Manistee County

Natural Hazards Mitigation Plan

2023

U.S. Department of Homeland Security
FEMA Region 5
536 S. Clark St. 6th Floor
Chicago, IL 60605

FEMA

June 4, 2024

Mr. Matt Schnepp
State Hazard Mitigation Officer
Michigan State Police
Emergency Management and Homeland Security Division
P.O. Box 30634
Lansing, MI 48909

Dear Mr. Schnepp:

The Manistee County Hazard Mitigation Plan was reviewed based on the local plan criteria contained in 44 CFR Part 201, as authorized by the Disaster Mitigation Act of 2000. The Manistee County Hazard Mitigation Plan met the required criteria for a multi-jurisdictional hazard mitigation plan and the plan is now approved for Manistee County.

Please submit adoption resolutions for the remaining jurisdictions who participated in the planning process:

Arcadia Township
Bear Lake Township
Bear Lake Village
Brown Township
Cleon Township
Eastlake Village
Filer Charter Township
Kaleva Village
Manistee City
Manistee Township
Maple Grove Township
Marilla Township
Norman Township
Onekama Township
Onekama Village
Springdale Township
Stronach Township

The expiration date of the Manistee County Hazard Mitigation Plan is five years from the date of this letter.

An approved local mitigation plan, including adoption by the local government, is one of the conditions for applying for and/or receiving FEMA mitigation grants from the following programs:

- Hazard Mitigation Grant Program (HMGP)
- HMGP Post-Fire
- Building Resilient Infrastructure and Communities
- Flood Mitigation Assistance

Having an approved mitigation plan does not mean that mitigation grant funding will be awarded. Specific application and eligibility requirements for the programs listed above can be found in each FEMA grant program's respective policies and annual Notice of Funding Opportunities, as applicable.

To avoid a lapsed plan, the next plan update must be approved before the end of the approval period, including adoption by the participating jurisdiction(s). Before the end of the approval period, please allow sufficient time to secure funding for the update, including the review and approval process. Please

include time for any revisions, if needed, and for your jurisdiction to formally adopt the plan after the review, if not adopted prior to submission. This will enable you to remain eligible to apply for and receive funding from FEMA's mitigation grant programs with a mitigation plan requirement. Local governments, including special districts, with a plan status of "Approvable Pending Adoption" are not eligible for FEMA's mitigation grant programs with a mitigation plan requirement.

We look forward to discussing options for implementing this mitigation plan. If there are any questions from either you or the communities, please contact Meghan Cuneo at (202) 615-5294 or email at Meghan.cuneo@fema.dhs.gov.

Sincerely,

John Wethington
Chief, Risk Analysis Branch
Mitigation Division

COUNTY OF
manistee
MICHIGAN
Manistee County Courthouse
415 Third Street · Manistee, Michigan 49660

CLERK
Shelli Johnson
(231) 723-3331
CONTROLLER/ADMINISTRATOR
Lisa Sagala
(231) 398-3504

RESOLUTION #2024-8

A RESOLUTION OF THE MANISTEE COUNTY BOARD OF COMMISSIONERS AUTHORIZING THE ADOPTION OF THE 2023 MANISTEE COUNTY, MICHIGAN NATURAL HAZARD MITIGATION PLAN - 5 YEAR UPDATE

At a regular meeting of the Manistee County Board of Commissioners held in the Manistee County Courthouse & Government Center, 415 Third Street, Manistee, Michigan, on the 21st day of May, 2024.

PRESENT: Jeff Dontz, Karen Goodman, Nikki Koons, Richard Schmidt, Eric Gustad, Janice McCraner, Margaret Batzer

ABSENT: None

The following resolution was offered by Janice McCraner and seconded by Karen Goodman:

Whereas, all jurisdictions within Manistee County have exposure to natural, technological and human-induced hazards that may damage or destroy life, property, the environment, or local economy; and

Whereas, pro-active mitigation of known hazards before a disaster event can reduce or eliminate damages and impacts to life, property, the environment or local economy; and

Whereas, The Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390) established new requirements for pre- and post-disaster hazard mitigation programs;

Whereas, the 2023 Manistee County Natural Hazard Mitigation Plan has been developed in accordance to the DMA of 2000 to reflect the concerns of the citizens and stakeholders of Manistee County;

Now, therefore, be it resolved that:

1. The 2023 Manistee County Hazard Mitigation Plan 5 Year Update is hereby adopted as an official plan of Manistee County.
2. The Manistee County Local Emergency Planning Committee/Local Planning Team will serve as the Natural Hazards Task Force. The duties shall be as outlined in the 2023 Manistee County Natural Hazard Mitigation Plan 5 Year Update.
3. The Manistee County Emergency Management Coordinator is charged with supervising the implementation of the Plan's recommendations within the funding limitations as provided by the County or other funding sources.
4. The Manistee County Emergency Management Coordinator shall convene the Natural Hazards Task Force annually. The coordinator's responsibilities will include monitoring the implementation of the plan and shall submit a written progress report to the Task Force in accordance with the following format:
    a. A review of the original plan.
    b. A review of any disasters or emergencies that occurred during the previous calendar year.
    c. A review of the actions taken, including what was accomplished during the previous year.
    d. A discussion of any implementation problems.
    e. Recommendations for new projects or revised action items. Such recommendations shall be subject to approval by the Manistee County Board of Commissioners.

STATE OF MICHIGAN Michigan)
)ss.
COUNTY OF MANISTEE Manistee)

I, Michelle Johnson, County Clerk, do hereby certify that the foregoing is a true copy of a Resolution adopted by the Manistee County Board of Commissioners at its regular monthly meeting held on the 21st day of May 2024 by the following vote:

YEAS: Dontz, Goodman, Koons, Schmidt, Batzer, Gustad, McCraner

NAYS: None

NOT VOTING: None

I further certify that the foregoing Resolution is a true, correct, and complete transcript of the original of said Resolution appearing on file and of record in my office.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the Seal of the County of Manistee this 21st day of May 2024.

CLERK OF THE COUNTY COMMISSION
MANISTEE COUNTY, MICHIGAN

Michelle Johnson, County Clerk

ACKNOWLEDGEMENTS

The 2023 Manistee County Hazard Mitigation Plan is prepared for Manistee County, Michigan and the jurisdictions in the county that have participated in the development of the plan update (please refer to Table 4 in this plan). The plan is the culmination of an interdisciplinary and interagency planning effort that required the technical assistance and contributions from representatives of the organizations and jurisdictions listed below. Refer to Appendix G for a table of how and when the representatives of each participating entity contributed to the development of the plan. Each jurisdiction is invited to be a continuing participant in future regular review and updates of the plan.

PARTICIPATING AGENCY/ JURISDICTION	REPRESENTATIVE	TITLE
Manistee County Board of Commissioners	Richard Schmidt	District 2 Commissioner (All of Townships of Cleon, Maple Grove, Marilla and Springdale)
	Nikki Koons	District 3 Commissioner (All of Norman, Dickson, and Brown Townships)
	Eric Gustad	District 4 Commissioner (All of Stronach Township, the Village of Eastlake, and all of Filer Township lying South of Merkey Road and 21st Street)
	Jeff Dontz	Chair, District 5 Commissioner (Part of Onekama Township, being the Village of Onekama and all of Onekama Township lying South of Eight Mile Road and Portage Lake, and all of Manistee Township, except the Village of Eastlake.)
	Karen Goodman	Vice Chair, District 6 Commissioner (That portion of the City of Manistee lying West of Maple Street and all of the City North of the Manistee River, and a portion of Filer Township lying North of Merkey Road and 21st Street in Filer Township)
	Margret Batzer	District 7 Commissioner (That portion of the City of Manistee lying East of Maple Street and South of the Manistee River.)
Manistee County Planning Commission	Eleanor DeYoung	Planning Commissioner; Village of East Lake resident
	Glenn Zaring	Planning Commissioner; City of Manistee resident
	Ted Batzer	Planning Commissioner; Stronach Twp. resident
	Phil Landis	Planning Commissioner; Stronach Twp. resident
	Margret Batzer	Planning Commissioner; Commissioner; City of Manistee resident
	Mary Becker-Witt	Planning Commissioner; Norman Twp. resident
Manistee County	Mike Machen	E.M./Deputy 911 Coordinator (former)
	Alvin Rischel	E.M./Deputy 911 Coordinator (current)
	Jim Espvik	911 Director (former)
	Lisa Sagala	Administrator/Controller
	Mike Szokola	Planning Director (former)
	Katie Mehl	Planning and Zoning Administrator
	Jodi Lynch	Planner I
	Nancy Baker	Planning Secretary/Assistant to Planner

PARTICIPATING AGENCY/ JURISDICTION	REPRESENTATIVE	TITLE
Manistee County	Brian Gutowski	Sheriff
	Jason Torrey	Undersheriff
	Gary Schwaiger	Drain Commissioner
	Karla Smith Kasten	Manistee County Recycling Coordinator
	Joe Coleman	Administrator, County Medical Care Facility
	Joe Jones	County Medical Care Facility
	Kristyn Malkowski	Administrative Secretary
	Heather Vasquez	Equalization Director
	Lindsey Marquardt	County Clerk
	Melissa Bjorkquist	Chief County Deputy Clerk
	Loren Van Alstine	Register of Deeds
	Julie Griffis	HR Generalist
	Susan Zielinski	Finance Officer
Manistee County Road Commission	Mark P. Sohlden	Manager
	Brad Lasko	Maintenance Supervisor
	Greg Hejl	Superintendent
Manistee Blacker Airport	Barry Lind	Airport Director
Manistee Intermediate School District	Mary Becker-Witt	Board President
Manistee Conservation District	Renee Mallison	Executive Director
Northwest Michigan Invasive Species Network	Audrey Menninga	ISN Coordinator
US Forest Service, Huron-Manistee National Forest	Benjamin Wagner	Deputy Fire Staff Officer
City of Manistee	Josh Glass	Police Chief
	Jeff Mikula	Public Works Director
	Bill Gambill	City Manager
Village of Bear Lake	Tracy Gary	Clerk
Village of Eastlake	Sherry Stamp	Clerk
Village of Kaleva	Karen Dufresne	Clerk
Village of Onekama	Roger Burger	President
Arcadia Twp.	Janice McCraner	Supervisor
Bear Lake Twp.	Deanna Pattison	Clerk
		Trustee
Brown Twp.	Lani Millsap	Treasurer
	Paul Wondolowski	Trustee

PARTICIPATING AGENCY/ JURISDICTION	REPRESENTATIVE	TITLE
Cleon Twp.	Linda Cudney	Treasurer
	Amy Herrst	Clerk
Filer Charter Twp.	Andy Bradford	Resident; TES Filer City Station Supervisor
	Terry Walker	Supervisor
Manistee Twp.	D. R. Bjorkquist	Supervisor
Maple Grove Twp.	H. Wayne Beldo	Supervisor/ Zoning Administrator
	Karen Roy	Treasurer
	Fran Beldo	Clerk
Marilla Twp.	Douglas Glick	Supervisor
		Planning Commissioner
Norman Twp.	Jack VanderBie	Fire Chief
	Karen Patnode	Clerk
Onekama Twp.	Edward Bradford	Treasurer
Springdale Twp.	Penny Nelson	Clerk
Stronach Twp.	Terry Lindeman	Trustee
	Philip Landis	Trustee
	Robert Sell	Treasurer
	Phil Vadeboncouer	Supervisor
	Barbara Rishel	Clerk
Little River Band of Ottawa Indians	Brandy Martin	Tribal Emergency Response Team Coordinator
	Steve Parsons	Planning Coordinator
	Gary Lewis	Utility Director
	Gary DiPiazza	Tribal Council
	Robert Robles	Sgt., Director of Public Safety
	Robert Medacco	Tribal Public Safety Director
Benzie County	Rebecca Hubers	E.M. Coordinator
Wexford County	Travis Baker	E.M. Coordinator (former)
District Health Dept. #10	Bret Haner	Emergency Preparedness Coordinator
	Jessica Savage	Director
American Red Cross	Megan Powers	Disaster Program Manager
National Weather Service Forecast Office - Gaylord	Pat Bak	Warning Coordination Meteorologist

PARTICIPATING AGENCY/ JURISDICTION	REPRESENTATIVE	TITLE
Michigan State Police - Manistee County	David Skorka	Trooper
Michigan State Police EMHSD	Mike Sobocinski	Hazard Mitigation Planning Analyst
	Lt. Michael deCastro	Region 7 District Coordinator
	Travis House	F/Lt.
Manistee Area Chamber of Commerce	Mark Miller	Director of Economic Development
Manistee County Medical Control Authority	Joel Robinson, D.O.	Medical Director
Munson Healthcare Manistee Hospital and Paul Oliver Memorial Hospital	Fred Craigin	Manager - Safety, Security and Emergency Mgmt.
Mobile Medical Response	Jason Sopha	
CMS Energy (TES Filer City Station)	Andy Bradford	Maintenance Supervisor
	Todd Guenthardt	Maintenance Superintendent
Interstate Asphalt Corp.	Samantha VanAelst	Compliance Specialist & Assistant Operations Manager

Prepared for Manistee County
with assistance from:

Networks Northwest
Talent / Business / Community

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Traverse City MI 49685-0506
Telephone: 231.929.5000
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I. INTRODUCTION

Hazard mitigation is defined as any action taken before, during, or after a disaster or emergency to permanently eliminate or reduce the long-term risk to human life and property from natural, technological and human-related hazards. Mitigation is an essential element of emergency management, along with preparedness, response and recovery.

