County as the County is considered to be a rural county and most of the structures are residential.

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

[10] Michigan Department of Environment, Great Lakes, and Energy, May, 2019

[11] FEMA's National Fire Data Center

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 Michigan and Bay County. The first major challenge is regarding the Michigan fire service and the lack of a state-mandated fire safety code and code enforcement program for all occupancies. A second major challenge is the firefighting capacity within County. Bay City has the only full-time firefighting staff in Bay County. Several communities have a combination of fulltime/parttime firefighting staff, while other communities only have parttime firefighting staffs. Both the combination fire departments and the parttime staffs are reliant upon paid-on-call firefighters or are without a fire service at all.

Due to the smaller size of the fire departments, when there is a multiple alarm fire within the County, other municipal fire departments are called out to assist in putting out the fire. This is not only a strain on the communities, should another fire occur.

Structural Fires in Bay County

There are numerous fires annually in Bay County that are handled by local fire departments. While a large majority of them are residential in nature, several commercial fires have occurred in recent years.

On 12/10/77 the Wenonah Hotel in Bay City burned down. This was the deadliest fire in Bay County history as 10 people died as a result of the fire with 66 people sent to hospital. 23 of the people were admitted and the remaining 43 were released. The cause of the fire was faulty wiring.

On 09/16/90 the Jupiter, a tanker carrying unleaded gasoline broke away from its moorings in Bay City on the Saginaw River just as the Buffalo, a freighter twice the size of the Jupiter, passed by. A collision occurred resulting in the discharge of 2.3 million gallons of unleaded gasoline into the river and also resulting in electric cables breaking away, which resulted in a fire. The fire burned for over 29 hours, causing 1 death, 12 injured, all sailors on the Jupiter, and over $6 million in costs, including the cost of the Jupiter and overtime costs for the local agencies.

On 05/31/14 a fire was reported at King Lumber in Monitor Township. A total of seven departments were called out to put out the blaze, which was limited to the principal structure.

Structural Fires Overview

Structural fires occur in every community annually. Older, more historic neighborhoods are more prone to fire as the homes are not as fireproofed as the more recently constructed homes. Because fires are a major concern in every municipality, most cities/villages have some form of fire department. As the municipalities in County are all smaller, rural communities, all departments have volunteer fire departments, with a fire chief that is either full-time or part-time. With smaller fire departments any multiple alarm fire, residential or commercial, will require the assistance of other departments.

WILDFIRES

An uncontrolled fire in grass or brushlands, or forested areas.

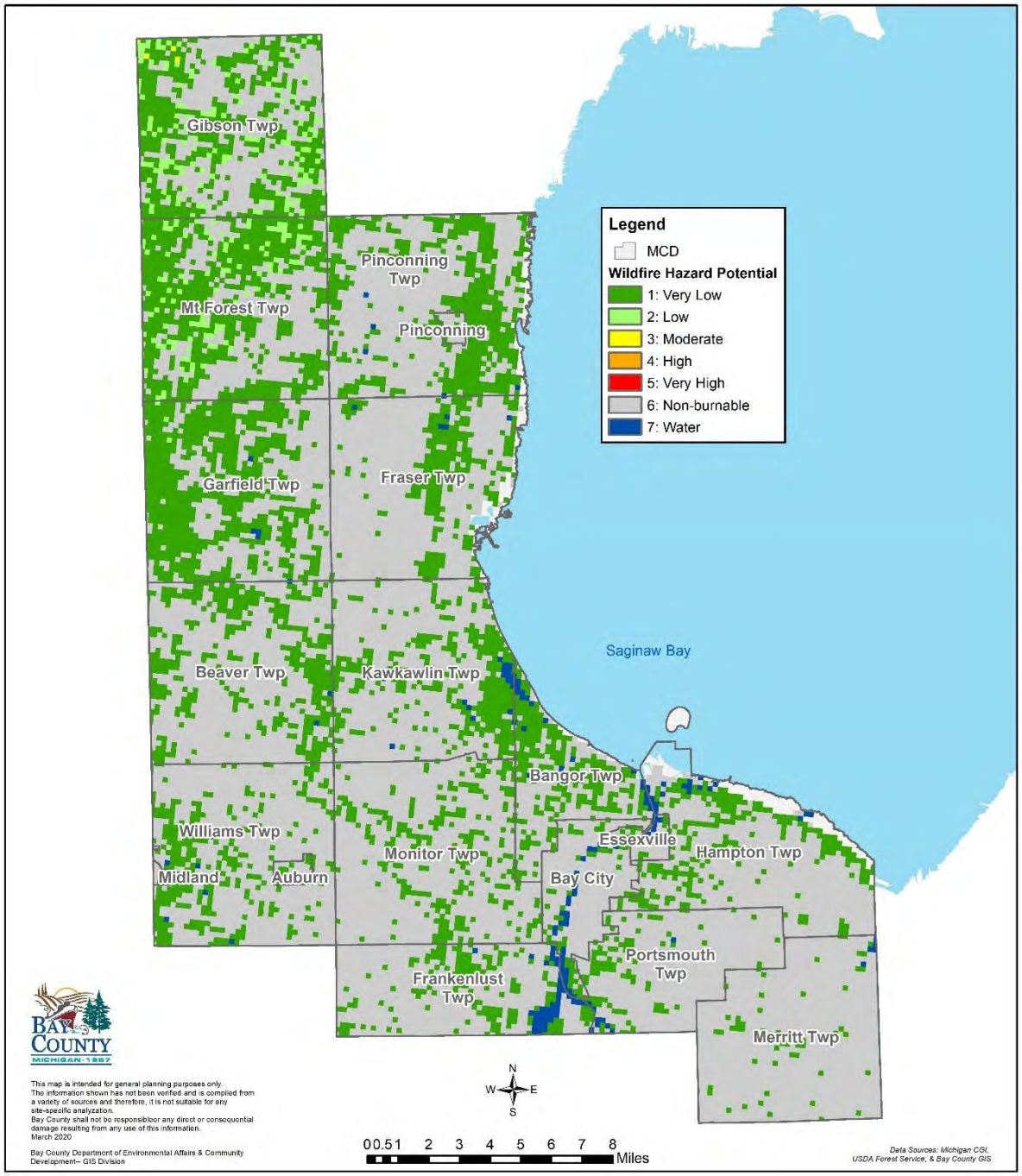
Hazard Description

Contrary to popular belief, lightning strikes are not a leading cause of wildfires in Michigan. According to 2017 Michigan Department of Natural Resources (MDNR) information, the leading cause of wildfires in Michigan was debris burnings, lightning caused only 4 percent of all wildfires and was seventh highest cause on the list. Debris burning was responsible for 32 percent of the 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.

Bay County Wildfire Risk Map

MAP 4.5



Wildfires in Bay County

Although there have been no significant wildfires in County in recent years, each year there are a number of small fires, most of which are so minor in nature the Michigan Department of Natural Resources (MDNR) is not called to assist in addressing the fire. (Please refer to the Wildfires Overview section for

more information on the annual number of wildfires in Bay County.) Given the appropriate weather, fuels (dry and dead grasses, tree debris, etc.) and topography, any fire can develop into a significant wildfire.

Wildfire Overview

The MDNR reports that since 1980 there have only been two (2) forest fires reported to their office, or one fire every 20 years. Having such an event would be a 5 percent probability. With neither fire resulting in any deaths, injuries, or physical damage to buildings or crops. These events are diminishing in the County with the reduced amount of forest/wooded areas. Also, with the improved training now be available to local fire departments, wildfires were given a moderate priority to address.

DROUGHTS

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. This is considered a regional event impacting the entire county and beyond rather than an event impacting a community or communities within the county.

A drought can cause many severe hardships for communities and regions. Probably one of the most common and severe impacts to a community like County would be the threat of wildfires as sixty-three percent of the County is forests. Also, there would be 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. 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 Crop Moisture Index (CMI) evaluates short-term moisture conditions across crop producing regions. The CMI 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 Bay County

The State of Michigan has been divided into ten (10) climate divisions for drought monitoring and analyses. Bay County is located in Division 7, which is located is the around Saginaw Bay and the Thumb area of the State. It consists of a six counties. According to the State of Michigan 2019 Hazard Analysis (an appendix to the 2016 State of Michigan Hazard Mitigation Plan), division 7 experienced six droughts ranging from eight months to 18 months in duration.[12]

1963-65 The longest drought in duration, the drought lasted 18 months, with January of 1911 having an index of value of -4.67.

1930-1931 Considered the most severe drought in the division, if not the State of Michigan, the Palmer Drought Severity Index reached an all-time low index value of -6.25 for the region7

Drought Overview

As previously stated, County is located in Division 7, of Michigan's 10 drought climate divisions. From the period of 124 years (1895-2018) County (Division 7), 54% of the years did not experience a moderate drought or worse (which is the highest percentage in the state), 23% of these years experienced a severe drought. Using months as a measure, 85.7% of the months in division 7 were without drought, and only 14.7% of the month included drought. It should also be noted that the last recorded drought of circumstance was in 1998-99. With recent changes in weather patterns that include heavier, more frequent thunderstorms, and the ever-increasing new techniques for fighting drought, this event was considered to be a low priority hazard to the County and would not be addressed in the action plan.

CIVIL DISTURBANCES

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.

[12] Michigan Hazard Analysis April 2019, Michigan Department of State Police

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 criminal (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 Overview

Civil disturbances occur rarely in Bay County. However, with the ever-increasing threats throughout society, this is a growing problem that should a civil disturbance of a large magnitude occur, the Michigan State Police, and possibly other law enforcement details will have to be called in to assist the local public safety personnel.

SCRAP TIRE FIRES

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 of the last forty years present environmental and safety hazards that will last into the foreseeable future. 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 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 Environment, Great Lakes, and Energy (EGLE), 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 EGLE 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 Bay County

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

Scrap Tire Overview

With the elimination of scrap tire sites within Bay County, this hazard has been greatly reduced. As there are old tires located at car dealerships and other sites, this hazard has not been completely eliminated.

OTHER 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 Environment, Great Lakes, and Energy (EGLE) (formerly known as the 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 is not according to the physical condition of the dam.

The National Inventory of Dams lists one (1) dam within Bay County and that dam having a low hazard potential classification. The definitions for these ratings by Michigan Law (Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act) are as follows:

Low hazard potential classification: failure or misoperation results in no probable loss of human life and low economic and/or environmental losses.[13] The dam is the Kawkawlin River Walleye Pond Dam.

Dam Failures in Bay County

There have been no dam failures in Bay County in recent memory.

Dam Failure Flooding Overview

According to the National Inventory of Dams Bay County has one dam, with that dam rated as a Low Hazard Potential Dam. The Federal Emergency Response Commission (FERC) has emergency planning oversight of the dams. Dam owners are required to maintain an Emergency Action Plan (EAP) for significant and high hazard potential dams. Owners are also required to coordinate with local Emergency Management officials to assure consistency with local Emergency Operations Plans. Due to the classification of the dam, dam failures was not identified as a priority to address.

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

[13] ibid

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 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 Bay County

One major event occurred in Bay County were reported by the NCEI for County, Michigan between 1996 and 2020.

Fog Overview

There was one major event that occurred in Bay County from 1996 to 2020, or about one every 25 years. There is a 4% possibility of a major fog event occurring in any given year. However, a major fog event is estimated to occur in Michigan every two years. Property damage can be significant for vehicles due to the number of crashes resulting from fog, although real property and structures are usually unaffected. Additionally, while fog has occurred in Bay County, they have not resulted in deaths, injuries, or property damages. Thus, while fog has not impacted the residents of County in recent years, it is not unforeseeable that fog could impact County in the future. However, fog is not considered to be a severe weather event and was identifies as a low priority to address. Thus, the County is less vulnerable to the impacts of fog.

EARTHQUAKES

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 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 Bay 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 - which could translate into shortages in Bay County. Being on the I 75 corridor and on Saginaw Bay, the County is positioned to receive shipments from major suppliers through a variety of sources.

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.

County is not in an area designated as being 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.

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 involved 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 are 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. The map on the previous page indicates the areas in the state that are potentially vulnerable to mine subsidence. 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.

Groundwater

According to a study done in 2006 by the U.S Geological Survey, Michigan State University, EGLE, Bay County has a very high water table, which would explain the low number of mines in Bay County.

Subsidence Overview

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

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 Stratfortress bomber operations in case the current Stratfortress 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 effects. 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 though thermal pulse and mass fires, while with small tactical bombs the blast effect and prompt radiation will be relatively more important.

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.

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 **c**ommunity during any period of emergency, including enemy attack).

NUCLEAR POWER PLANT ACCIDENTS

Nuclear Power Plant Accident: 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. Bay County does not have a nuclear power plant.

Bay 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 located within the US is approximately 130 miles away from Bay County, which is the Enrico Fermi II Nuclear Power Plant, located in Newport5, Michigan. Should an accident occur in the Midwest that could impact the County any measures would be addressed by an outside agency.

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

In **Table 4.14 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 Bay City, the assets that would be vulnerable to damage or injury are identified in that cell.) Earthquakes have been eliminated from 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 noticed by people.

HAZARD IMPACT
FOR BAY COUNTY MUNICIPALITIES

Table 4.13

Municipality	High Impact Hazards	Medium Impact Hazards	Moderate Impact Hazards	No Impact
Bay County	A,B,C,D,E	F,G,H,I,J,K,U	L,M,N,O	P,Q,R,S,T
Auburn	B,D,F,G,H,I, K,L,O,P,R,S,U	A,J,N	M,Q,T	C,E
Bay City	C,D	A,B,F,I,J,LR,S	E,G,H,K,M, N,O,P,Q,T,U	
Essexville	F,G,H,I,J,O,S	N,P	A,B,C,D,E,K,L,M, Q,R,U	T
Pinconning	A,B,D,O	G,H,K,L	C,F,I,J,M,N, P,Q,R,S	E,T,U
Bangor Township	A,B,C,D,E,H, I,J,O,P	F,G,K,L	M,N,Q,R,S,T,U	
Beaver Township		D,I,R	A,B,C,G,J,M, O,P,Q,S,U	E,F,H,K,L,N,T
Frankenlust Township	C,O	E,M	A,B,D,G,I,J,K, L,P,Q,R	F,H,N,S,T,U
Fraser Township	A,L,O	B,C,E,G,R	D,F,I,J,K,M,P,Q	H,N,S,T,U
Gibson Township	A,K,L,N,P,Q,R	D,G,I,J,M,T	B,C,H,O,S	E,F,U
Hampton Township	C,E	D,J,M,O,R	A,B,F,G,H,I,K,L, N,P,Q,S,T,U	
Monitor Township	B,C,D,F,H,I,K,O	A,G,L,P	E,J,M,N,Q,R,S,T,U	

Mount Forest Township	D,I,K,O,Q	A,J,P,R,U	B,C,F,G,H,L, M,N,S,T	E
Portsmouth Township	A,B,P	C,D,F,G,H,I,K,M,O,Q	E,J,L,N,R,S,T,U	
Williams Township		A,D,F,R,S	B,C,G,H,I,J, K,L,M,O,P,U	E,N,Q,T

A-Energy Emergencies, B-Infrastructure Failures, C-Riverine Flooding, D- Severe Weather, E-Shoreline Incidents, F-Cyber Crimes, G-Hazard Materials Incidents, H-Terrorism/Sabotage, I-Tornadoes, J-Transportation Accidents, K-Well/Pipeline Incidents, L-Extreme Temperatures, M-Invasive Species, N-Seasonal Population Changes/Special Events, O-Public Health Emergencies, P-Structural Fires, Q-Wildfires, R-Drought, S-Civil Disturbances, T-Scrap Tire Fires, U-Subsidence