Mitigation allows repairs and reconstruction to be completed after an incident occurs in such a way that does not just restore the damaged property as quickly as possible to pre-disaster conditions. It also ensures 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. When successful, hazard mitigation will lessen the impact of a disaster on people, property, the environment and economy, and continuity of services through the coordination of available resources, programs, initiatives, and authorities.

A *hazard*, in the context of this plan, is an event or physical condition that has potential to cause fatalities; injuries; damage to personal property, infrastructure, or the environment; agricultural product loss; or interruption of business or civic life. The Manistee County Natural Hazard Mitigation Plan focuses primarily on *natural* hazards such as extreme temperatures, drought, wildfires, flooding, shoreline hazards (such as dangerous currents, flooding, erosion, waterspouts and seiche), thunderstorms, high winds, hail, tornadoes, extreme winter weather, dense fog, and invasive species. The plan will also consider these technological and human-related hazards: dam failure and public illness outbreak.

The following natural hazards were not included in the analysis for this Hazard Mitigation Plan: earthquakes, subsidence, space weather, and meteorites and other impacting objects. Based upon review of the Michigan State Police's 2019 *Michigan Hazard Analysis*, most of Michigan is not located in an area subject to major earthquake activity. Additionally, while Manistee County contains the potential subsidence hazard of solution mining (injecting freshwater into salt formations and retrieving the resulting brines, there are no abandoned coal mines in the county, and sinkhole risks in the county range from "absent or likely absent" to "infrequent or likely infrequent". Damaging space weather events were not evaluated due to the lack of significant historical impact in northern Michigan. Damaging meteorite events were not evaluated due to the lack of historical impact in northern Michigan and their low probability of occurrence.

The main objective of the Manistee County Natural Hazard Mitigation Plan is to permanently eliminate or reduce long-term risks to people and property from natural hazards so that assets such as transportation, infrastructure, commerce, and tourism can be sustained and strengthened. This can be accomplished through collaborative efforts/activities amongst agencies within the county to protect the health, safety, and economic interests of the residents and businesses through planning, awareness, and implementation.

Through this Plan, a broad perspective was taken in examining multiple natural hazard mitigation activities and opportunities in Manistee County. Each natural hazard was analyzed from a historical perspective, evaluated for potential risk, and considered for possible mitigation.

Since the 2015 Plan's adoption period, the county and municipalities have achieved the following key endeavors to address their previously identified mitigation strategies.

- Develop a community emergency warning system: Manistee County now utilizes the CodeRED Emergency Notification system, which allows users who sign up for the free service to receive emergency notifications as well as weather alerts right on their phone.
- Local governments along the Lake MI coastline have adopted their revised (in 2021) FEMA FIRMs; these are being used to inform local units of government discussions regarding zoning ordinance changes regarding shoreline protection/property protection measures.
- Following an approximate 1,000 acre wildfire in the community of Dublin in 2021, Norman Township residents, the County EM, USFS and local fire departments have been collaborating on strategies to increase wildfire preparation and prevention measures in that area.

Appendix C provides a list of mitigation strategies included in the Manistee County 2015 Natural Hazards Mitigation Plan, along with their current status and how they may have been integrated into other local planning mechanisms.

Section VIII of this plan, "Mitigation Strategies", provides a current list of hazard mitigation strategies for each natural hazard identified. Mitigation strategies were developed based on discussions with local officials and a review of FEMA/MSP best practices for hazard mitigation. (Refer to Appendix D for a list of Alternative Strategies that were considered.) Strategies are grouped according to their purpose: Awareness and Preparation; Shelters; Buildings & Infrastructure; Utilities & Technology; and Environment & Natural Resources. The strategies table also includes: a

description of each strategy; what hazards it addresses; where the strategy applies; who is responsible for implementing the strategy; how the strategy will be implemented (what resources are available to apply the strategy); the estimated timeframe for completion; the level of priority; and what type of strategy it is. Most strategies are intended to be action items completed during the 5-year timeframe in which the plan is active. Some long-term strategies may extend beyond the 5-year timeframe due to feasibility or level of difficulty.

Recognizing the importance of reducing community vulnerability to natural hazards, Manistee County is actively addressing the issue through the development and implementation of this plan. This process will help ensure that Manistee County remains a vibrant, safe, enjoyable place in which to live, raise a family, continue to conduct business, and maintain a tourist base. The Plan serves as the foundation for natural hazard mitigation activities and actions within Manistee County, and will be a resource for building coordination and cooperation within the community for local control of future mitigation and community preparedness around the following goals:

Goal 1: Increase local awareness and participation in natural hazards mitigation strategies
Goal 2: Integrate natural hazards mitigation considerations into the community's comprehensive planning process
Goal 3: Utilize available resources and apply for additional funding for natural hazards mitigation
Goal 4: Develop and complete natural hazards mitigation projects in a timely manner

II. PLANNING PROCESS

The Stafford Act, as amended by the Disaster Mitigation Act of 2000, shifted the Federal Emergency Management Agency's (FEMA) scope of work to promoting and supporting prevention, or what is referred to as hazard mitigation planning. FEMA requires government entities to have a natural hazards mitigation plan in place and updated on a 5-year cycle as a condition for applying for grant funding related to natural hazard mitigation and remediation. Manistee County has a history of mitigation planning and adopted past Natural Hazard Mitigation Plans in 2007 and 2015. The adoption of the 2023 plan will reaffirm the eligibility of the county, as well as those local municipalities who participated in the planning process and adopted the county's plan, for federal pre-disaster mitigation funding.

Plan Development

The update of the County's plan was led by the Natural Hazards Task Force composed of the County's Local Emergency Planning Committee (LEPC), organized by the Manistee County Central Dispatch (911) staff. Team members consist of first responders and local, regional, and state public entities that ensure the readiness of County entities by recommending equipment purchases, training and exercises, and public education on preparedness issues. Networks Northwest staff assisted with the updated plan by providing meeting facilitation, conducting an online survey, and writing the plan. Task Force meetings were held both virtually and at the County Emergency Operations Center and were open to the public. The schedule of all meetings involving work sessions/public input sessions was posted on the Manistee County Hazard Mitigation Plan project page of Networks Northwest's website.

Representatives of all of the following types of stakeholders were invited to participate in the planning process by various methods: email invitation, phone calls, meeting attendance/presentation, or mailed letters. Stakeholders included local and regional agencies involved in hazard mitigation activities; agencies that have the authority to regulate development; neighboring communities; representatives of businesses and other private organizations; and representatives of nonprofit organizations, including community-based organizations that work directly with and/or provide support to underserved communities and socially vulnerable populations (such as the District Health Department #10). Please refer to the Acknowledgements section in the beginning of this plan for a list of participants; Appendix G for a detailed table showing how and when representatives participated in the planning process; and Appendix F for meeting and public input documentation. All jurisdictions - except for the Village of Copemish, Dickson Township and Pleasanton Township - remain as continuing participants in the 2023 Hazard Mitigation Plan (since the 2015 plan was completed; see Table 4).

The following is an outline of events for the development of the 2023 Natural Hazard Mitigation Plan:

- On July 1, 2021, Mike Machen attended a project kick off meeting with county and tribal emergency managers.
- In December 2021, an online community survey was made available until March 2022.
- On December 20, 2021, Networks Northwest presented the community profile information and provided a summary of preliminary survey results. The meeting was held in person.
- On March 17, 2022 Networks Northwest presented the final survey results and the hazard analysis including historic weather events. The meeting was held in person.
- On May 19, 2022 a joint community meeting was held between Little River Band of Ottawa Indians officials and representatives from Manistee County to discuss potential hazards. The meeting was held virtually.
- August 22, 2022 Networks Northwest presented the draft plan and discussed hazards areas and potential strategies. The meeting was held in person.
- On December 8, 2022, Networks Northwest staff presented the background and purpose of the hazard mitigation planning process at the Manistee County Planning Commission's regular meeting. Draft hazard maps and mitigation strategies were also discussed with the Planning Commission. The Emergency Managers for Manistee County and LRBOI were also in attendance. The meeting was held in person.
- On December 16, 2022 Networks Northwest presented the draft mitigation strategies at the Manistee County LEPC/LPT meeting, along with draft hazard area maps and obtained feedback. The meeting was held in person and via Zoom.
- On February 21, 2023 Networks Northwest presented the revised draft plan, maps and strategies table at the Manistee County LEPC/LPT meeting. The meeting was held in person and via Zoom.
- On March 22, 2023 Alvin Rischel, Emergency Management Coordinator for Manistee County, attended the Manistee County's Michigan Township Association's meeting to share the availability of the draft plan and encourage communities to participate in reviewing the plan and provide feedback.
- On April 12, 2023, Alvin Rischel attended the regular board meeting of Stronach Township to discuss the opportunity for the township to review the draft County Hazard Mitigation plan and provide feedback.
- On May 24, 2023 a public notice was placed in the Manistee News Advocate announcing the public comment period for the draft plan, where it can be accessed, and details on the scheduled public hearing.

- On May 26, 2023, Networks Northwest mailed a letter to local government officials in Manistee County (Township Supervisors and Clerks; Village Presidents and Clerks; City of Manistee City Manager and Clerk). The letter provided notification of the public hearing on the draft plan, a website address to access the plan, and requested local government review and feedback.
- On June 20, 2023 a public hearing was held on the draft plan. The County Board of Commissioners voted to approve the draft plan for submittal to MSP/FEMA for their review and approval.

During development of the plan, all Manistee County municipalities were provided the opportunity to participate in the online community survey, participate in scheduled meetings, and comment on draft plan materials. Additionally, representatives from county and regional agencies that encompass or share borders with Manistee County (listed below) were invited to participate in the planning meetings, and were able to view the draft and final plan materials on the hazard mitigation project page of Network Northwest's website.

- Jolanda Murphy, Public Safety Department 2 Manager and Emergency Manager, Grand Traverse Band of Ottawa and Chippewa Indians
- Brandy Martin, Tribal Incident Commander, Little River Band of Ottawa Indians
- Rebecca Hubers, Emergency Management Coordinator, Benzie County
- Elizabeth A. Reimink, Emergency Management Coordinator, Mason County
- Patrick Maddox, Director of Emergency Management, Lake County
- Gregg Bird, Emergency Management Coordinator, Grand Traverse County
- Randy Boike, Deputy 911 Director/Emergency Management Coordinator, Wexford County
- Robert Carson, Regional Director of Community Development, Networks Northwest

Community Survey Results

The primary source of feedback was gathered through the Community Survey. The survey was shared electronically and available in an online format (posted on Manistee County's Facebook page and Networks Northwest's project webpage) from December 2021 to March 2022. The survey asked sixteen questions related to hazard mitigation and received 40 responses. The majority of responses were from elected or appointed officials, emergency personnel, local citizens and other stakeholders. The survey results are included as Appendix B. Table 1 lists representatives from local municipalities that did (or did not) respond to the community survey.

Table 1: Survey Responses by Local Municipality

Local Unit	Response	Title/Role (If Identified)
Manistee County	Yes	Emergency Management Coordinator, 911 Director, Planning and Zoning Administrator, Airport Director, Drain Commissioner, Conservation District Exec. Dir., Medical Care Facility Administrator
City of Manistee	Yes	Public Works Director; Elected Officials
Village of Bear Lake	Yes	Clerk
Village of Copemish	No	
Village of Eastlake	Yes	
Village of Kaleva	Yes	Clerk
Village of Onekama	No	
Arcadia Township	Yes	Supervisor
Bear Lake Township	Yes	Clerk, Trustee
Brown Township	Yes	Treasurer
Cleon Township	Yes	Clerk, Treasurer
Dickson Township	No	
Filer Township	Yes	
Manistee Township	Yes	Supervisor
Maple Grove Township	Yes	Supervisor
Marilla Township	Yes	Supervisor, Planning Commissioner
Norman Township	Yes	Fire Chief
Onekama Township	Yes	Treasurer
Pleasanton Township	No	
Springdale Township	Yes	Clerk
Stronach Township	No	

Responses to Question 3-5 asked about participants' knowledge of local planning efforts including the current hazard mitigation plan (72.5% indicated they were unfamiliar with the plan), local master plans (70% yes they have an adopted Master Plan), and a local Capital Improvements Plan (CIP) (35% indicated no, they do not have a CIP).
Questions 6 and 7 asked participants if there had been significant natural hazards in the past and to identify them. 57.5% said they had experienced a significant natural hazard in the last 10 years, with descriptions provided as follows:

Arcadia Twp.
- We lost a valued park and beach access because of the increased water levels of Lake MI.

Cleon Twp.
- Power outage due to snow.

Filer Twp.
- 7/21/2016 – 12" of rain cause localized flooding

Manistee Twp.
- Damage and loss of property due to high water levels

Norman Twp.
- Wildland fire
- Greater than 100-year flood (Pine Creek)

Onekama Twp.
- Flooding, High Water

City of Manistee
- Meteotsunami, major thunderstorm with straightline winds, flooding, winter storms, lakeshore and Riverwalk erosion, sewer overflow from heavy rains (2019-2020)

County of Manistee
- Wildfire, high/straight-line winds, flood, lakeshore flooding, seiche, high water levels on Lake MI and connecting waterways, coastal dune erosion, proximity of structures to coastal recession, COVID-19

Questions 8 and 9 asked about community concerns for future natural hazard events and the types of natural hazard events that are likely to have the largest impact. 67.5% of participants are "somewhat concerned" about a future natural hazard impacting the community. When asked what type of hazard participants were most likely to cause the largest impact responses included the following: High Winds (27), Flooding/Heavy Rain (20), Illness Outbreak/Future Pandemic (14), Wildfire (14), High Lake Water Levels (7), Heavy Snowfall/Winter Storm/Ice/Blizzard (6), Drought/Loss of Water to Wells (4), Power Outage (3), Storms/High-Intensity Storms (3), Dam Failure (2), Tornado (1), Pollution of Waterways (1), Storm Drain Collapse (1), Extreme Heat/Cold Events (1), and Lightning (1).

Questions 10 asked about community concerns infrastructure and what forms of investment might be required to mitigate natural hazards. Of the responses, dam infrastructure and general utilities were mentioned the most frequently with 8 and 6 respectively. Other responses included shoreline hazards such as flooding and erosion, and aging transportation infrastructure (roads, bridges, railroad bridges, culverts) throughout the county. Specific areas with infrastructure concerns mentioned include:

- Onekama Twp.: Floodwaters impacting septic systems surrounding Portage Lake
- Filer Twp.: "Power outages due primarily to high winds, which would affect the operation of our water and sewer infrastructure"
- Marilla, Dickson, Norman, Brown, and Manistee Townships, along with the Village of Eastlake and the City of Manistee would all be affected by floodwaters from a failure at the Hodenpyl or Tippy Dams.
- Marilla Twp. indicated the need for broadband services, as they are "greatly underserved"
- City of Manistee: "Heavy rainfalls can exceed capacity of storm water systems and our sanitary sewers can be impacted by illicit connections."
- Manistee Blacker Airport needs to maintain electrical service in order to operate
- Brown Twp.: "roads and boat ramp areas"

Questions 11 and 12 asked if participants were familiar with requests for assistance for mitigation projects in the past. 65% were unknown as to whether or not requests have been made. Similarly, Question 12 asked if those mitigation projects were granted: all responses either were unknown or not granted.

Questions 13 and 14 asked participants if they had considered mitigation strategies (46% said unknown), but some answered with strategies they would like to explore:

- Collaboration with local entities; continue hazard mitigation plan development
- Preparation and training such as evacuation plans for potential situations (i.e., flooding, dam breach, wildfire)
- "Explore federal funding options for improving infrastructure. Adjust building codes for flood zones, adjust building codes for higher wind rating. Consider public purchase of damaged structures in flood zones and return them to their natural state."

- "Increase the frequency of educational events where the topic is the ecology and dynamics of the Great Lakes and shoreline ecosystems, as well as the importance of native plant communities, placement of structures, etc."
- Education and training for homeowners and property owners who want to address shoreline erosion and flooding.
- "Explore and better understand options for landowners whose forests are leveled by windstorms – this might include options such as disaster relief provided by [the USDA] Farm Service Agency."
- A Marilla Township representative indicated the need for improved broadband service.
- A City of Manistee representative indicated the need for "flood mitigation projects eliminating illicit connections and implementing a wet weather corrective action program", along with an annual removal/trimming program.
- A representative from the Manistee County Medical Care Facility expressed the need to have "more space to spread out people in a congregate setting."

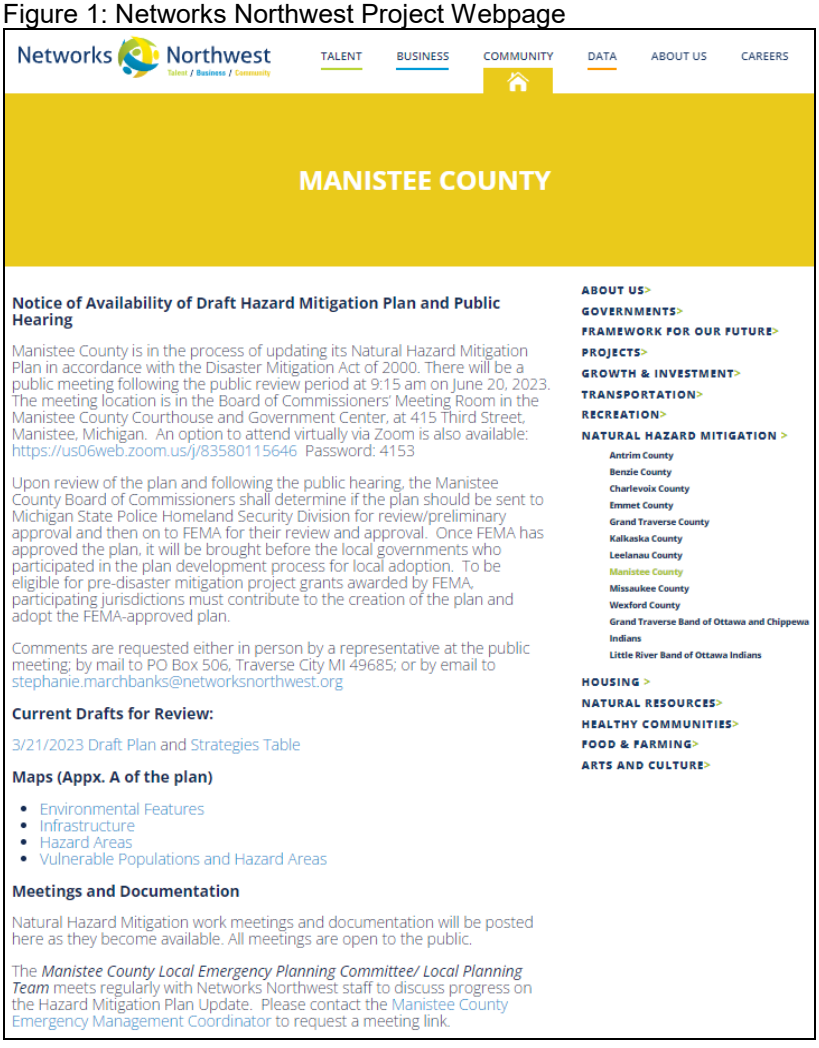
Question 15 asked if there was any additional information to be considered for the County's Natural Hazard Mitigation Plan. One participant asked to include the pandemic/illness outbreak as a potential natural disaster. Another comment asked about how the Army Corps of Engineers may help control erosion problems along the Lake Michigan shoreline and connecting waterways.

The final question, Question 16, asked survey-takers to respond with their contact information if they wish to be involved with the plan process. Several responses included a name, email address, and phone number to contact those who are interested. Many indicated no, they are not interested.

Draft Plan Review and Comment

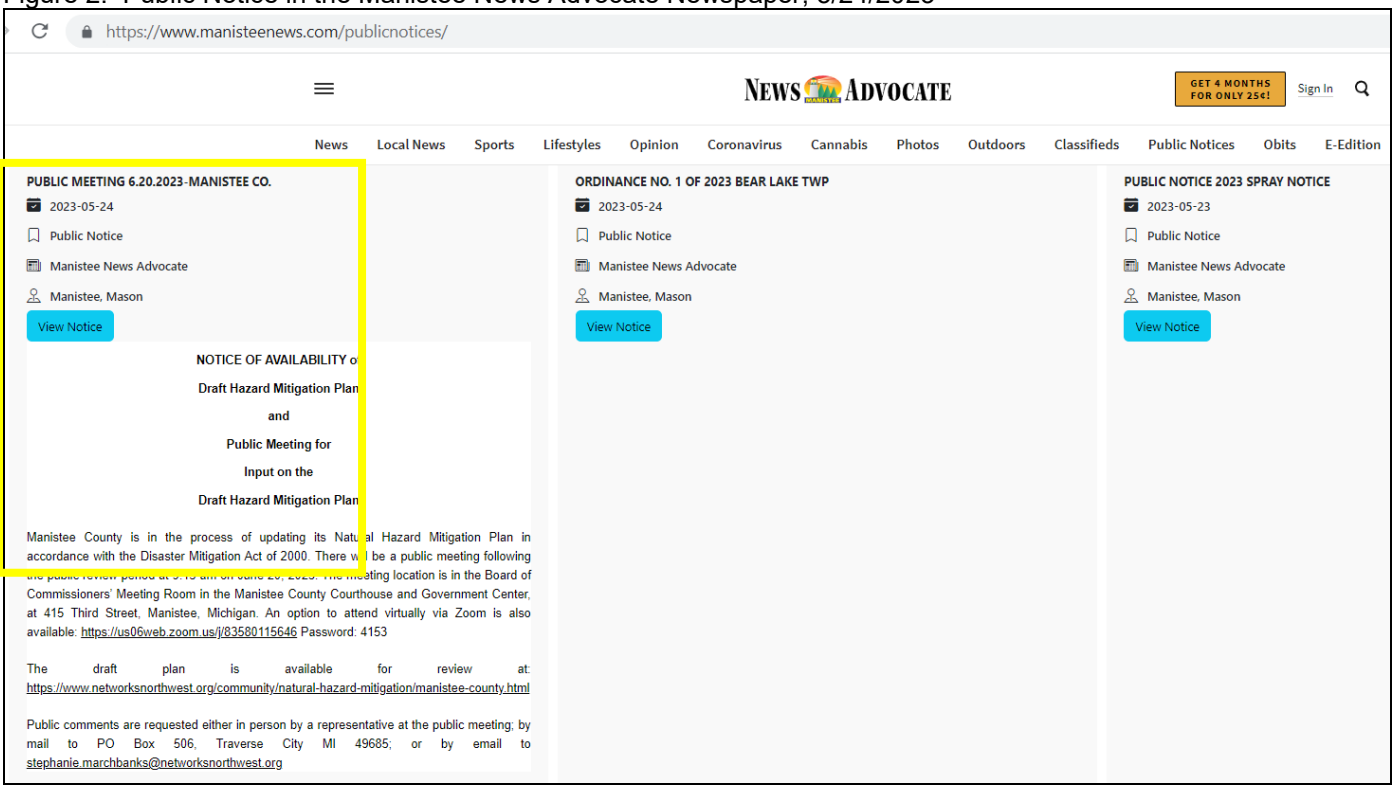
Upon approval by the Natural Hazards Task Force, the draft plan was released for review and comment. Figure 1 below illustrates the draft plan materials and public hearing notification on Networks Northwest's project webpage. The public was also notified through a published notice in the Manistee News Advocate on May 24, 2023 of the County's draft Hazard Mitigation Plan and the opportunity to provide feedback at the public hearing held on June 20, 2023 (Figure 2). No comments were received during the public review period or at the public hearing that resulted in changes to the draft plan.

Figure 1: Networks Northwest Project Webpage



Source: https://www.networksnorthwest.org/community/natural-hazard-mitigation/manistee-county.html Accessed 6/12/2023

Figure 2. Public Notice in the Manistee News Advocate Newspaper, 5/24/2023



III. COMMUNITY PROFILE

Land Use / Land Cover

Manistee County is located in Northwest Lower Michigan, and is bordered by Lake Michigan to the west, Benzie County to the north, Wexford County to the east, Grand Traverse County to the northeast, Lake County to the southeast, and Mason County to the south. Refer to Appendix A for maps illustrating the county's main roads, water bodies and jurisdictions.

According to the 2020 U.S. Census, Manistee County is approximately 542.33 square miles in land area and has 25 miles of Lake Michigan shoreline including several critical dune protection areas shown in red in Figure 2. It is estimated that there are 276 miles of rivers and streams in Manistee County, with an estimated 45 miles of state or federal wild/scenic/natural rivers. There are 9,600 acres of surface water in Manistee County, consisting in part of nine inland lakes each with a surface area greater than fifty acres. The importance of fresh water and water bodies for providing sustenance is immeasurable.

The predominant land cover type in Manistee County is "Forested", a combination of deciduous forest, evergreen forest, and mixed forest. Forested land covers over half of the county at 186,258.6 acres (Table 2). Most of the forested areas are on federally owned land in the Manistee National Forest in the southern/southeast part of the county.

The second most prevalent land cover type is "Shrub/Scrub" and "Herbaceous" at 14.29%, followed by wetlands at 13.57% (48,307.59 acres) (Table 2). These wetlands are primarily located along the Manistee River and the Manistee National Forest. Wetlands contribute significantly to water quality by acting as filters of storm water in addition to sustaining forest growth and providing habitat for wildlife. These areas generally are not suitable for development, but provide open space and recreational value as well as vital habitat for culturally significant animal and plant species.

Agriculture is the fourth largest type of land cover in the county. According to the 2017 USDA Census of Agriculture, there are 41,371 acres of farmland (274 total farms) in Manistee County. This represents a loss of 2,927 acres of farmland and 50 farms compared to what was reported in the 2012 Agriculture Census. The market value of products sold is $10,325,000. Of the products sold, crop, especially grains, oilseeds, dry beans, and dry peas are the #1 selling product with $3,249,000 in sales. Forage (hay/hayage), corn for grain, tart cherries, corn for silage or greenchop, and apples composed the top five crops in acreage in the county. Manistee County ranks 54 out of 83 counties in the State of Michigan for the sale of agricultural crops (right behind Benzie County at 53).

Developed land cover is found predominantly in and around the villages and the City of Manistee.