ASSET VULNERABILTY
FOR BAY COUNTY MUNICIPALITIES
Table 4.14

Community	Hail	Lightning	Severe Winds	Tornados	Extreme Heat	Ice/Sleet Storms	Snowstorms	Extreme Cold	Flooding	Shoreline Flooding & Erosion	Drought	Fog
Bay County	A,B,C,E,F,G	A,B,C,E,F,G	A,B,C,F,G	A,B,C,E,F,G	A	A,B,C,E,F,G	A,B,C,E,F,G	A	A,B,C,E,F,G	A	A	A
City of Auburn	A,B,E,F,G	A,B,E,F,G	A,B,E,F,G	A,B,E,F,G	A	A,B,D,E,F,G	A,B,E,F,G	A	A,B,E,F,G		A	A
Bay City	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
City of Essexville	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
City of Pinconning	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
Bangor Township	A,B,D,E,F,G	A,B,D,E,F,G	A,B,D,E,F,G	A,B,D,E,F,G	A,B,D,E,F,G	A,B,D,E,F,G	A,B,D,E,F,G	A	A,B,D,E,F,G		A	A
Beaver 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
Frankenlust Township	A,B,D,F,G	A,B,D,F,G	A,B,D,F,G	A,B,D,F,G	A	A,B,D,F,G	A,B,D,F,G	A	A,B,D,F,G		A	A
Fraser 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	A
Gibson 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
Hampton Township	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
Monitor Township	A,B,D,E,F	A,B,D,E,F,G	A,D,E,F,G	A,D,E,F,G	A,F,G	A,D,E,F,G	A,D,E,F,G	A,D,F,G	A,D,E,G		A	A
Portsmouth 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	A

Williams Township	A,B,D, E,G	A,B,D, E,G	A,B,D, E,G	A,B,D, E,G	A	A,B,D, E,G	A,B,D,E,G	A	A,B,D, E,G		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 (2010 PLAN)

Prior to the development of the mitigation strategies, Bay County Hazard Mitigation Advisory Committee (BCHMAC) developed goals and objectives. Below are the goals and objectives and the mitigation action categories as determined for the 2010 Hazard Mitigation Plan. Revised goals and objectives for the 2022 Plan, as determined by the BCHMAC 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.

GOAL 1: Reduce risks through regulations, such as building codes, planning ordinances, or floodplain regulations.

GOAL 2: Reduce exposure to hazards through building or parcel specific activities, such as flood proofing or property acquisition.

GOAL 3: Reduce impacts through response and recovery activities implemented during or after a disaster.

GOAL 4: Minimize impacts through projects, such as detention basins or tornado shelters.

GOAL 5: Assist residents to prepare for risks and implement protective measures for themselves and their property.

The next steps in the 2010 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 in what sequence or order these actions should be pursued. This step will also be utilized in the 2019 Plan and will be located in Chapter 6: Action Plan.

BAY COUNTY IMPLEMENTATION STRATEGY TABLE: 2010-2021					
Objective	**Mitigation**	**Priority**	**Status**	**Lead Agency**	**Outcomes**
City of Auburn Action Plan					
1	Expand Emergency Siren System County-wide	Low	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
2	Drainage Structure, Improvements and Maintenance	High	Ongoing	Bay County Drainage Commissioner	There has been a reduction in flooding as a result of the work completed.
Township of Bangor Action Plan					
1	Dredging of Kawkawlin River to move flood waters from area during major rain events	High	Complete	Bangor Twp Supervisor	Completed in November 2019.
2	Increasing the drainage of the Kawkawlin River where drainage is inadequate or non-existent	High	Started	Bangor Twp Supervisor	Project has begun throughout the Township as funds become available.
3	Installing pump stations near the Kawkawlin River to allow more water to get to the river faster	High	Not Started	Bangor Twp Supervisor	Grant funds not available, cost prohibitive to complete without grant funds.
4	Improve road grades in areas that water is not allowed to drain properly into the drains	High	Started	Road Commission	In design phase, scheduled for 2020.
5	Expand Emergency Siren System County-wide	Low	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
6	Develop an evacuation route for Killarney Beach Rd residents and create a 30+ ft green space west of Killarney Beach Road that will act as a fire break	High	Started	Road Commission	In design phase, scheduled for construction in 2022.

BAY COUNTY IMPLEMENTATION STRATEGY TABLE: 2010-2021					
Objective	**Mitigation**	**Priority**	**Status**	**Lead Agency**	**Outcomes**
City of Bay City Action Plan					
1	James Clements Flood Protection Dike stabilization and improvement ditch drainage and pump station improvements	Medium	Started	City of Bay City	Dikes stabilized; drainage ditch is not complete. Pump station improvements are not complete.
2	Purchase and install emergency warning sirens	Low	Complete	City of Bay City	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
3	Tree management	High	Ongoing	City of Bay City	The city has taken a more active role in the selection of trees planted in the parkway by identifying more appropriate trees.
4	Liberty and Independent Bridges Erosion Protection	Very High	Started	City of Bay City	Liberty bridge erosion control initiated. Contractor selected to complete project.
Township of Beaver Action Plan					
1	Bury Power Lines	High	Not Started	County Planning ITC	No longer being considered. Cost prohibitive to complete without grant funds.
2	Monitoring Gages	High	Not Started	Township Board	No longer being considered. Cost prohibitive to complete without grant funds.
3	Expand Emergency Siren System County-wide	High	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
City of Essexville Action Plan					
1	Establish sea wall along the Saginaw River	High	Started	DPW	Smith Park seawall constructed.
2	Bury utility lines	High	Not Started	DPW	No longer being considered. Cost prohibitive to complete without grant funds.
3	Tree management: Remove dead trees, trim trees, and plant new trees	High	Started	DPW	Consumers trims trees near power lines and identifies trees to be removed by municipality.
4	Expand Emergency Siren System County-wide	High	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.

BAY COUNTY IMPLEMENTATION STRATEGY TABLE: 2010-2021					
Objective	**Mitigation**	**Priority**	**Status**	**Lead Agency**	**Outcomes**
Township of Frankenlust Action Plan					
1	Remove contaminants from river dredging site spoils return to AG.	Low	Ongoing	Township Board	Dredging is underway.
2	Shelters for 2 schools in Township	Medium	Not Started	Township Board	No longer being considered. Cost prohibitive to complete without grant funds.
3	Purchase homes in 100-year floodplain and convert the space to a park or green space to reduce flood impacts	High	Not Started	Township Board	Grant funds not available, cost prohibitive to complete without grant funds.
4	Expand Emergency Siren System County-wide	High	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
Township of Fraser Action Plan					
1	Build barrier or purchase homes along Saginaw Bay	Medium	Not Started	Fraser Township Supervisor	No longer being considered. Cost prohibitive to complete without grant funds.
2	Clean Tebo Drain and enlarge Lake State Railroad Bridge	High	Not Started	Bay County Drain Commissioner	No longer being considered. Cost prohibitive to complete without grant funds.
3	Expand Emergency Siren System County-wide	High	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
4	Vegetation removal of invasive species impacting drainage	High	Not Started	County Planning	No longer being considered. Cost prohibitive to complete without grant funds.
Township of Garfield Action Plan					
1	Dredge River/Flood Walls	Medium	Not Started	Drainage Commission	No longer being considered. Cost prohibitive to complete without grant funds.
2	Bury Power Lines	High	Not Started	ITC	Cost prohibitive. ITC (electric provider) will not complete this at their cost. Cost is prohibitive for the property owners to pay to have it done.

BAY COUNTY IMPLEMENTATION STRATEGY TABLE: 2010-2021					
Objective	**Mitigation**	**Priority**	**Status**	**Lead Agency**	**Outcomes**
3	Expand Emergency Siren System County-wide	Low	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
Township of Gibson Action Plan					
1	Present Firewise Program to public to educate them on ways to protect their property from wildfire	High	Not Started	Fire Department	Fire department has provided information on fires to the public but has not promoted the Firewise Program.
2	Promote awareness of crop insurance programs and encourage participation	High	Ongoing	County Extension Service	Primarily promoted through Michigan State University Extension website.
3	Purchase back-up generator, folding cots, blankets, food, and medical supplies to facilitate Township Hall as an Emergency Shelter	High	Not Started	Fire Department Township Board	No longer being considered. Cost prohibitive to complete without grant funds.
4	Expand Emergency Siren System County-wide	High	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
Township of Hampton Action Plan					
1	Repair pumps at flood gate locations	High	Ongoing	Twp. DPW Director	Pumps at several locations have been replaced.
2	Increase height of dike to remove twp. 1% floodplain	High	Not Started	Hampton Township Supervisor	Dike maintained, easements have expired, ownership issues present problems with modifications of dike.
3	Cleaning of drainage ditches	Very High	Ongoing	Hampton Township Supervisor	Maintenance concerns with the drainage ditches.
4	Install emergency warning sirens in heavy populated areas of the twp.	Low	Complete	Hampton Township Supervisor	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
5	Install emergency generator at Twp. Hall emergency shelter	High	Not Started	Hampton Township Supervisor	Grant funds not available, cost prohibitive to purchase without grant funds.

BAY COUNTY IMPLEMENTATION STRATEGY TABLE: 2010-2021					
Objective	**Mitigation**	**Priority**	**Status**	**Lead Agency**	**Outcomes**
6	Retrofitting sanitary sewer system to remove storm water	Very High	Not Started	Hampton Township Supervisor	No combined system.
7	Build tornado shelters at both manufacture mobile home community and twp. RV campground	Very High	Not Started	Hampton Township Supervisor	There is a community building at one campground but does not fit shelter requirements. Cost prohibitive to do other building.
8	Education of public for flood warnings	High	Ongoing	Hampton Fire Dept.	Office of Emergency Management provides this information county-wide.
Township of Kawkawlin Action Plan					
1	Break walls and other structure in the Bay	High	Started	Township Planning Commission	Some walls done on private property, funded by the property owners. No publicly-owned walls constructed.
2	Purchase tornado sirens and build tornado shelters	Medium	Started	Township Board	Sirens purchased; shelters have not been built.
3	Dredging and cleaning out Kawkawlin River	Very High	Complete	Township Board	Completed in 2018.
4	Purchase back-up generator, folding cots, blankets, food and medical supplies to facilitate Township Hall as an Emergency Shelter	Medium	Not Started	Township Board	Grant funds not available, cost prohibitive to purchase without grant funds.
5	Publish information on Website	Medium	Not Started	Township Board	Website is available, must work with Emergency Management Coordinator (EMC) to coordinate the information being put on the website.
6	Expand Emergency Siren System County-wide	Low	Complete	Township Board	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.

BAY COUNTY IMPLEMENTATION STRATEGY TABLE: 2010-2021					
Objective	**Mitigation**	**Priority**	**Status**	**Lead Agency**	**Outcomes**
7	Develop an evacuation route for Brissette Beach and Linwood Beach Rd residents and create a 30- ft green space West of Brissette Beach and Linwood Beach Roads that will act as a fire break.	High	Not Started	Township Board	Planning has been put on hold.
Township of Merritt Action Plan					
1	Expand Emergency Siren System County-wide	High	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
Township of Monitor Action Plan					
1	Funding for drainage structure to minimize road flooding	Very High	Started	Bay County Road Commission	Several subdivision have completed improvements to alleviate flooding.
2	Build Tornado Shelters in our trailer parks	Very High	Not started	Monitor Township Board	Grant funds not available, cost prohibitive to purchase without grant funds.
3	Install Warning Sirens in Township	Medium	Complete	Monitor Township Board	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
4	Educational Programs to assist public with Flooding and Severe weather warnings	Medium	Ongoing	Monitor Township Board	Information continues to be distributed to homeowners on downspouts and back flow preventers.
Township of Mount Forest Action Plan					
1	Expand Emergency Siren System County-wide	High	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
City of Pinconning Action Plan					
1	Expand Emergency Siren System County-wide	High	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.

BAY COUNTY IMPLEMENTATION STRATEGY TABLE: 2010-2021					
Objective	**Mitigation**	**Priority**	**Status**	**Lead Agency**	**Outcomes**
2	Tree Management, Remove dead trees, trim trees and plant new trees	Medium	Ongoing	City of Pinconning	Work has been initiated.
Township of Pinconning Action Plan					
1	Erect sea walls and barriers to reduce ice floes along the Saginaw Bay	High	Started	Township Office	Privately owned walls have been constructed.
2	Warning system for storms and Emergency Operations Plan	High	Complete	Township Board	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
3	Educate the public on likely Hazards in our community	High	Ongoing	Township Board	EMC does this on a county-wide basis.
4	Improve drainage via the County Drain system to the Bay	High	Ongoing	Township Board	Work has been initiated.
5	Control vegetation on shoreline of the Saginaw Bay	High	Ongoing	Township Board	County-wide effort to reduce/eliminate phragmites has been initiated.
Township of Portsmouth					
1	Reinforce dikes along southern end of township	High	Not Started	Township Board	Grant funds not available, cost prohibitive to purchase without grant funds.
2	Expand Emergency Siren System County-wide	Low	Complete	Central Dispatch	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
3	Shelter for Riverview Trailer Park	High	Not Started	Township Board	Grant funds not available, cost prohibitive to purchase without grant funds.
Township of Williams Action Plan					
1	Siren System for Severe Weather	Very High-High	Complete	Planning Departments	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
2	Install Community Shelters in Schools and Manufactured Housing Complexes	High-Medium	Not Started	Planning Departments	Grant funds not available, cost prohibitive to purchase without grant funds.

BAY COUNTY IMPLEMENTATION STRATEGY TABLE: 2010-2021					
Objective	**Mitigation**	**Priority**	**Status**	**Lead Agency**	**Outcomes**
3	Tree trimming near power lines	Very High-High	Started	Planning Departments	ITC/Consumers Energy do some tree trimming.
4	Email/Text/Phone call Emergency Notification System	Medium	Complete	Bay County Emergency Management	Completed in 2012 using Bay Alerts. Rave was installed in 2014.
5	Expansion of fire ambulances substation so that it can be used as a severe weather station	Very High-High	Ongoing	Fire Department	Construction has begun on the building.
Bay County					
1	Siren System for Severe Weather	Medium	Complete	Bay County Emergency Management	75-80 percent coverage in the County. Additional sirens are not anticipated due to the high cost/benefit ratio.
2	Continued Education Regarding Hazard Mitigation	Medium	Ongoing	Bay County Emergency Management	This is done through website information and visits/ presentations by EMC.
3	Tree Trimming Near Infrastructure	Medium	Ongoing	Bay County Emergency Management	Bay City Public Works, ITC, and Consumers Energy all do tree trimming. Neighborhoods are scheduled on an annual basis.
All Jurisdictions					
1	Participating jurisdictions in NFIP-Confirmed compliance with NFIP	High	Started	Local Floodplain Manager	Fraser Township is only participating municipality that is participating.
2	Adopt and continue to implement floodplain ordinances	High	Started	Local Floodplain Manager	Fraser Township is only participating municipality that is participating.
3	Educate the public regarding the benefits of the NFIP	High	Started	Local Floodplain Manager	NFIP information is provided to the public via brochures and fliers at local open houses and community events.

BAY COUNTY IMPLEMENTATION STRATEGY TABLE: 2010-2021					
Objective	**Mitigation**	**Priority**	**Status**	**Lead Agency**	**Outcomes**
4	Updating local plans, codes, and ordinances consistent with hazard mitigation goals and to reduce impact of hazards on new and existing development	High	Ongoing	Local Governments	Hazard Mitigation was not identified in the previous master plans; however, the master plans approved since 2012 did include flood management when appropriate, (see table 6.1). Future master plans are to address hazard mitigation (see action item 12).

CHAPTER 6: ACTION PLAN

Through a systematic process that included the review of the action items identified in the Bay County 2010 Hazard Mitigation Plan (2010 Plan) and the possible mitigation strategies as identified in the 2003 Local Hazard Mitigation Planning Workbook (Workbook), the Bay County Hazard Mitigation Advisory Committee (BCHMAC) was able to identify the following actions to be the most effective strategies for hazard mitigation in the 2022 Hazard Mitigation Plan for Bay County. The actions include mitigation actions identified in the 2010 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 BCHMAC.

The BCHMAC initiated the selection process with a review of the goals and objectives as identified in the 2010 Plan and modified them to fit the needs of Bay County in 2022 and beyond. These goals and objectives are identified on the following page.

The action plan items from the 2010 Plan were then evaluated and those items that were deemed complete or no longer applicable were eliminated from this plan (see review of all 2010 items in Chapter 5). The BCHMAC then began review of the possible mitigation strategies as identified in the Workbook. After reviewing over 250 possible mitigation strategies (many of them duplicate strategies for multiple hazards) the BCHMAC was able to eliminate multiple strategies to reduce the number of possible strategies to 112. The final list of 112 strategies is found in Appendix D. The list of original strategies is found in Appendix E.

The BCHMAC was then asked to identify hazard mitigation projects/processes that address the hazards items on the list. Projects not identified in the 2010 Plan have been labeled as "NEW" in their descriptions. The projects/processes that will provide a higher impact to the residents of Bay County were given a high priority. Project/process items that were readily achievable with some impact to the residents of Bay County were identified as a medium priority. Projects/processes that had minimal impact to the residents of Bay County were identified as moderate priorities. A total of 20 projects were identified as high priority projects. These can be found on the following pages. In addition to the high priority projects, another 21 projects were identified as either medium or moderate priority projects. **A complete listing of all 41 projects can be found in appendix F.**

Funding for projects through FEMA can be through several of the Hazard Mitigation Assistance (HMA) Programs. There are three programs in the HMA program, the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), and the Building Resilient Infrastructure and Communities (BRIC). As funding may be available through one of more these programs, FEMA-HMA will be listed as a potential funding source, thereby not limiting the availability of one or more programs. (More information on these programs can be found on page 50.)

Bay County municipalities were asked to identify those projects they would participate in should the project be funded, and local funds be available (where applicable). A table following the list has been included that identifies those projects. It should be noted that the communities were able to select projects from the entire list of 41 projects.

BAY COUNTY PROPOSED GOALS AND OBJECTIVES

GOAL 1: Protect Public Health and Safety

OBJECTIVES

a. Provide community-wide hazard warning systems (for natural, health, and terrorism hazards)
b. Provide information and resources to increase hazard awareness and education to the public
c. Maintain existing resources and provide necessary training for public safety personnel
d. Identify and obtain necessary resources and equipment to prevent or minimize hazard effects
e. Provide guidelines to public/staff on ways to address the hazard effects
f. Increase security within infrastructure and facilities

GOAL 2: Minimize damage to public and private property

OBJECTIVES

a. Adopt policies to make property less vulnerable
b. Apply proactive mitigation measures to prevent hazard damage
c. Obtain necessary equipment, resources, and training to protect property if hazard occurs
d. Conduct public education sessions, training sessions and exercises to prepare for possible hazards
e. Protect public infrastructure and facilities

GOAL 3: Maintain essential services

OBJECTIVES

a. Identify, inspect and maintain all critical infrastructure and facilities
b. Repair or replace critical infrastructure and facilities that are damaged or degraded
c. Obtain necessary resources and equipment to insure essential services are maintained in the event of a hazard
d. Identify potential shelter sites in case of a hazard event-designate accordingly
e. Maintain communication infrastructure-fire, police, EMS; install redundant communications
f. Planning the continuity of operations
g. Maintain the resiliency through geodiversification of data systems

GOAL 4: Manage growth/development

OBJECTIVES

a. Develop hazard resistant growth policies
b. Discourage development in high hazard areas
c. Integrate hazard mitigation planning into land use planning and land acquisition
d. Encourage sustainable development
e. Protect and conserve natural resources

HIGH PRIORITY PROJECTS

Item 1

Drainage structure improvements/maintenance throughout Bay County

Action: Repair/upgrade drainage structure improvements throughout Bay County

- Location: County-wide
- Lead Agency: Drain Commission
- Participating Agencies: Road Commission
- Hazards Addressed: flooding, infrastructure failures
- Potential Funding Source(s): grants, property owners through special assessments
- Project Cost: To Be Determined (TBD)
- Schedule: Ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d; goal 2, objective b; goal 3, objective b
- Benefit(s): Reduce flooding and infrastructure failure with proper drainage infrastructure in place.

Item 2

Increase the capacity of the Kawkawlin River to move flood water from the area during major rain events

Action: Remove sediment to increase water flow to Saginaw Bay.

- Location: County-wide
- Lead Agency: Drain Commission
- Participating Agencies: Army Corps of Engineers
- Hazards Addressed: flooding
- Potential Funding Source(s): grants, FEMA, Army Corps of Engineers, property owners
- Project Cost: TBD
- Schedule: 2022
- Priority: High
- Goal/Objective Achieved: Goal 2, objective b
- Benefit(s): Reduce flooding along the Kawkawlin River basin.

Item 3

James Clements Flood Protection Dike stabilization and improvement ditch drainage and pump station improvements

Action: Repair dikes and replace pumps to improve water flow away from airport.

- Location: Bay City
- Lead Agency: Bay City
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: flooding infrastructure failure
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: TBD (as grants become available)
- Priority: High
- Goal/Objective Achieved: Goal 2, objectives b, c, and d; goal 3, objectives a, b, and d
- Benefit(s): Reduce flooding keeping the airport free from flooding.

Item 4

County-wide tree management

Action: Trim trees located near power line, plant area appropriate trees within parkways to be less or non-intrusive to utility lines, both overhead and underground.

- Location: County-wide
- Lead Agency: Consumers Energy, Bay City
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: infrastructure failure
- Potential Funding Source(s): Grants, Consumers Energy/City of Bay City, property owners
- Project Cost: TBD
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objective b and e
- Benefit(s): Reduce the infrastructure failure due to inclement weather and downing of trees/ power lines. Public safety improvements with fewer downed power lines.

Item 5

Complete an assessment to determine where shelters can be located for schools, manufactured home complexes, and RV Campgrounds

Action: Assess all schools, manufactured home complexes, and RV campgrounds to identify possible shelter sites.

- Location: County-wide
- Lead Agency: Office of Emergency Management (OEM)
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: severe weather events, tornadoes
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: 2022
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d, goal 3, objective e
- Benefit(s): Public safety is enhanced by finding shelters during these events.

Item 6

Assess Repetitive Loss Properties (RLP) and Severe Repetitive Loss Properties (SRLP) in 100-year floodplain in order to purchase homes and convert space to park/greenspace to reduce flooding

Action: Identify RLP and SRLP in Bay County and seek funds to purchase properties that can be utilized as green space.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: flooding
- Potential Funding Source(s): FEMA
- Project Cost: TBD
- Schedule: 2022
- Priority: High

- Goal/Objective Achieved: Goal 2, objective b; goal 4, objective a, c, and e
- Benefit(s): Reduce, and hopefully eliminate, RLP/SRLP properties in Bay County.

Item 7

Remove invasive vegetation species that negatively impact drainage

Action: Identify invasive vegetation species, create plan, and eliminate/mitigate their growth; thereby improving drainage throughout the county.

- Location: County-wide
- Lead Agency: Drain Commission
- Participating Agencies: Bay County Environmental Affairs, Cooperative Invasive Species Management Association (CISMA), (see Table 6.1)
- Hazards Addressed: invasive species, flooding
- Potential Funding Source(s): Drain Commission, grants, CISMA
- Project Cost: TBD
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objective b; goal 4, objective e
- Benefit(s): Environmental protection will be enhanced, and flooding damages will be mitigated with the elimination/reduction of invasive species.

Item 8

Retrofit sewer system to eliminate combined sewer systems

Action: Identify combined sewer systems in the County and develop a plan to retrofit system(s) into separate sanitary and storm sewer systems.

- Location: County-wide
- Lead Agency: TBD (Communities that will be addressing the matter.)
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: public health emergencies, flooding
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d, goal 2, objective b; goal 3, objective a
- Benefit(s): With the elimination of combined sewers, flooding in homes will be reduced as will the inclusion of human waste during floods.

Item 9

Utilize educational programs to assist public with flooding and severe weather warnings

Action: Use FEMA-approved educational programs to educate public on flooding and other weather-related hazard warnings.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: all hazards
- Potential Funding Source(s): OEM budget
- Project Cost: NA

- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, objectives b and e; goal 2, objective d
- Benefit(s): Improved public awareness of hazards

Item 10

Reinforce dikes on Saginaw Bay

Action: Reinforce/update dikes to reduce shoreline flooding

- Location: Fraser, Hampton, and Kawkawlin Townships
- Lead Agency: Fraser, Hampton, and Kawkawlin Townships
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: flooding
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: TBD
- Priority: High
- Goal/Objective Achieved: Goal 2, objectives b and e, goal 3, objectives a and b
- Benefit(s): Flooding reduces along Saginaw Bay.

Item 11

Adopt and implement floodplain ordinances

Action: Review status of floodplain ordinances in all municipalities. Work with them to adopt and/or implement plan consistent with National Flood Insurance Program (NFIP) guidelines.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: flooding
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: 2023
- Priority: High
- Goal/Objective Achieved: Goal 2, objective a, goal 4, objectives a, b, c, d, and e
- Benefit(s): Potential to reduce flood insurance costs, better awareness of flood mitigation measures.

Item 12 (NEW)

Update local plans, codes, and ordinances consistent with hazard mitigation goals and to reduce the impact of hazards on new and existing development

Action: Work with local municipalities as they update their planning documents to include language to limit/eliminate developments within floodplains and is consistent with the Bay County Hazard Mitigation Plan.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: all hazards
- Potential Funding Source(s): NA

- Project Cost: NA
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objectives and b; goal 3, objective g, goal 4, objectives a, b, c, d, and e
- Benefit(s): Multiple documents in Bay County will be addressing hazards, providing better awareness of hazards and hazard mitigation activities.

Item 13 (NEW)

Complete an assessment to determine where generators are needed to keep local government functioning at optimum levels

Action: Complete an assessment of critical facilities requiring generators for all local governments .

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: all hazards
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objective e; goal 3, objectives a and d
- Benefit(s): Identify the facilities in need of generators during infrastructure failures.

Item 14 (NEW)

Purchase and install generators as identified in assessment (Item 13)

Action: Utilizing the assessment, purchase and install generators at critical facilities.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: all hazards
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: TBD
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d; goal 2 objectives c and e, goal 3, objectives d and g
- Benefit(s): Creating a safer environment by allowing facilities to operate during infrastructure failures.

Item 15 (NEW)

Install retention/detention basins

Action: Using recommendations from Road Commission/Drain Commission, install retention/detention basins strategically located throughout the County to reduce flooding.

- Location: County-wide
- Lead Agency: Department of Water and Sewer
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: flooding

- Potential Funding Source(s): TBD
- Project Cost: TBD
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d; goal 2, objectives b and e; goal 3, objective d, goal 4, objective e
- Benefit(s): Flooding reduced in areas where retention/detention basins are located.

Item 16 (NEW)

Identify sites for staging of disaster debris

Action: Identify sites that can be utilized for the staging of debris resulting from hazards.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: all weather hazards
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: 2023
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d; goal 2, objectives b and c
- Benefit(s): Reduce recovery time after extreme events.

Item 17 (NEW)

Raise homes located within floodplains to bring them above the floodplain elevation.

Action: Raise homes located within floodplains to bring them above the floodplain elevations

- Location: County-wide
- Lead Agency:
- Participating Agencies: Army Corps of Engineers
- Hazards Addressed: flooding
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: TBD
- Priority: High
- Goal/Objective Achieved: Goal 2, objectives b, c, and d; goal 4, objectives a, c, d, and e
- Benefit(s): This will mitigate/eliminate the RLP/SRLP from future flooding.

Item 18 (NEW)

Upgrade the storage and refrigeration capacity of equipment for health department testing/storage

Action: Work with health department to identify current storage and refrigeration capacity for health department tests in order to upgrade/expand these facilities.

- Location: County-wide
- Lead Agency: Bay County Health Department
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: public health emergencies
- Potential Funding Source(s): grants
- Project Cost: TBD

- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objective c; goal 3 objectives b and d
- Benefit(s): Improved testing/storage capacity for vaccines during public emergency events.

Item 19 (NEW)

Increase the number of volunteers to assist in the contact tracing and case investigations for the health department

Action: Promote the need for additional volunteers to assist in the current (and future) health crises to assist in contact tracing, case investigation, or other duties that would reduce exposure to COVID-19 or other health related events. Provide training as required.

- Location: County-wide
- Lead Agency: Bay County Health Department
- Participating Agencies: Michigan Department of Health and Human Services (MDHHS)
- Hazards Addressed: Public health emergencies
- Potential Funding Source(s): State/Federal grants
- Project Cost: TBD
- Schedule: Ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objective d; goal 3, objectives d and g
- Benefit(s): Contain the spread of viruses and improve epidemiological surveillance

Item 20 (NEW)

Increase potable water storage capacity

Action: Install two above-ground water storage tanks in Bangor Township.

- Location: Bangor Township
- Lead Agency: Bay County Department of Water and Sewer
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Public health emergencies
- Potential Funding Source(s): grants/local match
- Project Cost: $10,000,000
- Schedule: 2023/24
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d, goal 3, objective d
- Benefit(s): Provide additional potable water for Bay County residents.

Bay County Hazard Mitigation Municipal Participation Chart

Table 6.1

Community	Action Item (s)[1]	Most Recent Master Plan Approval Date
Bay County*	1,4,5,6,7,8,9,20,11,12,13,14,15,16,17,18,19,20,22,24, 25,26,28,29,30,31,32,33,36,37,39,40,41	NA
City of Auburn*	1,4,5,12,13,25,32	2017
Bay City	3,4,7,8,9,11,12,13,14,16,22,24, 25,26,28,29,32,33,35	2017
City of Essexville	1, 7, 8, 13, 15, 35	2007
City of Pinconning*	4,5,9,12,13,25,32	1995
Bangor Township	1,2,4,5,6,7,8,9,12,13,15,16,20,21, 22,23,24,25,28,32,35,36,37,38	2002
Beaver Township*	1,2,5,9,11,12,13,25,32,37,38	2007
Frankenlust Township	1, 7, 29	
Fraser Township	1, 5, 16, 23, 37	
Gibson Township*	1,9,12,25,32,37,38	
Hampton Township	4, 5, 7, 10, 13, 14, 23, 27, 36, 36, 37	2018
Monitor Township	1,2,7,35,37	2013
Mount Forest Township	13, 21, 37	
Portsmouth Township	1,4,5,6,7,9,11,12,16,17,21,22,24, 25,27,30,32,35,36,37,38	2002
Williams Township*	1,5,9,12,13,25,32,37,38	

1-The complete list of projects can be found in Appendix F beginning on page 187.