Table 2: Land Cover by Type, Manistee County

Classification	Acres	Percent
Developed (High Intensity)	574.1	0.16%
Developed (Med. Intensity)	1,750.58	0.49%
Developed (Low Intensity)	6,882.43	1.93%
Developed (Open Space)	16,605.95	4.67%
Agriculture (Cultivated Crops and Hay/Pasture)	36,042.55	10.13%
Forested (Deciduous, Evergreen and Mixed)	186,258.60	52.34%
Wetlands	48,307.59	13.57%
Shrub/Scrub, Herbaceous	50,866.61	14.29%
Barren Land	1,507.12	0.42%
Open Water	7,080.00	1.99%
TOTAL	**355,875.53**	**100.00%**

Source: Networks Northwest

The 2015 Manistee County Hazard Mitigation Plan indicated that 235,300 acres, or 64.9%, of the county contained forested lands, and 73,503 acres or 20.3% were wetlands. When comparing this data to current data, the amount of forested areas and wetlands have decreased. Wetlands are primarily located along the Manistee River and the Manistee National Forest, and contribute significantly to water quality by acting as filters of storm water in addition to sustaining forest growth and providing habitat for wildlife. These areas generally are not suitable for development, but provide open space and recreational value as well as vital habitat for culturally significant animal and plant species.

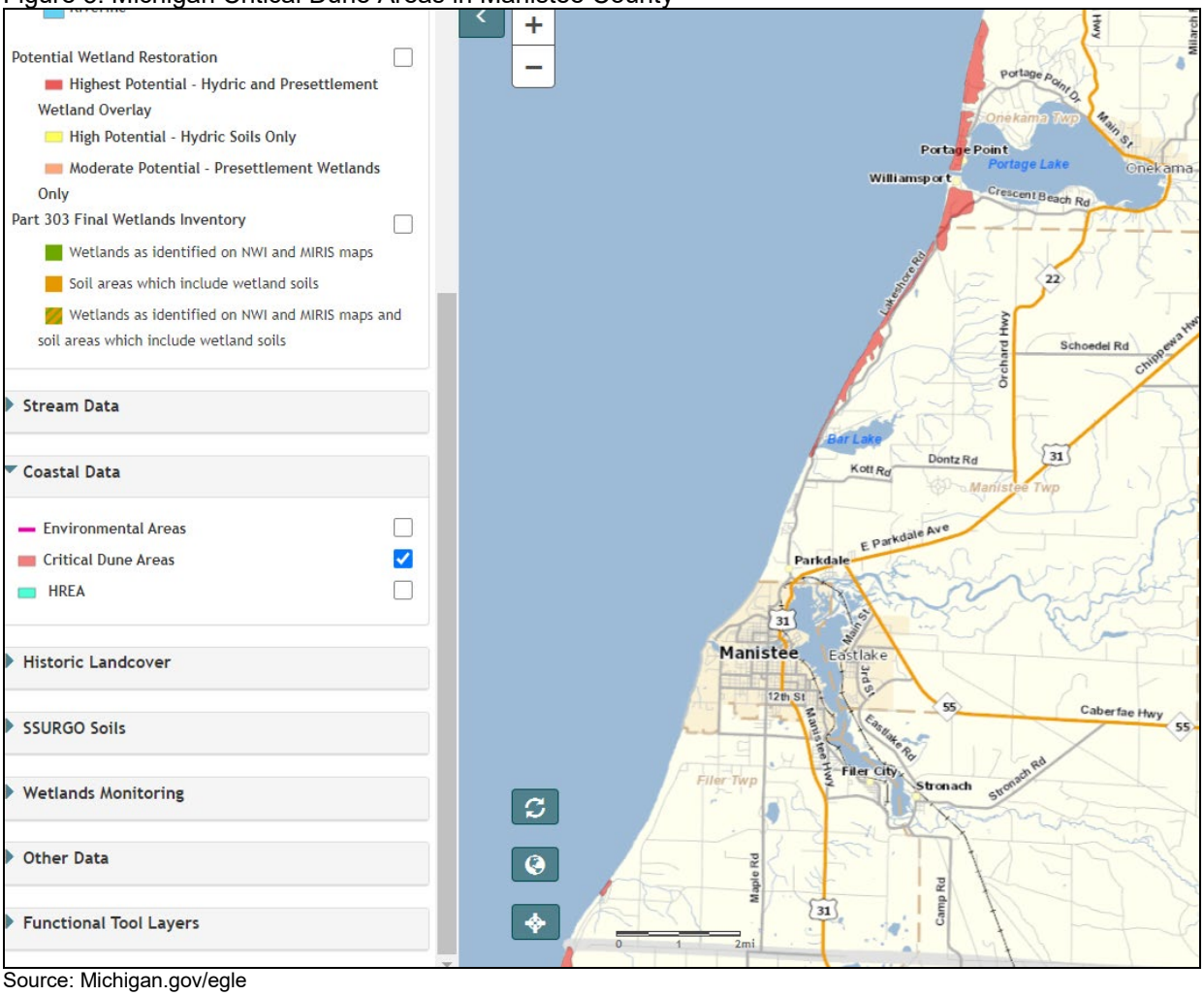
While development in the county has remained fairly steady in the past decade, it has been noted that the type of new development is changing. Office and industrial development has largely stopped, commercial development has slowed, but residential development is occurring as quickly as plans can be approved. Housing of all types and prices is in demand, but many communities desire smaller units and multiple family units. This type of housing is especially important for the senior population and will likely be in demand for many years. The Environmental Features Map in Appendix A shows the intensity of development in the county as well as natural features.

Many of Manistee County's Lake Michigan Shoreline areas contain State-designated and regulated Critical Dune Areas (Figure 3) as well as High Risk Erosion Areas (Figures 4 and 5).

Critical Dune Areas (CDAs) are a combination of coastal barrier dunes, land that has dune-like features, and unique plant communities. Regulatory authority goes to the water's edge. The CDAs include public lands and private properties where developmental, silvicultural, and recreational activities are regulated and a permit is required under Part 353, Sand Dunes Protection and Management, of the NREPA. The law balances the benefits of protecting, preserving, restoring and enhancing the diversity, quality, functions, and value of the critical dunes with the benefits of economic development, multiple uses, and public access. A permit is required for activities that significantly alter the CDA, such as the construction of a house or garage, building a road or driveway, installing a septic system, installing retaining walls, and sand removal. Currently EGLE administers Part 353 for all CDAs in Manistee County.

High-Risk Erosion Areas (HREAs) are shorelines of the Great Lakes where the land is receding at a rate of one foot or more per year for a minimum of 15 years. Recession rates change over time as water levels fluctuate and coastal conditions change. Along these shorelines, new structures are required to meet setbacks for their protection from a changing shoreline. When structures are not in danger, the shoreline does not need to be altered to protect the structure. A permit is required for construction of a structure on any portion of a designated High-Risk Erosion Area parcel regardless of how far the project is from the lakeshore. Common activities requiring a permit include construction of a house, garage, or addition, substantial reconstruction of an existing home, the installation of a septic system, covered porches, or a commercial building. HREAs are regulated by the Administrative Rules of Part 323, Shorelands Protection and Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Currently EGLE administers Part 323 for all HREAs in Manistee County.

Figure 3: Michigan Critical Dune Areas in Manistee County



Source: Michigan.gov/egle

Figure 4: High-Risk Erosion Areas in Southern Manistee County

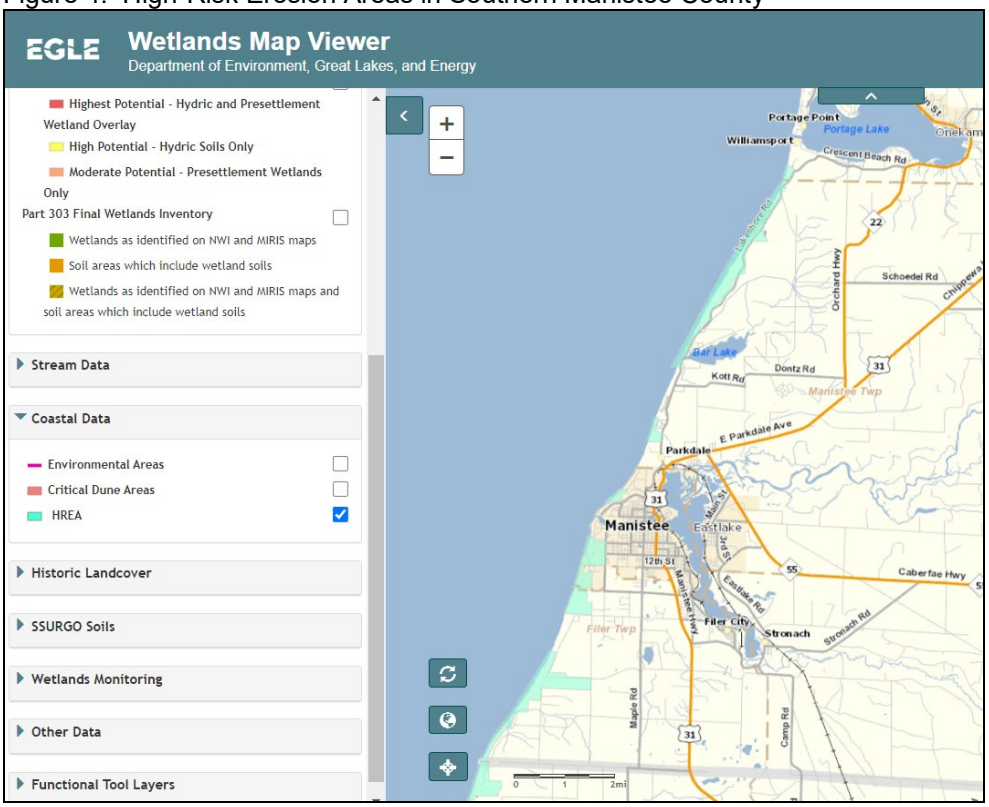
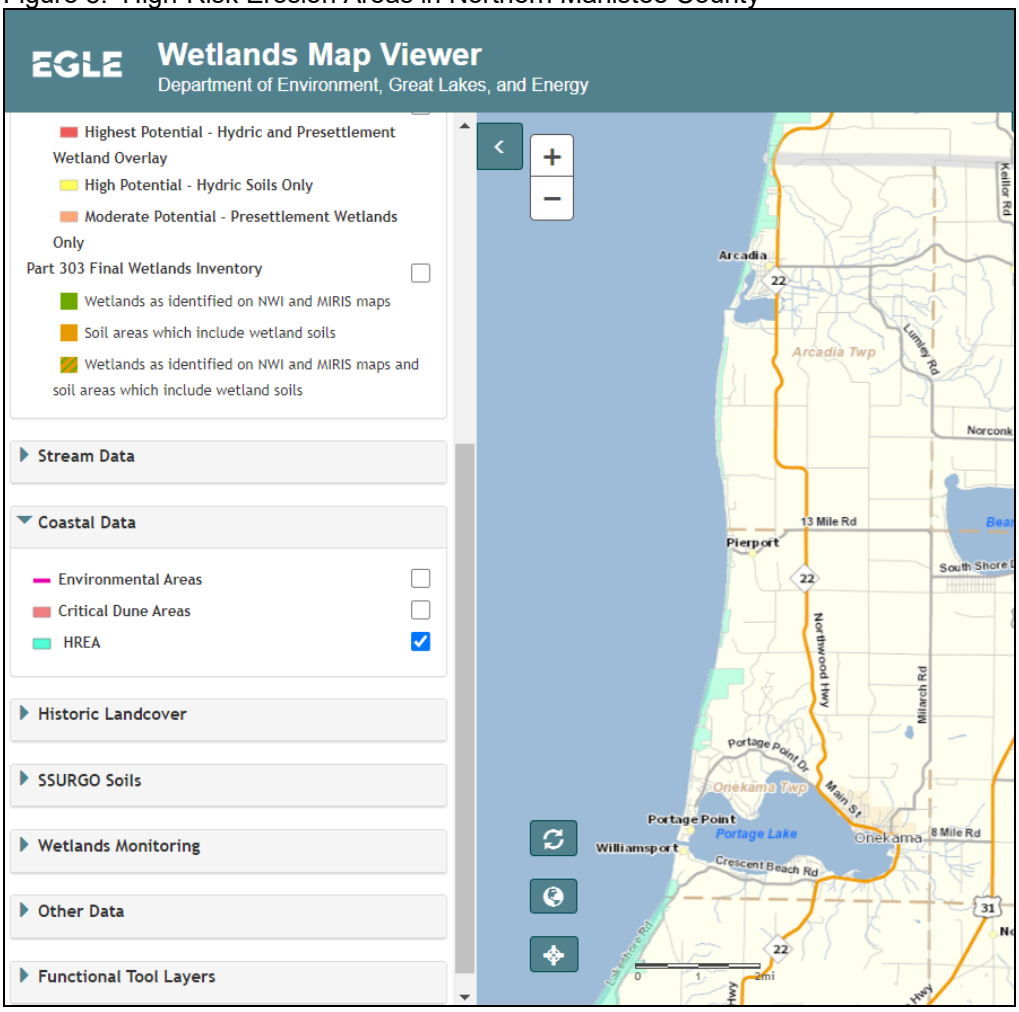


Figure 5. High-Risk Erosion Areas in Northern Manistee County



Climate

Northwest Michigan experiences a four season climate with mild summers and cold, snowy winters. Manistee County coastal areas are set apart from inland areas. Lake Michigan keeps coastal areas warmer in the winter and cooler in the summer, with less rainfall than locations further inland. Since 1991, Manistee County has experienced the most precipitation in October with 3.91 inches on average and an average annual total precipitation of 35.54 inches. June and July share the hottest month with a mean average temperature of 92 °F, however, June has the highest temperature on record of 103 °F. February is the coldest month with a mean average temperature of -11 °F. The lowest temperature on record is -29 °F in February 2015.