*-The projects for these communities are estimates, based on input throughout the planning process.

CHAPTER 7: FOLLOW-UP

The follow-up for Bay 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 the five-year cycle. When updated, the plan will be resubmitted to the Michigan State Police, Emergency Management and Homeland Security Division for approval. 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 Bay County Local Planning Team (GCLPT) 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 Bay County when future updates of their comprehensive plans are taking place.

The GCLPT will continue to monitor the status and track the progress of the plan elements on an annual basis. The GCLPT 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 Bay County Emergency Management Coordinator 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 need 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 GCLPT 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 GCLPT and its jurisdictions. The GCLPT'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 Bay County Emergency Management Coordinator 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 GCLPT:

- Updates to the plan.
- The Bay 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 –
BAY COUNTY HAZARD MITIGATION ADVISORY COMMITTEE
SIGN-IN SHEETS

Bay County Hazard Mitigation Update Public Hearing 03/12/2019
SIGN-IN SHEET

Please Print:

Name	Affiliation	Name	Affiliation	Name	Affiliation
Ryan Marz	Bay County	Melissa Maillette	Bay Co. Health Dept.		
Bill Ernst	EMCOG	Rebecca Brandt	Bay Co Mosquito Control		
Adam Gac	WUCX Q90.1	Wanda LB Rau	Bay Co Dept on Aging		
Shelby Putnam	Bay County JGHS pompon team	Beth Eurich	Bay Co Dept on Aging		
Craig Aimar	JGHS	Mark Rankin	MSU Extension		
Ray Ogden	GLBMW!	Pat Beson	Resident		
Karen Hubner	JGHS	Mel McNally	Resident		
Jeff Anderson	Bay Metro	John Hall	Resident WSGW Radio		
Laura Ogar	Bay Co. Gov. Affairs/Comm Dev				
Leslie Eschenbacher	CAN Council/GLBR	Jon Morse	Bay County Buildings & Grounds		
Nancy Koroskle	Bay County	Dan Tomczak	Bay County Pinconning Park		
Brandon Krause	Bay County R.D.A	John Andrus	Resident		
Trevor Keyes	Bay Future, Inc.	Craig Goulet	Bay County		
Alicia Wallace	Bay Co. EH & CDD	Cristen Gignac	Bay County		
Allen Eichhorn	B.C Lions Club	Chris Hogan	Bay County		

Bay County Hazard Mitigation Update Public Hearing 03/12/2019
SIGN-IN SHEET

Please Print:

Name	Affiliation	Name	Affiliation	Name	Affiliation
Affany Jeay	BAY COUNTY				
Jan Histed	Bay County				
Amber Davis-Johnson	Bay County				
Jim Barcia	Bay Co.				
Daine Yawiski	Bay County				
DEANNE BERGER	BAY COUNTY				
MIKE DUNCAN	BAY County				
Bob Redmond	Bay County				
Vaughn Begick	Bay Co. Com.				
ERNIE KAYSER	Bay Co Com.				
KIM COONAN	Bay County				
Tom Herek	Bay County				
Tom Ryden	Bay County				
MICHAEL ELLETZ	BAY County				

BAY COUNTY Date 5-30-19

MITIGATION PLAN UPDATE SIGN-IN SHEET

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
Bill ERNAT	EMCOG	(989) 992-8700	—
Ryan Manz	Bay County Emer. Management	989-895-4112	—
Chuck Cribley	" " "	989-488-9409	30
GREG WALTERHOUSE	RESIDENT	WALTEGL@BCSSU.EDU	10
Melissa Maillette	Bay Co. Health Dept.	maillettem@baycounty.net	
Robert Dion	City of Bay City	rdion@bayCityMi.org	— 1.0
Wade Sivik	City of Bay City	wsivik@baycitymi.org	— 1.0
ROB GLENN	BANGOR TWP FIRE DEPT	firechief@bangortownship.org	3.3
BRIAN DUCHAM	BCDPS - FIRE DIVISION	BDUCHAM@baycitymi.org	—
Terry Moultane	City of Bay City	tmoultane@baycitymi.org	2
Laura Ogar	Bay County Env. Affairs/Comm. Dev. Dept.	ogarl@baycounty.net	—
PAUL WASEK	Williams Charter Twp.	supervisor@williamstwp.com	28
Jay Anderson	Bay County Transp. Plan / GIS	andersonj@baycounty.net	—

BAY COUNTY Date JUNE 27, 2019

MITIGATION PLAN UPDATE SIGN-IN SHEET

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
BILL ERNST	EMCOG	(989) 992-8700	—
Ryan Manz	Bay County Emergency Services		
GREG WALTERHOUSE	RESIDENT	WALTEGL@BGSU.EDU	8
Ken Skunda	BAY CITY DEPT PUBLIC SAFETY	989 295-7537	.5
Melissa Maillette	Bay County Health Dept.	Maillettem@baycounty.net	
Chris Izworski	Bay County GIS	izworskic@baycounty.net	0
Wade Slivik	City of Bay	wslivik@baycitymi.org	2
Jay Anderson	Bay County GIS	andersonj@baycounty.net	0
Paul Visscher	Williams Twp.	supervisor@williamstwp.com	20
BOB GLENN	BANGOR TWP FIRE	989 684 8504	7

BAY COUNTY Date 7-25-19

MITIGATION PLAN UPDATE SIGN-IN SHEET

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
Bill Ernat	EMKOG	989 992-8700	—
Ryan Mertz	Bay County Emerg Mgr.	989-895-4112	—
GREG WALTERHOUSE	RESIDENT	WALTEGL@BGSU.EDU	10
Robert Dion	City of Bay City	989-894-8317 rdion@bayCityMi.org	1
Kurt Corradi	Bay City Public Safety	989-892-8601 Kcorradi@baycitymi.org	1
Melissa Maillette	Bay Co. Health Dept.	989-895-2032 maillettem@baycounty.net	—
Chris Izewski	Bay Co 9-1-1	989-895-4052	—
JAMES STARKEY	BANCROFT TOWNSHIP FIRE DEPT	989 684-8504	4
PAUL WASEK	Williams Twp.	989-662-4241	14

BAY COUNTY Date 8-22-19

MITIGATION PLAN UPDATE SIGN-IN SHEET

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
BILL ERNAT	EMCOG	(989) 992-8700	—
Jay Anderson	Bay Co GIS	(989) 895-4064	—
ROB GLENN	BANGOR TWP FD	989 684 8504	4.0
Robert Dion	City of Bay City	989-894-8317	1
PAUL WASEK	Williams Twp.	989-662-4241	14
Kurt Conradi	Bay City DPS	989 892-8601	—
Terri Close	Hampton Twp	989-893-7541	8
JOHN A. CASE	BAY CITY DPS	989-893-6513	
Ryan Manz	Bay County Emergency Services	989-895-4112	—

BAY COUNTY Date 9-26-19

MITIGATION PLAN UPDATE SIGN-IN SHEET

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
Bill Ernat	EMCOG	(989) 992-8700	—
Ryan Manz	Bay County EMC	989- 895- 4112	—
GREG WALTERHOUSE	RESIDENT	WALTEGLE@BGSU.EDU	10
Melissa Maillette	Bay County Health Dept.	(989) 895-2032	—
Matt Schwab	Bay City Public Safety Dept	989-892-8601	—
Robert Dion	City of Bay City	989-894-8317	1
Bob Glenn	Bangor Twp FD	989 684 8504	13.3
Chris Izworski	9-1-1	989 895-4052	—
Wade Slivik	Bay City	989- 894-8134	2

BAY COUNTY Date 10-24-19

MITIGATION PLAN UPDATE SIGN-IN SHEET

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
Bill Ernat	EMCOG	(989) 992-8700	—
Jay Anderson	Bay Co. GIS	989 895-4064	—
Justin Martin	MMR	989 493-1819	— 12
GREG WALTERHOUSE	RESIDENT	WALTECL@BGSU.EDU	10
Robert Dion	City of Bay City	989-894-8317	/
Chris Izworski	9-1-1	989-795-4052	0
Kurt Corradi	Bay City DPS	989 892-8601	/
Melissa Maillette	Bay Co. Health Dept.	989-895-2032	n/a
Terri Close	Hampton Twp	989-893-7541 tmclose@hamptonmi.net	8
DONNA SAMYN	HAMPTON Twp	989-893-7541 hamptontreasurer@hamptonmi.net	
Ryan Manz	Bay Co. EMC	989-895-4112	—
PAUL WAEK	Williams Twp.	989-662-4241 (x11)	21
Rob Glenn	BANGOR Twp FIRE	989 684 8504	6.6

BAY COUNTY Date 1-23-2020

MITIGATION PLAN UPDATE SIGN-IN SHEET

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
Bill Ernst	EMCOG	(989) 992-8700	—
Ryan Metz	Bay County Emergency Management	989-895-4112	—
Randy Stefaniak	Portsmouth Twp	989-529-8237	10
Kaney Prieur	Hampton Township Public Safety	989-895-8811	— 8
Terri Close	Hampton Township	989-893-9849	8
Laura Ogar	Bay County Env Affairs & Comm Dev Dept	989-895-4195	— 1
Ken Mielkin	Monitor Twp.	989-684-7203	8
Chris Icwosh	9-1-1	989-895-4052	~~8~~ 0
Melissa Maillette	Bay Co. Health Dept.	(989) 895-2032	N/a
Matt Schwab	Department of Public Safety Bay City	989-892-8601	N/A
Rob Glenn	Bangor Twp FD	989 684 8504	6.6
Robert Dion	City of Bay City	989-894-8317	1
Wade Sivik	City of Bay City	989-894-8136	1
Paul Brack	Williams Twp.	989-662-4241	20

BAY COUNTY Date 2-27-2020

MITIGATION PLAN UPDATE SIGN-IN SHEET

NAME (PLEASE PRINT)	ORGANIZATION	PRIMARY CONTACT INFORMATION (PHONE OR EMAIL)	MILES DRIVEN (Round Trip)
BILL ERNST	EMCOG	BERNAT@EMCOG.ORG	—
GREG WALTERHOUSE	RESIDENT	WALTEGL@BGSU.EDU	10
Kurt Conradi	BC OPS	Kconradi@baycitymi.org	1
KAREY PRIEUR	HAMPTON Public Safety	hamptonfirechief@hamptonmi.net	8
RAB GLENN	BANGOR TWP FD	firechief@bangortownship.org	4.4
Wade Slivik	City Bay City	wslivik@baycity.mi	1.0
Robert Dion	City of Bay City	rdion@baycitymi.org	1.0
Jay Anderson	Bay County - EOS	andersonj@baycounty.net	—
GLENN RAULEY	BANGOR TWP	glennrowley@bangortownship.org	2
Ryan Marz	Bay County - EMC	Marzr@baycounty.net	—
Jim Lillo	Bay County Road Commission	JLILLO@BAYCOROAD.ORG	0 11
BILL BOHLEN	BAY COUNTY DWS	BBOH@BAYCODWS.ORG	~~0~~ 6
Melissa Maillette	Bay Co. Health Dept.	maillettem@baycounty.net	0

Bay County Attendance Sheet

June 11, 2020

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	X
Kurt Corradi	City of Bay City	
Chuck Cribley	Bay County Emergency Management	
Melissa Mailette	Bay County Health Department	X
Robert Dion	City of Bay City	
Wade Slivik	City of Bay City	X
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	
Jay Anderson	Bay County GIS	X
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	X
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	X
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefanish	Portsmouth Township	
Karey Prieur	Hampton Township	
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	
Bill Bohlen	Bay County	X

Bay County Attendance Sheet

July 23, 2020

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	X
Kurt Corradi	City of Bay City	X
Chuck Cribley	Bay County Emergency Management	
Melissa Mailette	Bay County Health Department	
Robert Dion	City of Bay City	
Wade Slivik	City of Bay City	X
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	X
Jay Anderson	Bay County GIS	X
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	X
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	X
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	X
Karey Prieur	Hampton Township	
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	
Bill Bohlen	Bay County	
Julie Coppens	Bay County	
Timothy Mark		X

Bay County Attendance Sheet

August 27, 2020

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	X
Kurt Corradi	City of Bay City	X
Chuck Cribley	Bay County Emergency Management	
Melissa Mailette	Bay County Health Department	X
Robert Dion	City of Bay City	X
Wade Slivik	City of Bay City	
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	X
Paul Wasek	Williams Charter Township	X
Jay Anderson	Bay County GIS	X
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	X
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	X
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	
Karey Prieur	Hampton Township	
Ken Malkin	Monitor Township	X
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	X
Bill Bohlen	Bay County	X
Julie Coppens	Bay County	
Timothy Mark		

Bay County Attendance Sheet

September, 24th 2020

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	X
Kurt Corradi	City of Bay City	
Chuck Cribley	Bay County Emergency Management	
Melissa Mailette	Bay County Health Department	X
Robert Dion	City of Bay City	
Wade Slivik	City of Bay City	X
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	
Jay Anderson	Bay County GIS	
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	X
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	X
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	
Karey Prieur	Hampton Township	
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	X
Bill Bohlen	Bay County	
Julie Coppens	Bay County	
Timothy Mark		X
Caleb Rowell		X

Bay County Attendance Sheet

October, 22nd 2020

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	X
Kurt Corradi	City of Bay City	X
Chuck Cribley	Bay County Emergency Management	
Melissa Mailette	Bay County Health Department	X
Robert Dion	City of Bay City	X
Wade Slivik	City of Bay City	X
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	X
Jay Anderson	Bay County GIS	X
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	X
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	X
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	
Karey Prieur	Hampton Township	
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	X
Bill Bohlen	Bay County	
Julie Coppens	Bay County	
Timothy Mark		X
Caleb Rowell		

Bay County Attendance Sheet

December, 10th 2020

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	X
Kurt Corradi	City of Bay City	
Chuck Cribley	Bay County Emergency Management	
Melissa Mailette	Bay County Health Department	
Robert Dion	City of Bay City	X
Wade Slivik	City of Bay City	X
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	
Jay Anderson	Bay County GIS	X
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	X
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	X
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	X
Karey Prieur	Hampton Township	
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	X
Bill Bohlen	Bay County	
Julie Coppens	Bay County	
Timothy Mark		X
Caleb Rowell	Bay City Public Safety	
Ryan Goebel	Bay County	X
Terry Spencer	Monitor Township	X

Bay County Attendance Sheet

January, 28th 2021

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	
Kurt Corradi	City of Bay City	X
Chuck Cribley	Bay County Emergency Management	
Melissa Mailette	Bay County Health Department	X
Robert Dion	City of Bay City	X
Wade Slivik	City of Bay City	
Rob Glenn	Bangor Township Fire Department	
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	
Jay Anderson	Bay County GIS	
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	X
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	X
Karey Prieur	Hampton Township	
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	X
Bill Bohlen	Bay County	
Julie Coppens	Bay County	
Timothy Mark		X
Caleb Rowell	Bay City Public Safety	
Ryan Goebel	Bay County	
Terry Spencer	Monitor Township	

Bay County Attendance Sheet

February, 25th 2021

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	X
Kurt Corradi	City of Bay City	X
Chuck Cribley	Bay County Emergency Management	
Melissa Mailette	Bay County Health Department	X
Robert Dion	City of Bay City	
Wade Slivik	City of Bay City	
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	
Jay Anderson	Bay County GIS	
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	X
Karey Prieur	Hampton Township	
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	X
Bill Bohlen	Bay County	
Julie Coppens	Bay County	
Timothy Mark		X
Caleb Rowell	Bay City Public Safety	
Ryan Goebel	Bay County	
Terry Spencer	Monitor Township	
Bryan Benchley	Hampton Township	X
Ryan Smith	Bay County GIS	X

Bay County Attendance Sheet

April, 22nd 2021

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	
Kurt Corradi	City of Bay City	X
Chuck Cribley	Bay County Emergency Management	
Melissa Opheim	Bay County Health Department	X
Robert Dion	City of Bay City	
Wade Slivik	City of Bay City	X
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	
Jay Anderson	Bay County GIS	
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	X
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	X
Karey Prieur	Hampton Township	
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	
Bill Bohlen	Bay County	X
Julie Coppens	Bay County	
Timothy Mark	Bangor Township	X
Caleb Rowell	Bay City Public Safety	
Ryan Goebel	Bay County	
Terry Spencer	Monitor Township	
Bryan Benchley	Hampton Township	
Ryan Smith	Bay County GIS	X
Chris Mausolf	Bay County Sheriff Department	X

Bay County Attendance Sheet

May, 27 2021

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	
Kurt Corradi	City of Bay City	
Chuck Cribley	Bay County Emergency Management	
Melissa Opheim	Bay County Health Department	X
Robert Dion	City of Bay City	X
Wade Slivik	City of Bay City	
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	
Jay Anderson	Bay County GIS	
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	X
Karey Prieur	Hampton Township	x
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	
Jim Lillo	Bay County Road Commission	
Bill Bohlen	Bay County	x
Julie Coppens	Bay County	
Timothy Mark	Bangor Township	X
Caleb Rowell	Bay City Public Safety	
Ryan Goebel	Bay County	
Terry Spencer	Monitor Township	x
Bryan Benchley	Hampton Township	
Ryan Smith	Bay County GIS	
Chris Mausolf	Bay County Sheriff Department	x
Ron Campbell		x
R Wolf	Bay city	x

Bay County Attendance Sheet

June 24, 2021

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	
Kurt Corradi	City of Bay City	
Chuck Cribley	Bay County Emergency Management	
Melissa Opheim	Bay County Health Department	X
Robert Dion	City of Bay City	X
Wade Slivik	City of Bay City	X
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	
Jay Anderson	Bay County GIS	
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	X
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	X
Karey Prieur	Hampton Township	
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	X
Bill Bohlen	Bay County	X
Julie Coppens	Bay County	
Timothy Mark	Bangor Township	X
Caleb Rowell	Bay City Public Safety	
Ryan Goebel	Bay County	
Terry Spencer	Monitor Township	
Bryan Benchley	Hampton Township	
Ryan Smith	Bay County GIS	
Chris Mausolf	Bay County Sheriff Department	
Ron Campbell		
R Wolf		
Louie Matijega		X
John Kramer		X
Dennis Pake		X

Bay County Attendance Sheet

October 14, 2021

Person	Agency	In Attendance
Bill Ernat	EMCOG	X
Ryan Manz	Bay County Emergency Management	X
Greg Walterhouse	Bay County Resident	
Kurt Corradi	City of Bay City	
Chuck Cribley	Bay County Emergency Management	
Melissa Opheim	Bay County Health Department	
Robert Dion	City of Bay City	X
Wade Slivik	City of Bay City	X
Rob Glenn	Bangor Township Fire Department	X
Brian Ducham	City of Bay City	
Terry Moultane	City of Bay City	
Laura Ogar	Bay County Environmental Affairs/Comm. Dev.	
Paul Wasek	Williams Charter Township	
Jay Anderson	Bay County GIS	
Ken Skurla	City of Bay City	
Chris Izworski	Bay County	X
James Starkey	Bangor Township Fire Department	
Terri Close	Hampton Township	
John Case	City of Bay City	
Matt Schwab	City of Bay City	
Justin Martin	Mobile Medical Response	
Donna Samyn	Hampton Township	
Randy Stefaniac	Portsmouth Township	X
Karey Prieur	Hampton Township	X
Ken Malkin	Monitor Township	
Glenn Rowley	Bangor Township	X
Jim Lillo	Bay County Road Commission	X
Bill Bohlen	Bay County	X
Julie Coppens	Bay County	
Timothy Mark	Bangor Township	X
Caleb Rowell	Bay City Public Safety	
Ryan Goebel	Bay County	
Terry Spencer	Monitor Township	
Bryan Benchley	Hampton Township	
Ryan Smith	Bay County GIS	
Chris Mausolf	Bay County Sheriff Department	
Ron Campbell		
R Wolf		
Louie Matijega		
John Kramer		X
Dennis Pake		
Dave Haag	City of Auburn	X
Lt. Chlebowski		X

APPENDIX B

VOLUNTEER MATCH DOCUMENTATION

(WASHINGTON, April 11, 2019) – Today, Independent Sector announces that the latest value of a volunteer hour is $25.43 – up 3% from the previous year. That figure, estimated from data collected in 2018, shows the incredible contributions volunteers make to their communities and our country.

Currently, about 63 million Americans volunteer about 8 billion hours of their time, talent, and effort to improve and strengthen their communities. With the new Value of Volunteer Time, these Americans are contributing approximately $203.4 billion to our nation through nonprofit organizations of all types. The release of this figure coincides with National Volunteer Week, April 7-13, a program of Points of Light meant to celebrate the power and impact of volunteer service.

"Volunteerism has been a driving force in the strength and power of our civil society since this country's founding," said Dan Cardinali, president and CEO of Independent Sector. "We know that giving of our time, talent, and effort transforms organizations, communities, and our nation, and also has profound effects on the individuals giving their time. The Value of Volunteer Time gives us just one concrete measure to illustrate the power of individuals to transform communities."

"We believe the most powerful force of change in our world is the individual – one who takes action and makes a positive difference," said Natalye Paquin, president and CEO of Points of Light. "This data shows the value that volunteers bring to the sector and the world. When people use their talents and skills to take action and support causes they care about, we can build a stronger, more just and equitable world."

"As Americans, we are remarkable," said Greg Baldwin, CEO of VolunteerMatch. "In 2018, our generosity was greater than the profits of Facebook, Apple, Amazon and Google combined. The freedom to voluntarily associate with the people, groups, and causes we care about is what makes democracy possible, but exercising that freedom is what makes democracies great."

In addition to the national number, Independent Sector also provides the state-level value of volunteer time for all 50 states, the District of Columbia, and Puerto Rico. State level values range from $12.64 an hour to as high as $41.72.

To learn more about the Value of Volunteer Time, the methodology, and explore historical national and state-level data, visit independentsector.org/valuevolunteers.

###

Independent Sector is a diverse community of changemakers, nonprofits, foundations, and corporations working to ensure all people in the United States thrive. *Learn more at independentsector.org.*

Contact:
Kristina Gawrgy Campbell
202-467-6144
kristinac@independentsector.org

Volunteers contribute* $187.7 billion *to the United States through their time, talent, and effort in 2019

(WASHINGTON, July 20, 2020) –Today, Independent Sector, with the Do Good Institute, announces that the latest value of a volunteer hour is $27.20 – up 7% from the previous year. Estimated from data collected in 2019, the figure shows the valuable contributions volunteers make to support our communities and country.

According to the most recent figures released in 2018 by the Corporation for National and Community Service, about 77.4 million people in the United States volunteered about 6.9 billion hours of their time, talent, and effort to improve and strengthen their communities. With the new Value of Volunteer Time, these community champions are contributing approximately $187.7 billion to our nation.

The latest value was calculated by the University of Maryland's Do Good Institute and recent graduate of the School of Public Policy, Michael Sousane. The figure is calculated with hourly earnings released by the U.S. Bureau of Labor Statistics, using a new method to adjust the hourly value for fringe benefits. Learn more about the methodology, developed by DGI senior researcher Nathan Dietz and Sousane, at independentsector.org/value-volunteer-time-methodology.

"We know intuitively and through the Value of Volunteer Time that volunteers' selfless work is a valuable asset that enables nonprofits to extend even further critical services they provide in communities nationwide," said Independent Sector president and CEO Dan Cardinali. "But during this extraordinary time of challenge caused by COVID-19, when many organizations are struggling economically to maintain mission-critical operations, the contributions of volunteers are more important than ever, and often a critical linchpin that enables nonprofit organizations to continue to provide needed services to help communities endure and survive the pandemic."

"Volunteering not only helps nonprofit organizations better support the people and communities they serve around the country, but also promotes civic participation, helping to strengthen the ties that bind communities together," said Robert T. Grimm, Jr., director of the Do Good Institute. "Our nation is full of people whose time and talents make a positive difference in the lives of so many individuals, and the data just proves even further what a valuable asset volunteers are in building stronger and more equitable communities."

In addition to the national number, Independent Sector also provides the state-level value of volunteer time for all 50 states, the District of Columbia, and Puerto Rico. State level values range from $13.16 an hour (for Puerto Rico) to as high as $44.14 (for the District of Columbia).

For more on the Value of Volunteer Time, the methodology, and to explore historical national and state-level data, visit independentsector.org/valuevolunteers.

###

Independent Sector *is the only national membership organization that brings together a diverse community of changemakers, nonprofits, foundations, and corporations working to ensure all people in the United States thrive. Learn more at independentsector.org.*

Contact: Independent Sector: Kristina Gawrgy Campbell, media@independentsector.org; 202-467-6144

(WASHINGTON, April 20, 2021) – Today, Independent Sector, with the Do Good Institute, announces that the latest value of a volunteer hour is $28.54 – up 4.9% from the previous year. Estimated from data collected in 2020, the figure shows the valuable contributions volunteers make to support our communities and country.

According to the Value of Volunteer Time, and using data from AmeriCorps on volunteer hours, volunteers typically contribute nearly $200 billion to our communities. However, there is evidence that the number of hours volunteered by Americans in 2020 has decreased due to the COVID-19 pandemic. While it will take some years to assess the full extent of impact from COVID-19, a recent study by Fidelity Charitable found that 66% of volunteers have decreased the amount of time they volunteer or stopped entirely due to the pandemic.

The latest value, calculated by the University of Maryland's Do Good Institute, is measured based on hourly earnings released by the U.S. Bureau of Labor Statistics. And while the pandemic certainly had an impact on volunteerism, wages in 2020 for the employed actually increased leading to an increased Value of Volunteer time rate. Learn more about the methodology here.

"As we celebrate our volunteers during National Volunteer Week, we should know just how much value these tireless individuals contribute to creating a healthier and more equitable nation," said Daniel J. Cardinali, president and CEO of Independent Sector. "As we work through our second year of a global pandemic when people, organizations, and communities continue to suffer, the contributions of volunteers have been an often life-saving and critical component to us enduring and rebuilding for future generations to come."

"The incredible challenges presented over the last year have been met time and time again by passionate, motivated, and generous people who are ready to help their neighbors and communities," said Nathan Dietz, senior researcher, Do Good Institute and the researcher responsible for calculating the findings. "All across the country, every day, these volunteers are offering their time and expertise to implement solutions, provide services, and help rebuild communities – but their value is often overlooked or often times is incalculable. This year's Value of Volunteer Time calculations go to show the immensity of their contributions on our nation."

In addition to the national number, Independent Sector also provides the state-level value of volunteer time for all 50 states, the District of Columbia, and Puerto Rico. State level values range from $13.74/hour for Puerto Rico to $48.67/hour for the District of Columbia.

For more on the Value of Volunteer Time, the methodology, and to explore historical national and state-level data, visit independentsector.org/volunteer_time.

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Independent Sector is the only national membership organization that brings together a diverse community of changemakers, nonprofits, foundations, and corporations working to strengthen civil society and ensure all people in the United States thrive.

*The **Do Good Institute**, housed in the School of Public Policy at the University of Maryland, provides education, programs, research and resources to develop the next generation of nonprofit leaders, social innovators and civic-minded students.*

Media Contact:

Bradley Wong
202-467-6122
media@independentsector.org

APPENDIX C
BAY COUNTY LOCAL COMMUNITY PARTICIPATION

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 Bay County Hazard Mitigation Advisory Committee (BCHMAC), which was used in advisory capacity for the Bay County data. The BCHMAC scheduled monthly meetings to complete the Plan in a timely manner. The second means to participate was the completion of a community survey. A copy of the cover letter and survey are found on the following pages, with the results of the survey found immediately following the sample survey.

Below is a list of the participating communities and their local representatives.

Bay County:	Jay Anderson, GIS Manager, Bay County Transportation (2019-21); Bill Bohlen, Director, Bay County Department of Water & Sewer; Jim Chlebowski, Lieutenant, Bay County Sheriff; Chuck Cribley, Volunteer, Emergency Management; Ryan Goebel, Superintendent, Bay Area Water Treatment Plant; Chris Haupt, Assistant Program Coordinator, Bay County Gypsy Moth Suppression Program; Chris Izworski, Director Bay County 9-1-1; Jim Lillo, Manager, Bay County Road Commission; Jeremy Lowell, Program Coordinator, Bay County Gypsy Moth Suppression Program; Melissa Maillette/Opheim, Emergency Preparedness & Health Education Division Manager, Bay County Health Department; Ryan Manz, Emergency Management Coordinator; Chris Mausolf, Undersheriff, Bay County Sheriff; Laura Ogar, Director Bay County Environmental Affairs; Dominic Pavone, GIS Technician, Bay County Transportation; Ryan Smith, GIS Manager, Bay County Transportation (2021-2)
City of Auburn:	David Haag, City Administrator
City of Bay City:	John Case, Acting Fire Chief, Bay City Department of Public Safety; Julie Coppens, Information Systems Manager; Kurt Corradi, Fire Chief, Bay City Department of Public Safety; Robert Dion, Director of Public Works; Brian Ducham, Acting Fire Chief; Terry Moultane, Planning Manager; Caleb Rowell, Deputy Director, Bay City Public Safety Department; Matt Schwab, Fire Lieutenant, Bay City Department of Public Safety; Ken Skurla, Fire Lieutenant, Bay City Department of Public Safety, Wade Slivik, City Assessor; Ryan Wolf, Fire Captain, Bay City Department of Public Safety
City of Essexville:	Dan Hansford, City Manager
City of Pinconning:	Bob Moffit, City Manager
Bangor Township:	Rob Glenn, Fire Chief; Timothy Mark, Building Official; Glenn Rowley, Supervisor; Jim Starkey, Assistant Fire Chief
Beaver Township:	Mary McCart, Clerk; Nick Tomczak, Supervisor
Frankenlust Township:	Ronald Campbell, Supervisor
Fraser Township:	Mark Galus, Supervisor
Gibson Township:	Dennis Pake, Fire Chief
Hampton Township:	Brian Benchley, Director of Public Safety; Terri Close, Supervisor; Karey Prieur, Fire Chief; Donna Samyn, Treasurer

Monitor Township: John Kramer, Fire Chief; Ken Malkin, Supervisor (2019-2020); Terry Spencer, Supervisor (2020-2022)
Mount Forest Township: Lewis Matijega, Assistant Fire Chief
Portsmouth Township: Randy Stefaniak, Fire Chief
Williams Township: Paul Wasek, Supervisor (2019-2020); William Butterfield, Supervisor (2020-2022)

September 21, 2020

Dear Local Official,

Bay County staff is working with the East Michigan Council of Governments staff in updating the Bay County 2010 Hazard Mitigation Plan. In order to have a better understanding of the hazards that impact each community within Bay County, we ask that you complete the attached survey and return it to manzr@baycounty.net no later than October 15th.