On any given day, coastal areas of Manistee County are highly susceptible to quick, sudden changes in the weather. Depending on the time of the year, the Great Lakes have a significant impact on temperatures, precipitation, and the strength of storms. In the spring when the lake water is colder than the air over them, they extract heat from the atmosphere. During the fall, the Great Lakes give off heat and moisture. In both cases, storms arrive on land stronger and more persistent than they might otherwise be. Thunderstorms, extreme winter weather events, and excessive rainfall are common natural hazards with the potential to cause loss of life and significant property damage. This plan identifies potential hazards and mitigation strategies to reduce the impact of those disasters.

Population

Manistee County is the 5th most populated county in the ten county region of Northwest Lower Michigan (Table 3) and is the ranked 58 out of 83 counties in the state for population.[1] The 2019 American Community Survey (ACS) estimated the county population to be 24,457 people. A comparison of the 2010 and 2019 ACS data indicates a 2% decrease in county population from 2010, when the population was an estimated 24,951 persons (Table 4). The estimated 2020 population per square mile is approximately 46.2 people.

[1] https://www.michigan-demographics.com/counties_by_population

Table 3: Population by County, State, 2019

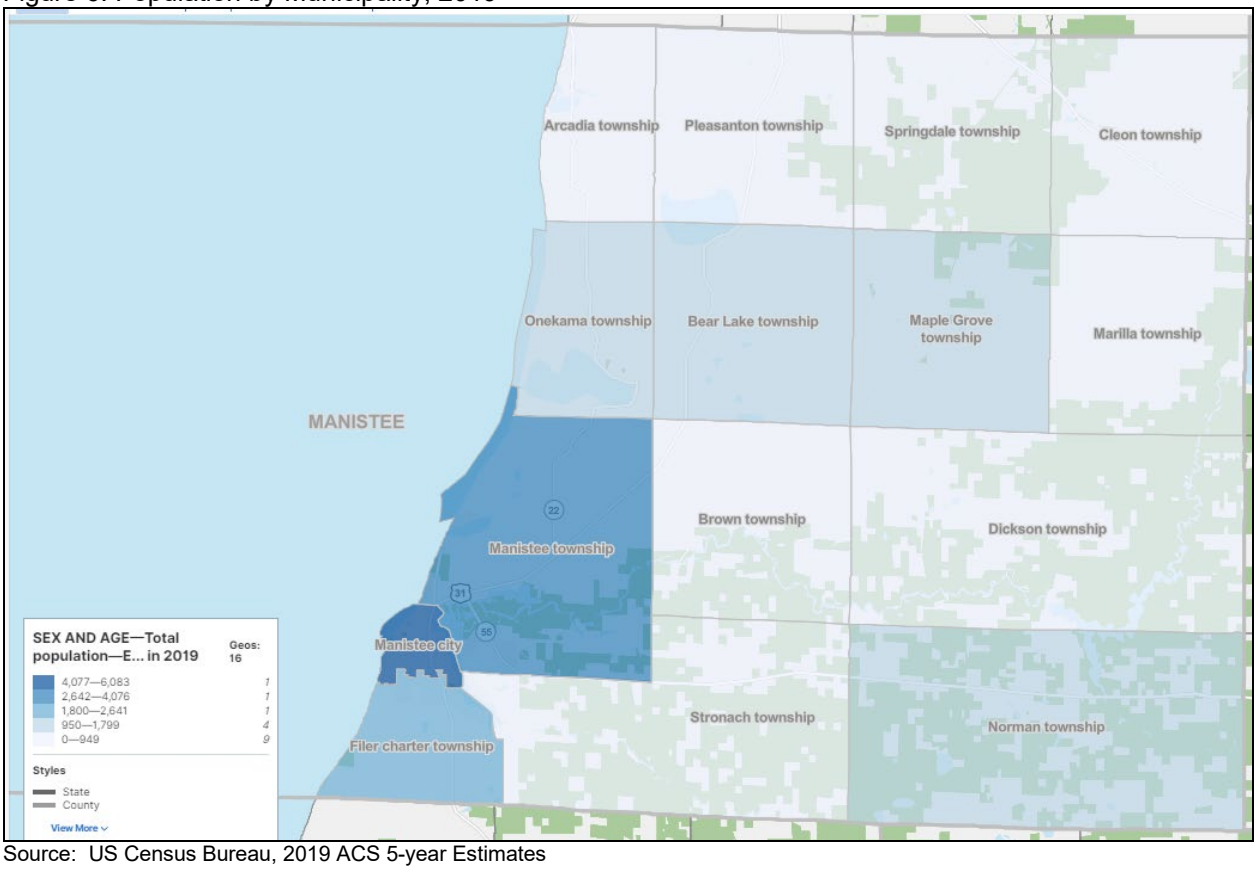
Jurisdiction	Population
Missaukee County	15,028
Kalkaska County	17,585
Benzie County	17,615
Leelanau County	21,652
Antrim County	23,206
Manistee County	**24,457**
Charlevoix County	26,188
Emmet County	33,104
Wexford County	33,256
Grand Traverse County	92,181
State of Michigan	9,965,265

Source: US Census, 2019 ACS 5-Year Estimates

Manistee County is composed of fourteen (14) townships, five (5) villages, of the City of Manistee. Between 2010 and 2019, the county lost an estimated 494 persons, resulting in a 2% decrease in population (Table 4). While the City of Manistee lost population, two of the surrounding townships, Stronach and Filer were two of the three jurisdictions to see the largest increase in population. Each of these is a commuter location for the City of Manistee. The jurisdiction with the largest population increase was Arcadia Township with an increase of 17.9%. Pleasanton Township saw the largest decrease in population with -20.9%. The City and four of the five villages (Bear Lake, Copemish, Eastlake, and Kaleva) all saw a decrease in population as well.

Despite the decrease in population, the City of Manistee remains the population center for the county. Together with Manistee Township, Filer Charter Township, and Stronach Township, this southwest portion of the county holds 13,625 people, or 56% of the total population. The City of Manistee, Manistee Township, and Filer Charter Township are the three most populous places in the county (Figure 6). Note that village population estimates are included within the respective surrounding township population estimates.

Figure 6: Population by Municipality, 2019



Source: US Census Bureau, 2019 ACS 5-year Estimates

Table 4: Population by Municipality and County, 2010-2019

Jurisdiction	2010 Estimated Population	2019 Estimated Population	Numeric Change	Percent Change	Continuing Participant from the 2015 Hazard Mitigation Plan?
Manistee County	**24,951**	**24,457**	**-494**	**-2.00%**	Yes
City of Manistee	6,362	6,083	-279	-4.40%	Yes
Manistee Township	4,054	4,076	22	0.50%	Yes
Filer Charter Township	2,413	2,641	228	9.40%	Yes
Bear Lake Township	1,872	1,799	-73	-3.90%	Yes
Norman Township	1,487	1,390	-97	-6.50%	Yes
Onekama Township	1,449	1,320	-129	-8.90%	Yes
Maple Grove Township	1,236	1,342	106	8.60%	Yes
Cleon Township	970	788	-182	-18.80%	Yes
Pleasanton Township	919	727	-192	-20.90%	No
Springdale Township	914	949	35	3.80%	Yes
Dickson Township	866	899	33	3.80%	No
Brown Township	767	643	-124	-16.20%	Yes
Stronach Township	721	825	104	14.40%	Yes
Arcadia Township	542	639	97	17.90%	Yes
Village of Eastlake	493	463	-30	-6.10%	Yes
Village of Kaleva	473	436	-37	-7.80%	Yes
Village of Onekama	403	461	58	14.40%	Yes
Marilla Township	379	336	-43	-11.30%	Yes
Village of Bear Lake	334	203	-131	-39.20%	Yes
Village of Copemish	253	143	-110	-43.50%	No

Source: U.S. Census Bureau, ACS 5-Yr Estimates

Like many northwest Michigan communities, Manistee County experiences an influx of seasonal residents and tourists during the summer months. However, the decennial Census and the American Community Survey only consistently and comprehensively track the permanent population. The 2022 *Seasonal Population Study for Northwest Lower Michigan*, analyzed the 2020 seasonal population for ten counties in northwest Michigan. The study collected data for permanent and part-time residents and overnight visitors in accommodations and short-term rentals by County. Northwest Lower Michigan's permanent base population is 310,802 and expands to its largest seasonal population of 676,052 in July, a 118% increase. As indicated in Table 5, Manistee County's base population increases by as much as 119% in August (25,032 to 54,924). On average, the county's population grows by 50%, or 12,495 people, throughout the year. All ten counties in the Networks Northwest service area were included in the study: Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, Manistee, Missaukee, and Wexford.

Table 5: Manistee County Seasonal Population by Month

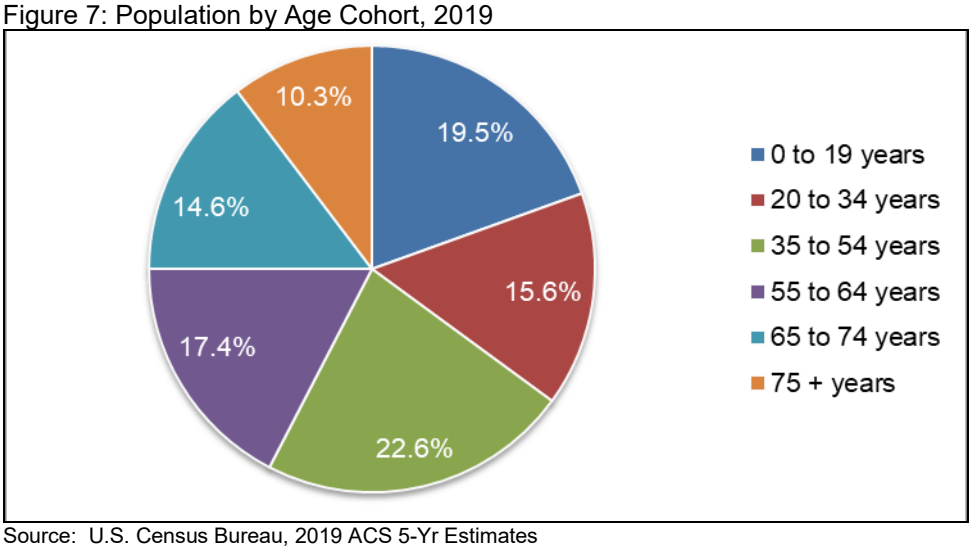
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Permanent Population	25,032	25,032	25,032	25,032	25,032	25,032	25,032	25,032	25,032	25,032	25,032	25,032	
Combined Population	28,218	28,244	29,218	29,928	41,819	51,200	54,656	54,924	38,988	34,333	30,232	28,564	37,527
Difference	3,186	3,212	4,186	4,896	16,787	26,168	29,624	29,892	13,956	9,301	5,200	3,532	12,495
Percent Change	**13%**	**13%**	**17%**	**20%**	**67%**	**105%**	**118%**	**119%**	**56%**	**37%**	**21%**	**14%**	**50%**

Source: Networks Northwest 2022 Seasonal Population Study

Age, Race & Disability

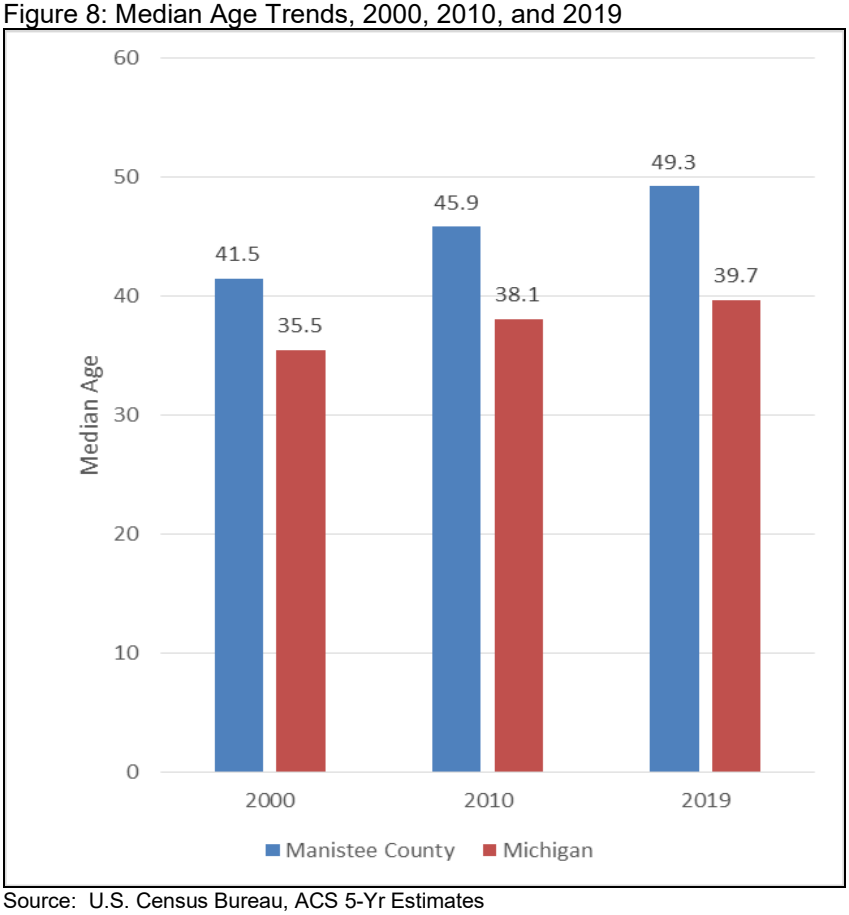
Understanding the age distribution and median age of Manistee County can help identify social, economic, and public service needs in the community. The county's total estimated 2019 population is broken into age cohorts (analyzing which proportions of a municipality's population are in which stages of life). This gives a nuanced view of the makeup of a community. Figure 7 indicates the cohort group with the largest population is the 35 to 54 year old group, followed by those in 0 to 19 year old group. This indicates a fairly young population, and a population likely to grow in the future due to a large number of persons within the family-forming age group (mid-20s to mid-40s). As shown in Figure 8, the median age (the midpoint where half the population is younger and half the population is older) of Manistee County is older (49.3 years) than the State (39.7 years). The county, like the State, is aging, but at a faster rate. The youngest community in the county is the City of Manistee with a median age of 43.9 years; the oldest community in the county is Arcadia Township with a median age of 58 years (Figure 9).

Figure 7: Population by Age Cohort, 2019



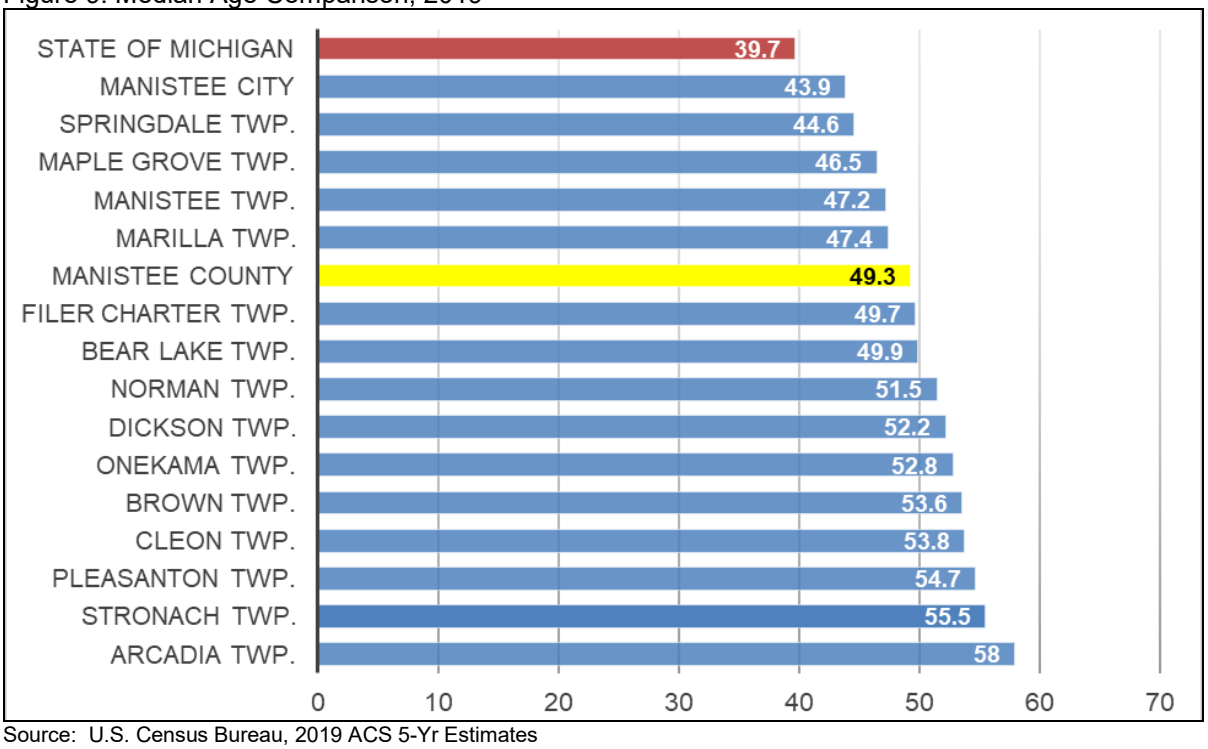
Source: U.S. Census Bureau, 2019 ACS 5-Yr Estimates

Figure 8: Median Age Trends, 2000, 2010, and 2019



Source: U.S. Census Bureau, ACS 5-Yr Estimates

Figure 9: Median Age Comparison, 2019



Source: U.S. Census Bureau, 2019 ACS 5-Yr Estimates

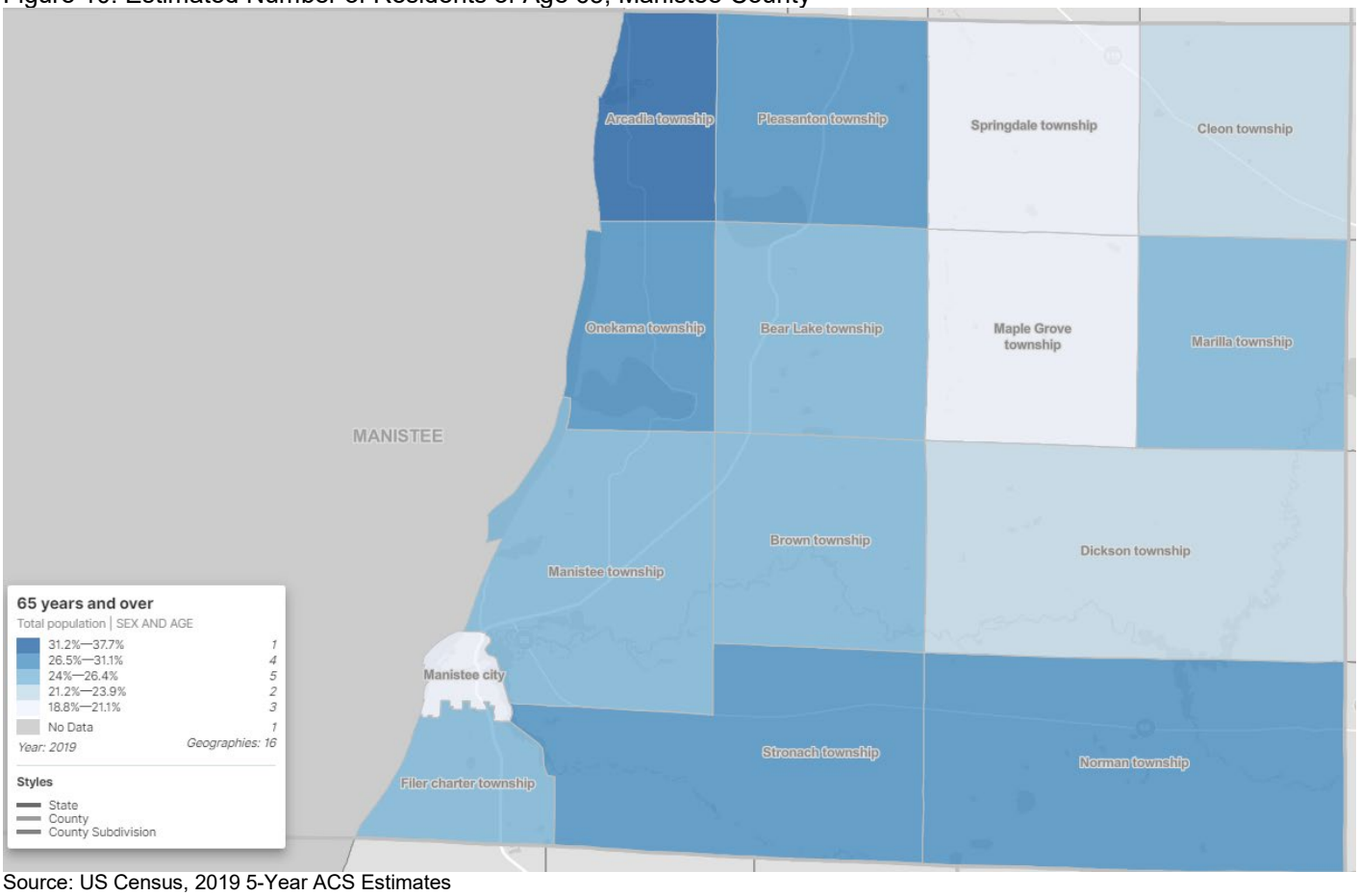
Persons over the age of 65 can be more vulnerable to the impacts caused by hazard events. An estimated 34% of persons aged 65 years or older in Manistee County has one or more type of disability (Table 7). Table 6 indicates that the communities of the City of Manistee, Manistee Township, and Filer Charter Township have the greatest number of residents in this age cohort. All but three of the county's jurisdictions have over 25% of their population in the age 65+ group, with Arcadia Township in the lead at 37.72%. The percentage of those over age 65 by community is illustrated in Figure 10.

Table 6. Estimated Population Over Age 65 by Jurisdiction

Jurisdiction	Pop > Age 65	Percentage	Total Pop.
Manistee County	6,110	24.98%	24,457
Manistee City	1,283	21.09%	6,083
Manistee Twp.	1,075	26.37%	4,076
Filer Charter Twp.	696	26.35%	2,641
Bear Lake Twp.	459	25.51%	1,799
Onekama Twp.	394	29.85%	1,320
Norman Twp.	389	27.99%	1,390
Maple Grove Twp.	283	21.09%	1,342
Arcadia Twp.	241	37.72%	639
Stronach Twp.	235	28.48%	825
Pleasanton Twp.	226	31.09%	727
Dickson Twp.	215	23.92%	899
Cleon Twp.	183	23.22%	788
Springdale Twp.	178	18.76%	949
Brown Twp.	166	25.82%	643
Marilla Twp.	87	25.89%	336

Source: US Census, 2019 5-Year ACS Estimates

Figure 10. Estimated Number of Residents of Age 65, Manistee County



Source: US Census, 2019 5-Year ACS Estimates

Table 7 represents the number of persons with one or more disability and also those with a disability by age group. An estimated 4,227 (18%) of Manistee County residents have one or more type of disability.

Table 7: Persons with a Disability, 2019

Total Civilian Noninstitutionalized Population	23,218 persons
With one or more disability	4,227 (18%)
Age 0-17 with a disability	214 (5% of that age group)
18 to 64 years with a disability	1,950 (15% of that age group)
65 years and over with a disability	2,063 (34% of that age group)

Source: US Census, 2019 ACS 5-yr Estimates

The racial composition of Manistee County is predominantly white (91.17%). 3.2% of the population identifies as Hispanic or Latino origin (of any race); 3.34% of the population is two or more races; 2.9% is Black or African American alone; 1.79% of the population is American Indian and Alaska Native alone; 0.38% of the population is Asian alone; 0.36% identifies as some other race; and 0.07% is Native Hawaiian and Other Pacific Islander alone.

The racial composition estimates of each jurisdiction in the County, as well as those identifying as being of Hispanic or Latino origin, are shown in Table 8. Yellow highlighted entries in the table indicate concentrations of races by geography. The largest estimates of groups by community are listed below.

- Identifying as being of Black or African American race alone: Manistee Township (596 persons); Maple Grove Township (48 persons); Brown Township (31 persons)
- Identifying as being American Indian/Alaskan Native alone: City of Manistee (146 persons); Manistee Township (141 persons); Pleasanton Township (38 persons); Norman Township (28 persons)
- Identifying as being Asian alone: Identifying as being of two or more races: City of Manistee (31 persons); Manistee Township (25 persons); Filer Charter Township (22 persons)
- Identifying as Native Hawaiian & Other Pacific Islander: City of Manistee (12 persons)

- Identifying as Some Other Race: City of Manistee (43 persons)
- Identifying as Two or More Races: City of Manistee (312 persons); Manistee Township (184 persons); Maple Grove Township (73 persons); Onekama Township (65 persons); Bear Lake Township (62 persons); Filer Charter Township (51 persons); Brown Township (22 persons)
- Identifying as of Hispanic or Latino Origin (can identify as any type of race): City of Manistee (257 persons); Manistee Township (149 persons); Bear Lake Township (128 persons); Maple Grove Township (71 persons); Filer Charter Township (44 persons); Pleasanton Township (39 persons); Cleon Township (27 persons).

These communities represent areas that contain small concentrations of minority populations, which are also considered socially vulnerable populations in a natural hazard event scenario. These populations may have limited social and financial resources to withstand or recover from a hazard event.

Table 8: Race and Hispanic/Latino Population Estimates, Manistee County Communities

Jurisdiction	Total Population Est. (2019)	White	Black or African American	American Indian & Alaska Native	Asian	Native Hawaiian & Other Pacific Islander	Some other race	Two or more races	Hispanic or Latino (of any race)
Arcadia Township	639	613	21	5	0	0	0	0	7
	100%	96%	3%	1%	0%	0%	0%	0%	1.10%
Bear Lake Township	1,799	1,697	5	10	4	0	21	62	128
	100%	94%	0%	1%	0%	0%	1%	3%	7.10%
Brown Township	643	573	31	13	0	4	0	22	0
	100%	89%	5%	2%	0%	1%	0%	3%	0.00%
Cleon Township	788	767	0	9	0	0	0	12	27
	100%	97%	0%	1%	0%	0%	0%	2%	3.40%
Dickson Township	899	882	0	17	0	0	0	0	23
	100%	98%	0%	2%	0%	0%	0%	0%	2.60%
Filer Charter Township	2,641	2,539	4	12	22	0	13	51	44
	100%	96%	0%	1%	1%	0%	1%	2%	1.70%
City of Manistee	6,083	5,539	0	146	31	12	43	312	257
	100%	91%	0%	2%	1%	0%	1%	5%	4.20%
Manistee Township	4,076	3,129	596	141	25	0	1	184	149
	100%	77%	15%	4%	1%	0%	0%	5%	3.70%
Maple Grove Township	1,342	1,213	48	5	0	0	3	73	71
	100%	90%	4%	0%	0%	0%	0%	5%	5.30%
Marilla Township	336	328	0	4	1	0	0	3	0
	100%	98%	0%	1%	0%	0%	0%	1%	0.00%
Norman Township	1,390	1,353	1	28	0	0	1	7	15
	100%	97%	0%	2%	0%	0%	0%	1%	1.10%
Onekama Township	1,320	1,253	0	0	2	0	0	65	4
	100%	95%	0%	0%	0%	0%	0%	5%	0.30%
Pleasanton Township	727	680	0	38	0	0	0	9	39
	100%	94%	0%	5%	0%	0%	0%	1%	5.40%
Springdale Township	949	938	4	0	0	0	0	7	3
	100%	99%	0%	0%	0%	0%	0%	1%	0.30%
Stronach Township	825	793	0	9	7	0	5	11	5
	100%	96%	0%	1%	1%	0%	1%	1%	0.60%
Manistee County	24,457	22,297	710	437	92	16	87	818	772
	100%	91.17%	2.90%	1.79%	0.38%	0.07%	0.36%	3.34%	3.20%

Source: US Census, 2019 ACS 5-yr Estimates

Housing

The average household size for Manistee County residents is 2.44 persons, which is slightly lower than the State's average of 2.46. The county had an estimated 15,848 housing units in 2019 (Table 9). Of those, there are an estimated 9,426 total households, or "occupied housing units". The Census defines a household as all the people who occupy a single housing unit, regardless of their relationship to one another.