The first page of the survey identifies each of the hazards that were identified as potential threats to the citizens/businesspersons/visitors of Bay County. Please indicate the potential impact of these events should they occur in your community. For all of these hazards, your response should be based on a larger-scaled event, not just an everyday occurrence. Also, for your convenience a definition of the hazards can be found at the end of the survey.

After completing the information on the first page, we ask that the remaining 11 questions are answered to the best of your ability. It is important that we get the most accurate, truthful information possible. Therefore, if you are unsure of an answer, please contact the person most knowledgeable on the subject to respond to the questions (s). It is most critical that the information is accurate, and not descriptive of dangerous situations, when they do not exist.

The successful update of the Hazard Mitigation Plan is dependent upon getting the best, most recent information to include in the Plan. Your response is greatly appreciated. Without your input, we will not have that information in the Plan.

If you have any questions on the survey or the status of the Hazard Mitigation Plan update process, please contact Ryan Manz at manzr@baycounty.net or Bill Ernat at bernat@emcog.org.

Sincerely,

Ryan Manz
Emergency Management Coordinator
County of Bay County

_____ Local Municipality

Hazard Mitigation Community Survey

Hazard	High Impact	Medium Impact	Moderate Impact	No Impact
Energy Emergencies				
Infrastructure Failures				
Riverine Flooding				
Severe Weather				
Shoreline Incidents				
Cyber Crimes				
Hazard Materials Incidents				
Terrorism/Sabotage				
Tornadoes				
Transportation Accidents				
Well/Pipeline Incidents				
Extreme Temperatures				
Invasive Species				
Population Changes/Special Events				
Public Health Emergency				
Structural Fires				
Wildfires				
Drought				
Civil Disturbances				
Scrap Tire Fires				
Subsidence				

extreme temperatures-extreme cold and extreme heat;
hazard material incidents-hazardous material fixed site and transportation;
well/pipeline incidents-oil/gas well incidents and petroleum/gas pipelines;
severe summer weather-hail, lightning, severe winds, and thunderstorms;
severe winter weather-ice/sleet storms and snowstorms; and
shoreline incidents-shoreline erosion and shoreline flooding.

1. FEMA is well aware that municipal resources vary with each municipality. Please identify those resources below that are available to your community.

Planning Staff	_____	Emergency Management Staff	_____
Public Works Department	_____	County Emergency Management Staff	_____
Taxing Authority	_____	Zoning Ordinance/Land Use Plan	_____
Building Codes	_____	Ordinance Authority	_____
Local Police Department	_____	Fulltime Fire Department/Equipment	_____
County Sheriff	_____	Volunteer Fire Department/Equipment	_____
Hospital/Medical Facilities	_____	Emergency Medical Services	_____

2. What hazardous events have resulted in damaged or loss of property and/or injury/death of human lives in your community? Please include the date and results of the event. (Hazards can be found on the previous page.)

3. 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?

4. 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. What extra measures are required by your community?

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 from the first page do you feel your community is best prepared to mitigate (lessen the impact)? Why?

9. What hazard from the first page 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?

_____ _____

Local Municipality Date

_____

Person Completing Survey

HAZARDOUS EVENT DEFINITIONS

CIVIL DISTURBANCES-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.

CLIMATE CHANGE - A non-random change in climate that is measured over several decades or longer. The change may be due to natural or human-induced causes.

CYBER CRIMES-Criminal offenses committed via the Internet or otherwise aided by various forms of computer technology, such as the use of online social networks to bully others or sending sexually explicit digital photos with a smart phone.

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

DROUGHT-A water shortage caused by a deficiency of rainfall, generally lasting for an extended period of time.

EARTHQUAKES-A shaking or trembling of the crust of the earth caused by the breaking and shifting of rock beneath the surface**.**

ENERGY EMERGENCY-An actual or potential shortage of gasoline, electrical power, natural gas, fuel oil, or propane-of sufficient magnitude and duration to potentially threaten public health and safety, and/or economic and social stability.

EXTREME TEMPERATURES (COLD)-Prolonged periods of very low temperatures often accompanied by exacerbating conditions such as heavy snowfall and high winds.

EXTREME TEMPERATURES (HEAT)-Prolonged periods of very high temperatures often accompanied by exacerbating conditions such as high humidity and lack of rain.

FOG-Condensed water vapor in cloudlike masses lying close to the ground and limiting visibility.

HAIL-Condition where atmospheric water particles from thunderstorms form into rounded or irregular lumps of ice that falls to the earth.

HAZARDOUS MATERIAL INCIDENTS/FIXED SITE AND 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.

HAZARDOUS MATERIAL INCIDENTS/TRANSPORTATION-An uncontrolled release of hazardous materials during transport, capable of posing a risk to health, safety, property or the environment.

ICE/SLEET STORMS-A storm that generates sufficient quantities of ice or sleet to result in hazardous conditions and/or property damage**.**

INFRASTRUCTURE FAILURES-A failure of critical public or private utility infrastructure resulting in a temporary loss of essential functions and/or services.

LIGHTNING-The discharge of electricity from within a thunderstorm**.**

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 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.

OIL/GAS WELL INCIDENT-An uncontrolled release of oil or gas, or the poisonous by-product hydrogen sulfide, from wells.

PETROLEUM AND NATURAL GAS PIPELINE ACCIDENTS-An uncontrolled release of petroleum or natural gas, or the poisonous by-product hydrogen sulfide, from a pipeline.

PUBLIC HEALTH EMERGENCIES-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 (FLUVIAL) FLOODING-The overflowing of rivers, streams, drains and lakes due to excessive rainfall, rapid snowmelt, ice, or high winds.

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.

SCRAP TIRE FIRES-A large fire that burns scrap tires being stored for recycling/re-use.

SEASONAL POPULATION INCREASE-A population change for an extended time period, in the county, beyond the normal level of people to which resources are allocated.

SEVERE WINDS-Non-tornadic winds 58 miles per hour (mph) or 50.4 knots per hour (kph) or greater.

SHORELINE INCIDENTS-Flooding, shoreline erosion, and wind-blown ice floes impacting the shoreline properties along Lake Huron.

SNOWSTORMS-A period of rapid accumulation of snow often accompanied by high winds, cold temperatures, and low visibility.

STRAIGHT-LINE WINDS- Damaging winds are often called “straight-line” winds to differentiate the damage they cause from tornado damage. Strong thunderstorm winds can come from a number of different processes. Most thunderstorm winds that cause damage at the ground are a result of outflow generated by a thunderstorm downdraft. Damaging winds are classified as those exceeding 50-60 mph. Damage from severe thunderstorm winds account for half of all severe reports in the lower 48 states and is more common than damage from tornadoes. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles.

STRUCTURAL FIRES-A fire, of any origin that ignites one or more structures, causing loss of life and/or property.

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

SURFACE (PLUVIAL) FLOODING-the accumulation of water in low-lying and inadequately drained areas, following heavy precipitation events, including structural or power failures in municipal sewage systems, causing water to flood or back-up into houses, other structures, and infrastructure. caused when heavy rainfall creates a flood event independent of an overflowing water body.

TORNADOES-A violently whirling column of air extending downward to the ground from a cumulonimbus cloud. (The wind speed of tornadoes is 65 mph or greater.)

TRANSPORTATION ACCIDENTS: AIR, LAND, AND WATER-A crash or accident involving an air, land or water-based commercial passenger carrier resulting in death or serious injury.

WILDFIRES-An uncontrolled fire in grass or brushlands, or forested areas.

WIND-BLOWN ICE FLOE-An ice floe driven on shore by winds in the Saginaw Bay.

Community Responses
Hazard Mitigation Community Survey

Hazard	High Impact	Medium Impact	Moderate Impact	No Impact
Energy Emergencies	4,5,8,9,13	1,2,11,12,14	3,6,7,10	
Infrastructure Failures	1,4,5,11,13	2,8	3,6,7,9,10,12 14	
Riverine Flooding	2,5,7,10,11	8,13	3,4,6,9,12,14	1
Severe Weather	1,2,4,5,11,12	6,9,10,13,14	3,7,8	
Shoreline Incidents	5,10	7,8	2,3,11,13	1,4,6,9,12,14
Cyber Crimes	1,3,11	2,5,13,14	4,8,10,12	6,7,9
Hazard Materials Incidents	1,3	4,5,8,9,11,13	2,6,7,10,12,14	
Terrorism/Sabotage	1,3,5,11	4,13	2,9,10,12,14	6,7,8
Tornadoes	1,3,5,11,12	2,6,9,13	7,8,10,14	
Transportation Accidents	3,5	1,2,9,10,12	4,6,7,8,11,13,14	
Well/Pipeline Incidents	1,9,11,12	4,5,13	2,3,7,8,10,14	6
Extreme Temperatures	1,8,9	2,4,5,11	3,7,10,12,13,14	6
Invasive Species		7,9,10,13	1,2,3,4,5,6,8,11, 12,14	
Population Changes/Special Events	9	1,3	2,4,5,10,11,12, 13	6,7,8,14
Public Health Emergency	1,3,4,5,7,8,11,12	10,13	2,6,9,14	
Structural Fires	1,5,9,13	3,11,12	2,4,6,7,8,10,14	
Wildfires	9,12	13	1,2,3,4,5,6,7,8, 10,11	14
Drought	1,9	2,6,8,10,12,14	3,4,5,7,11,13	
Civil Disturbances	1,3,	2,14	4,5,6,9,10,11,12, 13	7,8
Scrap Tire Fires		9	1,2,5,10,11,12,13	3,4,6,7,8,14
Subsidence	1	12	2,3,5,6,10,11,13, 14	4,7,8,9

1-**City of Auburn**
2-Bay City
3-City of Essexville
4-City of Pinconning
5-Bangor Township
6-Beaver Township
7-Frankenlust Township
8-Fraser Township
9-Gibson Township
10-Hampton Township
11-Monitor Township
12-Mount Forest Township
13-Portsmouth Township
14-Williams Township

1. FEMA is well aware that municipal resources vary with each municipality. Please identify those resources below that are available to your community.

   Answers to this question can be found in Table 3.4 on page

2. What hazardous events have resulted in damaged or loss of property and/or injury/death of human lives in your community? Please include the date and results of the event. (Hazards can be found on the previous page.)

Community	Events
Bay City	2020/2021-COVID-19 August 2014-Infrastructure Failure (water main break), between 15020 million gallons of water leaked from system in 3 days, Bay county residents were to restrict water use to drinking, bathing, and cooking June 2017-Flood-emergency declaration from extreme flooding, six bridges and coverts destroyed in addition to damaged and collapsed roadways May 2020-flood severity on the order of a 500-year event when water was discharged due to dam failure and extreme rain. Basement flooding was widespread.
City of Essexville	NA
City of Pinconning	Rain event in May 2020.
Bangor Township	2020/21-COVID-19 2017, 2018, 2019, 2020, 2021-flooding events (flooding events are minimally 1 per year) 1990-Jupiter explosion/fire
Beaver Township	NA
Frankenlust Township	May 2020- shoreline flooding on Middlegrounds.
Gibson Township	NA
Hampton Township	2020/21-COVID-19 Transportation Accidents resulting in 2 fatalities 2019 Structural Fire-garage fire containing hazardous materials was a total loss
Mount Forest Township	NA
Williams Township	NA

3. Does your community have large seasonal shifts in population?

   Bay City-No
   City of Essexville-No
   City of Pinconning-No
   Bangor Township-No

Beaver Township-No
Frankenlust Township-No
Gibson Township-No
Hampton Township-No
Mount Forest Township-No
Williams Township-No

Are there a significant number of seasonal homes in the community?

Bay City-No
City of Essexville-No
City of Pinconning-No
Bangor Township-No
Beaver Township-No
Frankenlust Township-No
Gibson Township-No
Hampton Township-No
Mount Forest Township-No
Williams Township-No

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?

Bay City-NA
City of Essexville-NA
City of Pinconning-NA
Bangor Township-NA
Beaver Township-NA
Frankenlust Township-NA
Gibson Township-NA
Hampton Township-NA
Mount Forest Township-NA
Williams Township-NA

4. 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. What extra measures are required by your community?

Community	Event(s)/Measures Taken
Bay City	Fireworks Festival/Additional public safety personnel are called in for the event
City of Essexville	NA
City of Pinconning	Father's Day Weekend Cheese Festival/Additional staff are called in to assist during the parade on Saturday
Bangor Township	Homecoming parade/Additional police are brought in with a road closure.
Beaver Township	NA
Frankenlust Township	NA

Gibson Township	NA
Hampton Township	NA
Mount Forest Township	NA
Williams Township	Auburn Cornfest in July/Extra police are called in

5. Does your staff utilize data back-up systems and anti-virus software for the municipality's computers? If no, why not?

   Bay City-Yes
   City of Essexville-Yes
   City of Pinconning-Yes
   Bangor Township-Yes
   Beaver Township-Yes
   Frankenlust Township-Yes
   Gibson Township-Yes
   Hampton Township-Yes
   Mount Forest Township-Yes
   Williams Township-Yes

6. Has your community installed lightning protection devices on the community's infrastructure? If no, why not?

   Bay City-Yes
   City of Essexville-Yes
   City of Pinconning-Yes
   Bangor Township-Yes
   Beaver Township-No, has not been an issue
   Frankenlust Township-Not Sure
   Gibson Township-No
   Hampton Township-No, high cost
   Mount Forest Township-Yes
   Williams Township-Yes

7. Does your staff utilize surge protectors on critical electronic equipment? If no, why not?

   Bay City-Yes
   City of Essexville-Yes
   City of Pinconning-Yes
   Bangor Township-Yes
   Beaver Township-Yes
   Frankenlust Township-
   Gibson Township-No
   Hampton Township-Yes
   Mount Forest Township-Yes
   Williams Township-Yes

8. What hazard from the first page do you feel your community is best prepared to mitigate (lessen the impact)? Why?

Community	Event(s)-Why
Bay City	Structural Fires-Bay City has a full-time fire department working 24 hours a day, there are cross-trained public safety personnel, and there are mutual aid agreements with the surrounding municipalities
City of Essexville	Shoreline issues-thee is a large elevation difference from the shoreline and the City
City of Pinconning	Infrastructure Failures-The City has made numerous purchases of emergency supplies
Bangor Township	Structural fire-Full-time and paid-on-call fire department with two fire stations
Beaver Township	Fires-Outstanding fire department
Frankenlust Township	Not sure
Gibson Township	Fires/transportation accidents-the Township has a fire department
Hampton Township	Infrastructure Failures-there is funding currently in place to make needed improvements to aging water and sewer infrastructure
Mount Forest Township	Structural Fires
Williams Township	Drought- easy to address water shortage

9. What hazard from the first page do you feel your community is least prepared to mitigate (lessen the impact)? Why?

Community	Event(s)-Why
Bay City	Flooding-Cannot control water flow and affect large areas rather than a specific neighborhood.
City of Essexville	Well/Pipeline-The City has little to no control on them
City of Pinconning	Terrorism and Cyberterrorism
Bangor Township	Flooding
Beaver Township	Tornadoes-Cannot control them
Frankenlust Township	Shoreline flooding
Gibson Township	Hazardous waste
Hampton Township	Shoreline incidents and severe weather-With high lakes levels, any additional water puts a strain on the aging infrastructure
Mount Forest Township	Subsidence
Williams Township	Sabotage/Terrorism-Limited resources to address

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?