The City of Manistee has the largest percentage of housing units of all municipalities in the county (22.8%), followed by Manistee Township (10.8%), Norman Township (9.4%), Onekama Township (8.6%), and Filer Charter Township (8.3%). Furthermore, an estimated 63.3% of the county's residential units were built before 1980 (Table 10). The 2019 ACS also estimates that over 80.8% of the county's household units are 1-unit, detached structures (or single-family homes), and 8.4% are mobile homes.

Overall, Manistee County gained an estimated 198 occupied housing units between 2010 and 2019. Manistee Township had the greatest number of additional housing units, followed by Onekama Township, Stronach Township and Springdale Township. Norman Township had the greatest decrease in the number of housing units, followed by the City of Manistee, Pleasanton Township and Brown Township.

Table 9: Housing Unit Estimates by Municipality, 2010 and 2019

Jurisdiction	2010 Units	2019 Units	Unit Change	Percent Change	Percent of 2019 Total
Manistee County	**15,650**	**15,848**	**198**	**1.3%**	
Manistee City	3,778	3,618	-160	**-4.2%**	22.8%
Manistee Twp.	1,485	1,713	228	**15.4%**	10.8%
Norman Twp.	1,709	1,493	-216	**-12.6%**	9.4%
Onekama Twp.	1,228	1,357	129	**10.5%**	8.6%
Filer Charter Twp.	1,244	1,318	74	**5.9%**	8.3%
Bear Lake Twp.	980	949	-31	**-3.2%**	6.0%
Dickson Twp.	693	784	91	**13.1%**	4.9%
Maple Grove Twp.	788	756	-32	**-4.1%**	4.8%
Springdale Twp.	619	725	106	**17.1%**	4.6%
Pleasanton Twp.	812	686	-126	**-15.5%**	4.3%
Stronach Twp.	550	672	122	**22.2%**	4.2%
Arcadia Twp.	517	604	87	**16.8%**	3.8%
Cleon Twp.	516	542	26	**5.0%**	3.4%
Brown Twp.	490	387	-103	**-21.0%**	2.4%
Marilla Twp.	241	244	3	**1.2%**	1.5%

Sources: US Census, 2010 & 2019 ACS 5-Yr Estimates
Note: *The number of housing units for each village is incorporated into the totals for the respective township in which each village is located.

Table 10: Year Structure Built, Manistee County 2019

Year Structure Built	Estimated Units	% of Total	
Built 2010 or later	194	1.22%	
Built 2000 to 2009	1,616	10.20%	
Built 1990 to 1999	2,242	14.15%	
Built 1980 to 1989	1,759	11.10%	36.67%
Built 1970 to 1979	2,411	15.21%	63.33%
Built 1960 to 1969	2,156	13.60%	
Built 1950 to 1959	1,407	8.88%	
Built 1940 to 1949	1,014	6.40%	
Built 1939 or earlier	3,049	19.24%	
TOTAL	**15,848**	**100.00%**	

Source: US Census, 2019 ACS 5-yr Estimates

Table 11 provides the estimates of housing units in Manistee County and whether they are occupied or vacant, as well as the median housing value of owner-occupied units ($125,400) and the median gross rent ($716). Of the 15,848 total housing units, (90%) are occupied (indicating physically occupied, principal residence housing units). 40.5% are categorized as vacant, but it is important to note this includes seasonally-occupied/ secondary homes.

Table 11: Housing Tenure, Manistee County, 2019

Total housing units	15,848	%
Occupied housing units	9,426	59.5%
Owner-occupied	7,861	83.4%
Median Housing Value	$125,400	
Renter-occupied	1,565	16.6%
Median Gross Monthly Rent	$716	
Vacant housing units	6,422	40.5%

Source: US Census, 2019 ACS 5-year Estimates

Economic Profile

The *2021 Comprehensive Economic Development Strategy (CEDS)* prepared by Networks Northwest is the product of a locally-based, regionally-driven economic development planning process to identify strategies for economic prosperity. The plan was prepared for the ten county region of northwest Lower Michigan. Table 12 provides a comparison of annual average wage for each county in the CEDS planning area for 2018. Kalkaska County has the highest average annual wage with $50,971, followed by Grand Traverse County at $44,562. Manistee County has the 9th highest average annual wage at $33,821.

Table 12: Average Annual Wage by County, 2018

County	Average Annual Wage
Antrim	$33,081
Manistee	**$33,821**
Benzie	$33,908
Missaukee	$35,917
Leelanau	$36,833
Emmet	$40,258
Wexford	$40,586
Charlevoix	$44,558
Grand Traverse	$44,562
Kalkaska	$50,971

Source: 2021 Comprehensive Economic Development Strategy (CEDS) prepared by Networks Northwest

The economic profile of Manistee County is further described in Table 13. The county's industry makeup is divided into 20 different North American Industry Classification Sectors (NAICS) with associated industry job numbers and annual average wages. The industry with the largest number of jobs in 2018 was "Other includes (private, management of business, and unallocated)" with 43% of jobs, followed by "Retail trade" with 14% of jobs and "Manufacturing" with 13% of jobs. The industry with the highest annual average wage is "Manufacturing" at $54,802, followed by "Information" with $45,305. The 2018 annual average wage for "Retail trade" was $20,074.

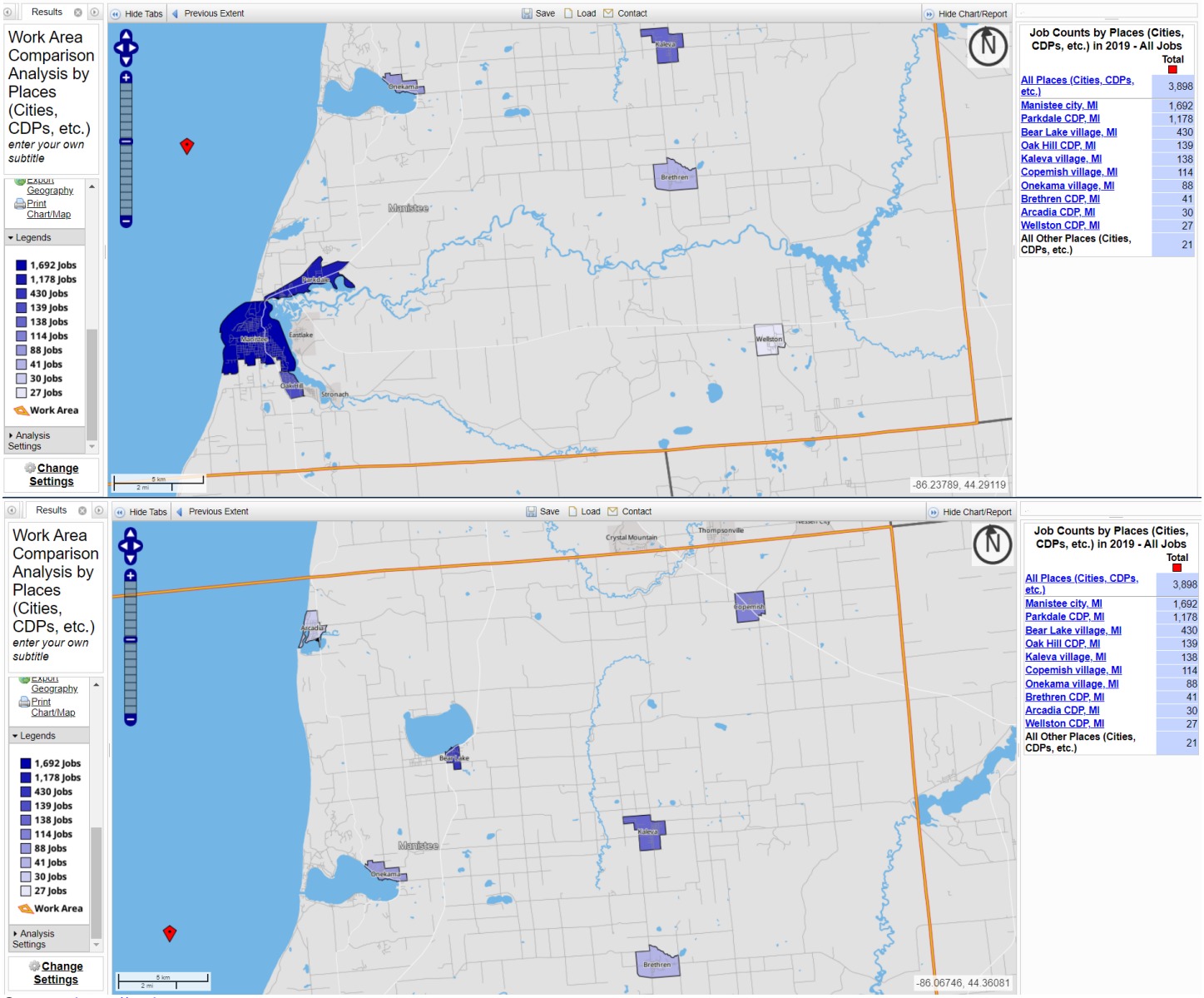
Table 13: Manistee County Industry Sector Data, 2018

Industry	Establishments	Jobs	Percent Distribution in the County	Average Annual Wage
Total Covered Employment	532	7,078	100.00%	$33,821
Agri., forestry, hunting	11	D	D	$27,992
Mining	2	D	D	$40,339
Construction	65	267	3.80%	$27,615
Manufacturing	**24**	**927**	**13.10%**	**$54,802**
Wholesale trade	8	208	2.90%	$30,776
Retail trade	**87**	**1,005**	**14.20%**	**$20,074**
Transportation, warehousing	20	119	1.70%	$41,081
Utilities	3	39	0.60%	**D**
Information	9	57	0.80%	$45,305
Finance and Insurance	20	125	1.80%	$32,177
Real Estate, rental, leasing	11	29	0.40%	$16,378
Professional, technical services	30	82	1.20%	$34,345
Administrative, waste services	21	91	1.30%	$44,905
Educational services	13	N/A	N/A	**D**
Health care, social assistance	47	N/A	N/A	**D**
Arts, entertainment, recreation	13	173	2.40%	$18,502
Accommodation and food services	63	598	8.40%	$10,751
Other services, exc. public admin.	60	222	3.10%	$18,917
Public administration	24	68	1.00%	$31,757
Other Includes (private, management of business, and unallocated)	**1**	**3,068**	**43.30%**	**N/A**

Source: 2021 Comprehensive Economic Development Strategy (CEDS) prepared by Networks Northwest
**D means limited industries of a sector that would disclose confidential information*

Additionally, OnTheMap, an online interactive tool available from the US Census Bureau, allows for viewing areas of job density within the county. This website may be useful for emergency preparedness planning as related to response and potential impact to local economic activity areas. It appears the greatest number of jobs are within and surrounding the City of Manistee. Figures 11 and 12 are screenshots of the interactive map when completing an area profile analysis for all workers in all jobs in the county in 2019.

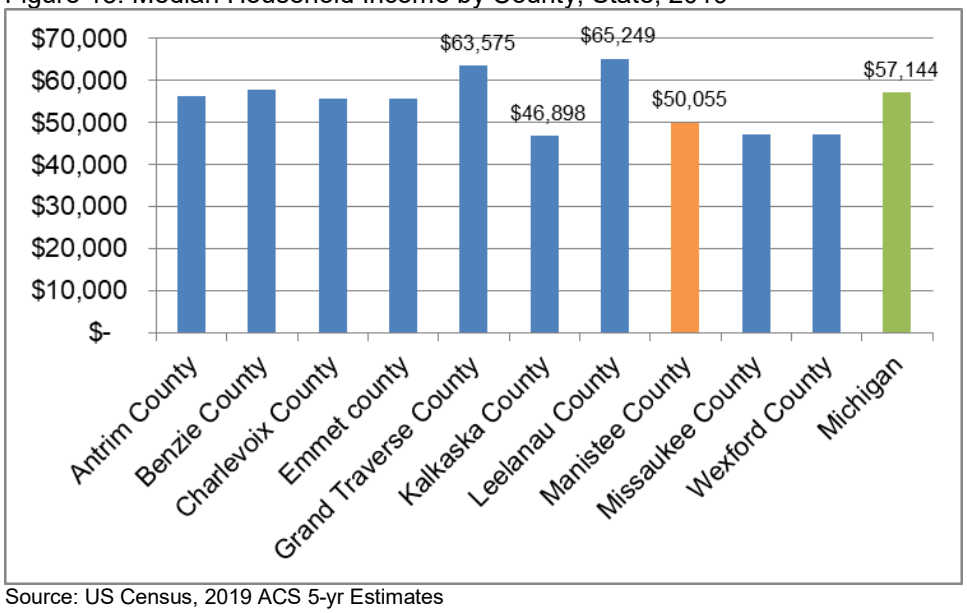
Figures 11 and 12: Jobs Counts by Location in Manistee County, 2019



Source: https://onthemap.ces.census.gov

Figure 13 presents a comparison of the median household income (MHI) across the ten county region, the State of Michigan, and local jurisdictions. Manistee County has a median household income of $50,055, ranking 7th highest in the 10 county region. Leelanau County has the highest median household income at $65,249. Locally, Onekama Township and the Village of Onekama have the highest MHI, at $71,429 and 71,250, respectively (Table 14). The Village of Bear Lake has the lowest MHI with $36,250.