Community	Event(s)/Measures Takes
Bay City	Education and
City of Essexville	Inspections/monitoring of non-city owned property
City of Pinconning	Check on computers to make sure they are protected from shortages
Bangor Township	Education and capital resources
Beaver Township	Increase public awareness

Frankenlust Township	Not sure
Gibson Township	Funding for first responders for equipment and training
Hampton Township	Improvements to the drain system to reduce flooding/Eradication of phragmites
Mount Forest Township	Public awareness/education for situations
Williams Township	Create an anti-sabotage group to potentially address these situations

11. Are you aware of any properties that have experienced flood damage to their homes on multiple occasions as a result of flood waters?

Bay City-No
City of Essexville-No
City of Pinconning-No
Bangor Township-Yes
Beaver Township-No
Frankenlust Township-yes, Middleground properties
Gibson Township-No
Hampton Township-No
Mount Forest Township-Yes
Williams Township-Yes

APPENDIX D
BAY COUNTY FINAL MITIGATION STRATEGIES

1. Increased coverage and use of NOAA Weather Radio, and public early warning systems and networks, or comparable device-based notifications.
2. Tree trimming and maintenance to prevent limb breakage andsafeguard 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.)
3. Buried/protected power and utility lines to resist damage from severe winds, lightning, ice, and other hazards. (NOTE: Where appropriate: Burial may sometimes cause additional problems and costs in cases where eventual cable breakages are harder to locate and more expensive to repair.)
4. Provide and publicize designated heating and cooling centers within the community, where persons in need may go to obtain relief from outdoor temperatures, especially vulnerable populations.
5. Higher engineering standards for drain and sewer capacity, to the expansion of infrastructure to higher capacity.
6. Government acquisition, relocation, or condemnation of structures within floodplain or floodway areas.
7. 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.).
8. Joining the National Flood Insurance Program (NFIP).
9. Obtaining flood insurance. (Requires community participation in the NFIP.)
10. Participation in the Community Rating System (CRS).
11. Homeowner's and rental insurance.
12. 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).
13. Elevating mechanical and utility devices above expected flood levels.
14. Flood warning systems and the monitoring of water levels with stream gauges and trained monitors.
15. Anchoring of manufactured homes to a permanent foundation in flood areas, but preferably these structures would be readily movable if necessary or else permanently relocated outside of flood-prone areas and erosion areas.
16. Using surge protectors on critical electronic equipment.
17. Installing lightning protection devices on the community's communications infrastructure and critical structures. More widespread use of lightning protection devices might also occur.
18. 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.
19. Proper building/site design and code enforcement relating to snow loads, roof slope, snow removal and storage, etc.
20. Using snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments.
21. De-icing measures (for freezing fog), as would be used for other ice-related hazards.

22. Floodplain 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.
23. Purchase or transfer of development rights - to discourage development in floodplain areas.
24. Protection (or restoration) of wetlands and natural water retention areas.
25. Stormwater management-Adequate design, installation, maintenance, and monitoring of municipal storm sewer systems. Ordinances or amendments to assist in stormwater management (e.g. forbidding illicit discharges). Planning for and regulating areas prone to flooding (acceptable uses and development restrictions through comprehensive planning, code enforcement, zoning, open space requirements, subdivision regulations, purchased or transferred development rights, land use and capital improvements planning) and involving drain commissioners, hydrologic studies, etc. in these analyses and decisions.
26. Drainage easements (allowing the planned and regulated public use of privately-owned land for temporary water retention and drainage).
27. Installing (or re-routing or increasing the capacity of) storm drainage systems, including the separation of storm and sanitary sewage systems.
28. Farmland and open space preservation.
29. 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, as well as at other critical facilities.
30. Detection and prevention/discouragement of illegal discharges into storm-water sewer systems, from home footing drains, downspouts and sumppumps.
31. Employing techniques of erosion control in the area (bank stabilization, planting of vegetation on slopes, creation of terraces on hillsides).
32. Increasing the function and capacity of sewage lift stations and treatment plants (installation, expansion, and maintenance), including possible separation of combined storm/sanitary sewer systems, if appropriate.
33. Wetlands protection regulations and policies.
34. Use of check valves, sump pumps and backflow preventers in homes and buildings.
35. Floodplain/coastal zone management - planning acceptable uses for areas prone to flooding (comprehensive planning, zoning, open space requirements, subdivision regulations, land use and capital improvements planning).
36. Enforcement of basic building code requirements related to flood mitigation.
37. Locating structures and infrastructure landward of the established setbacks.
38. Storage of water for use in drought events (especially for human needs during periods of extreme temperatures, and for responding to structural fire and wildfire events).
39. Legislative acts, local ordinances, and other measures to prioritize or control water use.
40. Encouragement of water-saving measures by consumers (including landscaping, irrigation, farming, and low-priority lawn maintenance and non-essential auto washing).
41. Anticipation of potential drought conditions, and the preparation of drought contingency plans.
42. Designs, for recreational and other water-related structures and land uses, that take into account the full range of water levels (of lakes, streams, andgroundwater).
43. Designs and plans for water delivery systems that include a consideration of drought events.
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 lands with a history of flammable

substances stored, spilled, or dumped on them).

46. Public notification of fire weather and fire warnings.
47. 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 made into wood chips for distribution.)
48. 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 for properties should be provided to the local fire department, and an address should be visible from the road so homes can be located quickly).
49. Have adequate water supplies for emergency firefighting (in accordance with NFPA standards).
50. Hydrological monitoring of groundwater levels in subsidence- prone areas.
51. Insurance coverage for subsidence hazards.
52. Real estate disclosure laws.
53. Code existence and enforcement.
54. Designs that include the use of firewalls and sprinkler systems (especially in tall buildings, dormitories, attached structures, and special facilities).
55. 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). Family members and residents should know how to use afire extinguisher.
56. 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).
57. Safe installation, maintenance, and use of electrical outlets and wiring.
58. Measures to reduce urban blight and associated arson (possibly including Crime Prevention through Environmental Design).
59. Defensible space around structures in fire-prone wildland areas.
60. Proper maintenance of power lines, and efficient response to fallen power lines.
61. Transportationplanningthatprovides roads, overpasses, etc. to maximize access andimprove emergency response times to all inhabited or developed areas of a community. (Not just planning for average traffic volumes in the community.)
62. Discourage civil disturbances and criminal activities that could lead to arson.
63. Enforced fireworks regulations.
64. Elimination of clandestine methamphetamine laboratories through law enforcement and public education.
65. Condominium-type associations for maintaining safety in attached housing/buildingunits or multi-unit structures.
66. 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).
67. Proper siting of tire storage and processing facilities (land use planning that recognizes scrap tire sites as a real hazard and environmental threat).

68. Pest-control measures for mosquitoes and other nuisances aroundscrap tireyards.
69. Compliance with/enforcement of Resource Conservation and Recovery Act (RCRA) standards.
70. Elimination of clandestine methamphetamine laboratories through law enforcement and public education.
71. Identification of radioactive soils and high-radonareas
72. Proper separation and buffering between industrial areas and other land uses.
73. Location of industrial areas away from schools, nursing homes, etc.
74. Compliance with all industrial, fire, and safety regulations.
75. Enhanced security and anti-terrorist/sabotage/civil disturbancemeasures.
76. Improved design, routing, and traffic control at problem roadway areas.
77. Long-term planning that provides more connector roads for reduced congestion of arterial roads.
78. Railroad inspections, maintenance and improved designs at problem railway/roadway intersections (at grade crossings, rural signs/signals for RR crossing).
79. Proper planning, design, maintenance of, and enhancements to designated truck routes.
80. Use of ITS (intelligent transportation systems) technology.
81. Locating pipelines away from dense development, critical facilities, special needs populations, and environmentally vulnerable areas whenever possible.
82. Increasing public awareness and widespread use of the "MISS DIG" utility damage prevention service (800-482- 7171).
83. Proper pipeline design, construction, maintenance and inspection.
84. Using buffer strips to segregate wells, storage tanks, and other production facilities from transportationroutes and adjacent land uses, inaccordance with state regulations, and consistent with the level of risk.
85. Adherence to all regulations and best industry practices, especially for relatively new techniques of hydraulic fracturing, in order to preserve Michigan's environmental quality and public confidence in the industry.
86. Proper location, design, and maintenance of water and sewer systems (to include insulation of critical components to prevent damage from ground freeze).
87. Redundancies in utility and communications systems, especially "lifeline" systems to increase resilience (even if at the cost of some efficiency).
88. Separation and/or expansion of sewer system to handle anticipated stormwater volumes.
89. "Rolling blackouts" in electrical systems that will otherwise fail completely due to overloading.
90. Replacement or renovation of aging structures and equipment (to be made as hazard-resistant as economically possible).
91. Physical protection of electrical and communications systems from lightning strikes.
92. Redundancies and alternatives in the energy supply system; provision of backup supply systems.
93. The capacity to use more than one type of fuel to sustain necessary operations and functions.
94. Use of alternative sources of energy (e.g. solar, wind sources) for key functions.
95. Architectural designs that reduce the need for outside energy inputs.
96. Long-term planning that provides more connector roads for reduced congestion of arterial roads.
97. Use of designated truck routes.
98. Airport maintenance, security, and safety programs.
99. Some suggest that design, management, integration, and lowered density of poor or blighted areas will reduce vandalism, crime, and some types of riot events. Crime Prevention Through Environmental Design (CPTED) is a field of planning that deals with this.
100. Structure and property insurance in risky areas, combined with anti-arson practices.
101. Design requirements for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, etc. that take into consideration emergency and security

needs.

102. Immunization programs to vaccinate against communicable diseases.
103. Improving ventilation techniques in areas, facilities, or vehicles that are prone to crowding, or that may involve exposure to contagion or noxious atmospheres.
104. Maintaining community water and sewer infrastructure at acceptable operating standards.
105. Demolition and clearance of vacant condemned structures to prevent rodent infestations.
106. Free or reduced-expense community clinics and school health services.
107. Brownfield and urban blight clean-up activities.
108. Proper location, installation, cleaning, monitoring, and maintenance of septic tanks.
109. Separation of storm and sanitary sewersystems.
110. Using laminated glass and other hazard-resistant, durable construction techniques in public buildings and critical facilities.
111. Establishing avenues of reporting (and rewards) for information preventing terrorist incidents and sabotage.
112. Consistent use of computer data back-up systems and anti-virus software.

APPENDIX E -
BAY COUNTY POSSIBLE MITIGATION ALTERNATIVES

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 <u>within</u> 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.

APPENDIX F
COMPLETE LIST OF ACTION ITEMS

Item 1

Drainage structure improvements/maintenance throughout Bay County

Action: Repair/upgrade drainage structure improvements throughout Bay County

- Location: County-wide
- Lead Agency: Drain Commission
- Participating Agencies: Road Commission
- Hazards Addressed: flooding, infrastructure failures
- Potential Funding Source(s): grants, property owners through special assessments
- Project Cost: To Be Determined (TBD)
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d; goal 2, objective b; goal 3, objective b
- Benefit(s): Reduce flooding and infrastructure failure with proper drainage infrastructure in place.

Item 2

Increase the capacity of the Kawkawlin River to move flood water from the area during major rain events

Action: Remove sediment to increase water flow to Saginaw Bay.

- Location: County-wide
- Lead Agency: Drain Commission
- Participating Agencies: Army Corps of Engineers
- Hazards Addressed: flooding
- Potential Funding Source(s): grants, FEMA, Army Corps of Engineers, property owners
- Project Cost: TBD
- Schedule: 2022
- Priority: High
- Goal/Objective Achieved: Goal 2, objective b
- Benefit(s): Reduce flooding along the Kawkawlin River basin.

Item 3

James Clements Flood Protection Dike stabilization and improvement ditch drainage and pump station improvements

Action: Repair dikes and replace pumps to improve water flow away from airport.

- Location: Bay City
- Lead Agency: Bay City
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: flooding infrastructure failure
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: TBD (as grants become available)
- Priority: High
- Goal/Objective Achieved: Goal 2, objectives b, c, and d; goal 3, objectives a, b, and d
- Benefit(s): Reduce flooding keeping the airport free from flooding.

Item 4

County-wide tree management

Action: Trim trees located near power line, plant area appropriate trees within parkways to be less or non-intrusive to utility lines, both overhead and underground.

- Location: County-wide
- Lead Agency: Consumers Energy, Bay City
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: infrastructure failure
- Potential Funding Source(s): Grants, Consumers Energy/City of Bay City, property owners
- Project Cost: TBD
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objective b and e
- Benefit(s): Reduce the infrastructure failure due to inclement weather and downing of trees/ power lines. Public safety improvements with fewer downed power lines.

Item 5

Complete an assessment to determine where shelters can be located for schools, manufactured home complexes, and RV Campgrounds

Action: Assess all schools, manufactured home complexes, and RV campgrounds to identify possible shelter sites.

- Location: County-wide
- Lead Agency: Office of Emergency Management (OEM)
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: severe weather events, tornadoes
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: 2022
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d, goal 3, objective e
- Benefit(s): Public safety is enhanced by finding shelters during these events.

Item 6

Assess Repetitive Loss Properties (RLP) and Severe Repetitive Loss Properties (SRLP) in 100-year floodplain in order to purchase homes and convert space to park/greenspace to reduce flooding

Action: Identify RLP and SRLP in Bay County and seek funds to purchase properties that can be utilized as green space.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: flooding
- Potential Funding Source(s): FEMA
- Project Cost: TBD
- Schedule: 2022
- Priority: High
- Goal/Objective Achieved: Goal 2, objective b; goal 4, objective a, c, and e

- Benefit(s): Reduce, and hopefully eliminate, RLP/SRLP properties in Bay County.

Item 7

Remove invasive vegetation species that negatively impact drainage

Action: Identify invasive vegetation species, create plan, and eliminate/mitigate their growth; thereby improving drainage throughout the county.

- Location: County-wide
- Lead Agency: Drain Commission
- Participating Agencies: Bay County Environmental Affairs, Cooperative Invasive Species Management Association (CISMA)
- Hazards Addressed: invasive species, flooding
- Potential Funding Source(s): Drain Commission, grants, CISMA
- Project Cost: TBD
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objective b; goal 4, objective e
- Benefit(s): Environmental protection will be enhanced, and flooding damages will be mitigated with the elimination/reduction of invasive species.

Item 8

Retrofit sewer system to eliminate combined sewer systems

Action: Identify combined sewer systems in the County and develop a plan to retrofit system(s) into separate sanitary and storm sewer systems.

- Location: County-wide
- Lead Agency: TBD (Communities that will be addressing the matter.)
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: public health emergencies, flooding
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d, goal 2, objective b; goal 3, objective a
- Benefit(s): With the elimination of combined sewers, flooding in homes will be reduced as will the inclusion of human waste during floods.

Item 9

Utilize educational programs to assist public with flooding and severe weather warnings

Action: Use FEMA-approved educational programs to educate public on flooding and other weather-related hazard warnings.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: all hazards
- Potential Funding Source(s): OEM budget
- Project Cost: NA
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 1, objectives b and e; goal 2, objective d

- Benefit(s): Improved public awareness of hazards

Item 10

Reinforce dikes on Saginaw Bay

Action: Reinforce/update dikes to reduce shoreline flooding

- Location: Fraser, Hampton, and Kawkawlin Townships
- Lead Agency: Fraser, Hampton, and Kawkawlin Townships
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: flooding
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: TBD
- Priority: High
- Goal/Objective Achieved: Goal 2, objectives b and e, goal 3, objectives a and b
- Benefit(s): Flooding reduces along Saginaw Bay.

Item 11

Adopt and implement floodplain ordinances

Action: Review status of floodplain ordinances in all municipalities. Work with them to adopt and/or implement plan consistent with National Flood Insurance Program (NFIP) guidelines.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: flooding
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: 2023
- Priority: High
- Goal/Objective Achieved: Goal 2, objective a, goal 4, objectives a, b, c, d, and e
- Benefit(s): Potential to reduce flood insurance costs, better awareness of flood mitigation measures.

Item 12 (NEW)

Update local plans, codes, and ordinances consistent with hazard mitigation goals and to reduce the impact of hazards on new and existing development

Action: Work with local municipalities as they update their planning documents to include language to limit/eliminate developments within floodplains and is consistent with the Bay County Hazard Mitigation Plan.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: all hazards
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: ongoing
- Priority: High

- Goal/Objective Achieved: Goal 2, objectives and b; goal 3, objective g, goal 4, objectives a, b, c, d, and e
- Benefit(s): Multiple documents in Bay County will be addressing hazards, providing better awareness of hazards and hazard mitigation activities.

Item 13 (NEW)

Complete an assessment to determine where generators are needed to keep local government functioning at optimum levels

Action: Complete an assessment of critical facilities requiring generators for all local governments .

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: all hazards
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objective e; goal 3, objectives a and d
- Benefit(s): Identify the facilities in need of generators during infrastructure failures.

Item 14 (NEW)

Purchase and install generators as identified in assessment (Item 13)

Action: Utilizing the assessment, purchase and install generators at critical facilities.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: all hazards
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: TBD
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d; goal 2 objectives c and e, goal 3, objectives d and g
- Benefit(s): Creating a safer environment by allowing facilities to operate during infrastructure failures.

Item 15 (NEW)

Install retention/detention basins

Action: Using recommendations from Road Commission/Drain Commission, install retention/detention basins strategically located throughout the County to reduce flooding.

- Location: County-wide
- Lead Agency: Department of Water and Sewer
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: flooding
- Potential Funding Source(s): TBD
- Project Cost: TBD
- Schedule: ongoing
- Priority: High

- Goal/Objective Achieved: Goal 1, objective d; goal 2, objectives b and e; goal 3, objective d, goal 4, objective e
- Benefit(s): Flooding reduced in areas where retention/detention basins are located.

Item 16 (NEW)

Identify sites for staging of disaster debris

Action: Identify sites that can be utilized for the staging of debris resulting from hazards.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: all weather hazards
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: 2023
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d; goal 2, objectives b and c
- Benefit(s): Reduce recovery time after extreme events.

Item 17 (NEW)

Raise homes located within floodplains to bring them above the floodplain elevation.

Action: Raise homes located within floodplains to bring them above the floodplain elevations

- Location: County-wide
- Lead Agency:
- Participating Agencies: Army Corps of Engineers
- Hazards Addressed: flooding
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: TBD
- Priority: High
- Goal/Objective Achieved: Goal 2, objectives b, c, and d; goal 4, objectives a, c, d, and e
- Benefit(s): This will mitigate/eliminate the RLP/SRLP from future flooding.

Item 18 (NEW)

Upgrade the storage and refrigeration capacity of equipment for health department testing/storage

Action: Work with health department to identify current storage and refrigeration capacity for health department tests in order to upgrade/expand these facilities.

- Location: County-wide
- Lead Agency: Bay County Health Department
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: public health emergencies
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objective c; goal 3 objectives b and d
- Benefit(s): Improved testing/storage capacity for vaccines during public emergency events.

Item 19 (NEW)

Increase the number of volunteers to assist in the contact tracing and case investigations for the health department

Action: Promote the need for additional volunteers to assist in the current (and future) health crises to assist in contact tracing, case investigation, or other duties that would reduce exposure to COVID-19 or other health related events. Provide training as required.

- Location: County-wide
- Lead Agency: Bay County Health Department
- Participating Agencies: Michigan Department of Health and Human Services (MDHHS)
- Hazards Addressed: Public health emergencies
- Potential Funding Source(s): State/Federal grants
- Project Cost: TBD
- Schedule: Ongoing
- Priority: High
- Goal/Objective Achieved: Goal 2, objective d; goal 3, objectives d and g
- Benefit(s): Contain the spread of viruses and improve epidemiological surveillance

Item 20 (NEW)

Increase potable water storage capacity

Action: Install two above-ground water storage tanks in Bangor Township.

- Location: Bangor Township
- Lead Agency: Bay County Department of Water and Sewer
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Public health emergencies
- Potential Funding Source(s): grants/local match
- Project Cost: $10,000,000
- Schedule: 2023/24
- Priority: High
- Goal/Objective Achieved: Goal 1, objective d, goal 3, objective d
- Benefit(s): Provide additional potable water for Bay County residents.

Item 21

Install pump stations near Kawkawlin River to allow more water to get to river more quickly

Action: Install pump stations, at previously identified locations, that would pump standing/stagnant water to the river in order to reduce local flooding.

- Location: Bangor, Monitor, and Kawkawlin Townships
- Lead Agency: Drain Commission
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Flooding
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: TBD
- Priority: Medium
- Goal/Objective Achieved: Goal 1, objective d; goal 2, objective b
- Benefit(s): Reduce flooding along Kawkawlin River.

Item 22

Purchase folding cots, blankets, and medical supplies to facilitate Township Halls as emergency shelters

Action: Purchase shelter supplies, such as blankets, folding cots, and medical supplies to stock facilities as identified emergency shelters.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: All hazards
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: 2025
- Priority: Medium
- Goal/Objective Achieved: Goal 1, objective d; goal 3, objective g
- Benefit(s): Improve mass care capabilities during emergency situations.

Item 23

Install and/or improve sea walls along Saginaw Bay, Saginaw River, and Kawkawlin River

Action: Install and /or improve sea walls along Saginaw Bay and the Saginaw and Kawkawlin Rivers

- Location: Bay City, City of Essexville, and Bangor, Frankenlust, Fraser, Hampton, Kawkawlin, Pinconning, Portsmouth Townships
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Shoreline flooding/erosion
- Potential Funding Source(s): grants, FEMA
- Project Cost: TBD
- Schedule:2026
- Priority: Medium
- Goal/Objective Achieved: Goal 2, objectives b and e
- Benefit(s): Reduce flooding/wind driven water/erosion along Saginaw Bay, and the Saginaw and Kawkawlin Rivers.

Item 24

Control vegetation (phragmites) on Saginaw Bay shoreline

Action:

- Location: Bay City, City of Essexville, and Bangor, Frankenlust, Fraser, Hampton, Kawkawlin, Pinconning, Portsmouth Townships
- Lead Agency:
- Participating Agencies: (see Table 6.1)
- Hazards Addressed:
- Potential Funding Source(s):
- Project Cost:
- Schedule:
- Priority: Medium
- Goal/Objective Achieved: Goal 4, objective e
- Benefit(s):

Item 25

Jurisdiction to participate/comply with NFIP regulations

Action: Get more municipalities to participate in the NFIP

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Flooding
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: Ongoing
- Priority: Medium
- Goal/Objective Achieved: Goal 1, objective b; goal 2, objective d; goal 4, objectives a-e
- Benefit(s): Mitigate the impact of flooding, reduce cost of flood insurance.

Item 26

Educate public on benefits of NFIP

Action: Develop program to educate the public on the benefits of getting flood insurance and other benefits of the NFIP.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Flooding
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: Ongoing
- Priority: Medium
- Goal/Objective Achieved: Goal 1, objective b; goal 2, objective d
- Benefit(s): Mitigate the impact of flooding, reduce cost of flood insurance.

Item 27

Liberty and Independence Bridges erosion protection

Action: Identify measures necessary to protect Liberty and Independence Bridges from issues resulting from erosion.

- Location: Bay City
- Lead Agency: Bay City
- Participating Agencies: NA
- Hazards Addressed: Infrastructure failure
- Potential Funding Source(s): grants, city budget
- Project Cost: TBD
- Schedule: Ongoing
- Priority: Moderate
- Goal/Objective Achieved: Goal 3, objective a
- Benefit(s): Infrastructure integrity secured.

Item 28

Bury power lines

Action: Work with local utility companies, developers, neighborhood groups, and municipal governments to develop a program to bury power lines as appropriate.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Infrastructure failure, energy emergencies
- Potential Funding Source(s): TBD
- Project Cost: TBD
- Schedule: TBD
- Priority: Moderate
- Goal/Objective Achieved: Goal 2, objective b and e; goal 4, objective d
- Benefit(s): Utility lines protected from weather conditions, thereby reducing the chances of power outages/infrastructure failures.

Item 29

Install monitoring gauges and mile markers on Saginaw and Kawkawlin Rivers

Action: Install gauges and mile markers on the Saginaw and Kawkawlin Rivers for persons using the rivers for recreational purposes and to gauge the rivers when they flood.

- Location: Bay City, Essexville, and Bangor, Frankenlust, Kawkawlin, Monitor, Portsmouth Townships
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Public health emergencies, flooding
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: 2024
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, objective d
- Benefit(s): Decreasing response time for emergency situations on the rivers (mile markers), and increased time to prepare for flooding (river gauges).

Item 30

Remove contaminants from river dredging spoil sites

Action: Remove contaminates from dredging spoil sites and relocate spoils to an appropriate location.

- Location: Bangor and Frankenlust Townships
- Lead Agency: Bangor Township
- Participating Agencies: EGLE, MDNR, EPA
- Hazards Addressed: Public health emergencies
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: 2024
- Priority: Moderate
- Goal/Objective Achieved: Goal 4, objective e
- Benefit(s): Protecting soil/improving water quality and public health.

Item 31

Construct shelters for identified locations from shelter assessment (Item 5-High Priority)

Action: Construct shelters utilizing the assessment as identified in Item 5.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Severe weather events, tornadoes
- Potential Funding Source(s): grants
- Project Cost: TBD
- Schedule: TBD
- Priority: Moderate
- Goal/Objective Achieved: Goal 3, objective e
- Benefit(s): Reducing the number/severity of casualties during severe weather/tornadoes.

Item 32

Present Firewise Program to public to educate them on ways to protect property from wildfire

Action: Educate local municipalities on benefits of the Firewise Program and mitigate damages resulting from wildfires.

- Location: County-wide
- Lead Agency: MABIS 3301
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Wildfires
- Potential Funding Source(s): MDNR
- Project Cost: TBD
- Schedule: 2023
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, objective e; Goal 2, objectives a and d
- Benefit(s): Better educated population on wildfire safety, reducing losses resulting from wildfires.

Item 33

Continued education regarding hazard mitigation

Action: Continue to educate the public on the dangers of hazards and the measures to take to mitigate the damages resulting from them.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: All hazards
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: Ongoing
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, objective e, goal 2, objective d
- Benefit(s): Better educated public, thus potentially reducing damages, injuries, and deaths resulting from hazards.

Item 34

Install cameras/fencing at municipal parks in Bay City

Action: Install cameras and fencing at Veterans Park and Wenonah Park

- Location: Bay City
- Lead Agency: Bay City Parks and Recreation
- Participating Agencies: Bay City Department of Public Works
- Hazards Addressed: Civil disturbances, sabotage/terrorism
- Potential Funding Source(s): city budget, grants
- Project Cost: TBD
- Schedule: 2024
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, objective f, goal 2, objectives b, c, and e; goal 3, objective f
- Benefit(s): Reduce the destruction of public property.

Item 35 (NEW)

Install aerial marker balls on power lines at mouth of Saginaw River

Action: Install aerial marker balls on power lines at the mouth of the Saginaw River to provide identification of the location of the power lines.

- Location: Bay City
- Lead Agency: OEM
- Participating Agencies: Utility companies
- Hazards Addressed: Infrastructure failures
- Potential Funding Source(s): Local governments/utility companies
- Project Cost: TBD
- Schedule: 2022/23
- Priority: Moderate
- Goal/Objective Achieved: Goal 2, objectives b and e
- Benefit(s): Utility lines protected from incoming sail boats, thereby reducing the chances of power outages.

Item 36 (NEW)

Replace lead water lines

Action: Replace all lead service lines.

- Location: County-wide
- Lead Agency: Health department
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: Public health emergencies
- Potential Funding Source(s): Grants/local funding
- Project Cost: TBD
- Schedule: Ongoing
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, objective d
- Benefit(s): Improve potable water, improve public health.

Item 37 (NEW)

Increase investment for first responders

Action: Seek additional funds for equipment, training, and training exercises for first responders.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: All hazards
- Potential Funding Source(s): Local budgets/grants
- Project Cost: TBD
- Schedule: Ongoing
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, objective c
- Benefit(s): Improved first responders capabilities.

Item 38 (NEW)

Increase investment to recruit for fire fighters/EMS personnel

Action: Seek additional funds to develop a program for the recruitment of fire fighters/EMS personnel.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: All hazards
- Potential Funding Source(s): Local budgets/grants
- Project Cost: TBD
- Schedule: Ongoing
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, objective c
- Benefit(s): Improved first responders capabilities.

Item 39 (NEW)

Implement Integrated Public Alert & Warning System (IPAWS) and encourage Bay County residents to sign up

Action: Implement IPAWS and promote the program to the county residents to increase citizen participation in the alert system.

- Location: County-wide
- Lead Agency: OEM
- Participating Agencies: (see Table 6.1)
- Hazards Addressed: All hazards
- Potential Funding Source(s): NA
- Project Cost: NA
- Schedule: 2022
- Priority: Moderate
- Goal/Objective Achieved: Goal 1, objective a
- Benefit(s): Improved notification system to residents/visitors within Bay County during time of events.

Item 40 (NEW)

House Information Technology (IT) disaster recovery system in Southfield

Action: Contract with agency to house information as a backup system, in Southfield, Michigan.

- Location: Bay City
- Lead Agency: Bay County Information Systems Division
- Participating Agencies: Bay County
- Hazards Addressed: All hazards
- Potential Funding Source(s): Local budget, grants
- Project Cost: TBD
- Schedule: 2022
- Priority: Moderate
- Goal/Objective Achieved: Goal 3, objective g
- Benefit(s): Maintain resiliency through geodiversification of the data systems by housing a disaster recovery system for Bay County IT in Sanilac County.

Item 41 (NEW)

Shared jail and 9-1-1 computer aided dispatch software

Action: Bay County and Sanilac County are to share hardware and software for the 9-1-1 systems. The primary shared hardware and software will be located in Bay County 9-1-1 Central Dispatch. Data are to be replicated and stored via hardware located in Sanilac County 9-1-1 Central Dispatch. The network will have multiple pathways for connectivity, which includes a designated ESinet provider and a business class internet connection.

- Location: Bay City/Sandusky Michigan
- Lead Agency: Bay County Central Dispatch
- Participating Agencies: Bay County, Sanilac County, Great Lakes Bay 911Consortium
- Hazards Addressed: All hazards
- Potential Funding Source(s): Local budgets, grants
- Project Cost: TBD
- Schedule: 2022
- Priority: Moderate
- Goal/Objective Achieved: Goal 3, objective g
- Benefit(s): Maintain resiliency through geodiversification of the 9-1-1 computer aided dispatch software and jail software by housing a back-up system for the Great Lakes Bay 911 Consortium located in Sanilac County.