Figure 13: Median Household Income by County, State, 2019



Source: US Census, 2019 ACS 5-yr Estimates

Table 14: Median Household Income (MHI) by Local Jurisdiction, Manistee County, 2019

Jurisdiction	MHI
Manistee County	$50,055
Village of Bear Lake	$36,250
Dickson Township	$38,250
Village of Kaleva	$38,500
Maple Grove Township	$40,909
City of Manistee	$44,878
Norman Township	$46,042
Village of Eastlake	$46,071
Springdale Township	$48,500
Cleon Township	$48,603
Pleasanton Township	$48,672
Village of Copemish	$48,750
Brown Township	$50,521
Manistee Township	$52,083
Marilla Township	$52,500
Filer Charter Township	$52,708
Stronach Township	$55,833
Bear Lake Township	$56,103
Arcadia Township	$59,375
Village of Onekama	$71,250
Onekama Township	$71,429

Source: US Census, 2019 ACS Estimates

The county's economic profile can be further described by considering the cost of housing, transportation, and other goods and services. The budgeting rule of thumb has been that a household should spend no more than 30 percent of its income on housing costs. Considering the MHI of Manistee County over twelve months, a household is earning $4,171 per month. The US Census 2019 5-year ACS estimates that the median gross monthly rent is $716 in Manistee County, which equates to about 17% of the median household income.

However, according to the 2019 Northwest Michigan Target Market Analysis[2] (conducted by LandUseUSA on behalf of Housing North and Networks Northwest), rents are far higher in Manistee County than what many renters can afford. While the affordable rent for a renter earning the mean wage in the county is $1,251, the affordable rent for a full-time minimum wage worker earning $9.45 an hour is $491. Anecdotally, the demand for housing is driving prices higher still. Home prices are increasing where the cost to purchase a home is often $200/square foot or more.

The following tables describe the population with the lowest incomes. It is estimated that in 2019, 11.5 percent of the population and 7.3% of families in the county lived at or below the poverty level (Table 15). The Census describes poverty thresholds differently based on the size of the family and the number of related children living together, as illustrated in Table 16.

Table 15: Manistee County Poverty Estimates, 2019

Cohort	Estimated Total in Manistee County	Estimated Number Below Poverty Level	Est. % Below Poverty Level
Families in Manistee County	5,956	435	7.3%
Families with related children under age 18	1,841	278	15.1%
Population for whom poverty status is determined	23,122	2,652	11.5%

Source: US Census, 2019 ACS 5-yr Estimates

Table 16: 2019 Federal Poverty Level Guidelines

Persons in family/household	Poverty guideline
1	$12,490
2	$16,910
3	$21,330
4	$25,750
5	$30,170
6	$34,590
7	$39,010
8*	$43,430

**For families/households with more than 8 persons, add $4,420 for each additional person.*

Financial hardship is further described in the United Ways of Michigan report entitled *ALICE in Michigan: A Financial Hardship Study*. ALICE, which is an acronym for "Asset Limited, Income Constrained, Employed", are those households with income above the Federal Poverty Level, but below the basic cost of modern living, such as housing, child care, food, health care, technology and transportation. The ALICE threshold is described as, "*the average income that a household needs to afford the basic necessities… for each county in Michigan. Households earning below the ALICE Threshold include both ALICE and poverty-level households*" (ALICE, 2019). Table 17 identifies the number of ALICE and poverty households for the county and each municipality. These households likely would not have reserve savings to cover an emergency, such as impacts to their personal property from a natural hazard event.

[2] https://www.housingnorth.org/target-market-analysis

Table 17: ALICE and Poverty Households in Manistee County

Location	Total Households	HH in Poverty & ALICE	% of HH in Poverty & ALICE	Poverty Households	ALICE Households
Marilla Twp.	128	55	43.0%	14	41
Arcadia Twp.	265	88	33.2%	21	67
Brown Twp.	231	97	42.0%	21	76
Stronach Twp.	380	137	36.1%	39	98
Cleon Twp.	315	138	43.8%	50	88
Pleasanton Twp.	329	138	41.9%	48	90
Springdale Twp.	336	147	43.8%	58	89
Onekama Twp.	518	160	30.9%	20	140
Dickson Twp.	363	189	52.1%	61	128
Bear Lake Twp.	611	227	37.2%	67	160
Maple Grove Twp.	488	248	50.8%	77	171
Norman Twp.	561	275	49.0%	60	215
Filer Charter Twp.	1,043	404	38.7%	54	350
Manistee Twp.	1,283	502	39.1%	130	372
Manistee City	2,575	1,223	47.5%	345	878
MANISTEE COUNTY	**9,426**	**4,028**	**42.7%**	**1,065**	**2,963**

Data Sources: 2019 ACS 5-Yr Estimates and https://www.unitedforalice.org/state-overview/michigan

IV. Hazard Identification and Assessments

Vulnerability Assessment

Hazard impacts on the community can be understood by evaluating vulnerabilities for commonly agreed upon assets. A community's assets are defined broadly to include anything that is important to the character and function of a community and can be described very generally in the following categories:

- People
- Economy
- Built environment
- Natural environment

Vulnerable populations include the economically disadvantaged, elderly, homeless, persons with a disability, and those of a minority race. Those that live unsheltered or in homeless encampments, assisted living facilities, mobile home parks, or isolated subdivisions are more susceptible to natural hazard events. Locations of mobile/manufactured homes and campgrounds/RV parks are represented on the *Vulnerable Populations and Hazard Areas Map* in Appendix A. (There may be other existing locations of vulnerable populations that are not indicated on the map.) The State Equalized Value (SEV) of the approximate area of these properties, based on the US Census Bureau's 2019 ACS 5-year estimates and Manistee County Equalization data, is as follows:

- Campgrounds: $3,030,929.20
- Mobile/Manufactured Homes: $1,975,118.10

The natural environment is the primary influencing factor for residents choosing to live and vacation in northwest Michigan. Manistee County is home to abundant forest lands, inland lakes and streams, unique sand dune areas, Lake Michigan shoreline and all of the wildlife within that are integral to the identity of the community. While natural resources are abundant, they are vulnerable to all types of hazards. Northwest Lower Michigan is also home to many sensitive wildlife populations that require specific climates and habitats to survive. Damaged, destroyed, or changing natural environments may decrease the chances for certain species' survival.

As stated previously, Northwest Michigan receives an influx of seasonal residents in the summer months. According to the 2022 report by Networks Northwest, *Seasonal Population Study for Northwest Lower Michigan*, the highest estimated monthly population (combined full-time, part-time and overnight visitors) within Manistee County occurs in August at 54,924 persons. This is more than double the estimated number of year-round residents (25,032 persons).

Infrastructure points (stream crossings, bridge conditions, and dams) and their available condition ratings are shown on the Infrastructure Map in Appendix A. Additionally, locations of critical infrastructure is represented on the Critical Infrastructure Map in Appendix A. Table 18 is a summary of critical infrastructure points in Manistee County:

Table 18: Critical Facilities and Infrastructure

Total Number of Sites	Facility Type
14	**Emergency Services** - Manistee Twp.: County Sheriff's Office, Oaks Correctional Facility, LRBOI Police Dept., Manistee Twp. Fire Dept. - City of Manistee: City Fire Dept. - Village of Kaleva: Maple Grove Fire Dept. - Village of Onekama: Onekama Fire Dept. - Village of Bear Lake: Bear Lake Fire Dept. - Village of Copemish: Cleon Fire Dept. - Village of Eastlake: Eastlake Fire Dept. - Filer Charter Twp.: Filer Fire Dept. - Dickson Township: Dickson Fire Dept. - Norman Township: Norman Fire Dept. - Stronach Township: Stronach Fire Dept.
10	**Government Facilities** - City of Manistee: City Hall, County Court House, Manistee DPW, Water Treatment Facility - Manistee Township: Tribal Water Treatment Facility, Tribal Government Building - Filer Charter Township: Township Hall - Dickson Township: Tippy Dam - Marilla Township: Hodenpyl Dam - Bear Lake Township: Manistee County Road Commission Building
8	**Schools (K-12)** - City of Manistee (5) - Dickson Township (1) - Bear Lake Village (1) - Onekama Village (1)
5	**Transportation** - Manistee Township: M-55 Bridge over Manistee River; Manistee County's Blacker Airport - City of Manistee: Maple St. Bridge over Manistee River - Dickson Township: N. High Bridge Road over Manistee River - Norman Township: M-55 over Pine River
4	**Communications** - 911 towers in Bear Lake Township, Marilla Township, Arcadia Township and Norman Township.
3	**Industry** - City of Manistee: Morton Salt - Filer Charter Township: Packaging Corporation of America - Stronach Township: Martin Marietta Chemical Mfg.
3	**Energy** - Filer Charter Township: Filer TES (Electricity) - Bear Lake Township: Blarney Castle (Natural Gas) - Village of Kaleva: Fischer Tanks (Natural Gas)
3	**Commercial** - Manistee Township: Little River Casino and Resort; Meijer supermarket - Filer Charter Township: Family Fare Grocery Store
2	**Healthcare** - Manistee Township: Munson Hospital; Manistee County Medical Care Facility

Source: Manistee County Emergency Management

Historical Analysis

The historical analysis of hazards in Manistee County uses information on impacts and losses from previous hazard events to predict potential impacts and losses during a similar event. Because of the occurrence of these events, communities are more likely to have experience with and/or data on impacts and losses. There have been 13 incidents involving a federal or state declaration of an emergency or disaster affecting Manistee County (Table 19; red, bold text). These events are also included in the hazard analysis for individual event types.

Table 19: Presidential and Governor Declared Disasters or Emergencies for Manistee County

Date of Incident	Type of Incident	Affected Area	(P)residential Declaration* / Federal ID Number** or State of Emergency (G)overnor's Declaration***
3/10/2020, 3/27/2020 Ended 5/11/2023	Pandemic	All 83 counties; Nationwide	(P) Major Disaster, (G) Emergency
1/29/2019	Extreme Cold	All 83 counties	(G) Emergency
7/14/2008	Thunderstorms, flooding	12 counties: Allegan, Barry, Eaton, Ingham, Lake, Manistee, Mason, Missaukee, Osceola, Ottawa, Saginaw, and Wexford Co.	(P) Major Disaster (1777)
6/19/2008	Thunderstorms	Lake, Manistee, Osceola, Ottawa, and Wexford Co.	(G) Emergency
9/7/2005	Hurricane evacuation	All 83 counties	(P) Emergency (3225)
9/4/2005	Hurricane evacuation	All 83 counties	(G Disaster
10/28/1986	Flooding, heavy rain	Allegan, Arenac, Bay, Clare, Clinton, Genesee, Gladwin, Gratiot, Huron, Ionia, Isabella, Kent, Lake, Lapeer, Macomb, Manistee, Mason, Mecosta, Midland, Montcalm, Muskegon, Newaygo, Oceana, Osceola, Ottawa, Saginaw, Shiawassee, Tuscola, and Van Buren Co.	(G) Disaster
9/15/1986			
9/12/1986			
9/10-19/86	Flooding	30 counties: Allegan, Arenac, Bay, Clare, Clinton, Genesee, Gladwin, Gratiot, Huron, Ionia, Isabella, Kent, Lake, Lapeer, Macomb, Manistee, Mason, Mecosta, Midland, Montcalm, Muskegon, Newaygo, Oceana, Osceola, Ottawa, Saginaw, Sanilac, Shiawassee, Tuscola, and Van Buren Co.	(P) Major Disaster (774)
1/26-27/78	Blizzard, snowstorm	Statewide	(P) Emergency (3057)
1/26/1978	Blizzard, snowstorm	Statewide	(G) Disaster
3/2/1977	Drought	44 counties: Alcona, Alger, Alpena, Antrim, Arenac, Baraga, Benzie, Charlevoix, Cheboygan, Chippewa, Clare, Crawford, Delta, Dickinson, Emmet, Gladwin, Gogebic, Grand Traverse, Houghton, Iosco, Iron, Isabella, Kalkaska, Lake, Leelanau, Luce, Mackinac, Manistee, Marquette, Mason, Mecosta, Menominee, Missaukee, Montmorency, Oceana, Ogemaw, Ontonagon, Osceola, Oscoda, Otsego, Presque Isle, Roscommon, Schoolcraft, and Wexford Co.	(P) Emergency (3035)
4/5/1956	Tornado	4 counties: Benzie, Leelanau, Manistee, and Ottawa Co.	(P) Major Disaster (53)
Notes			
***Does not include separate Secretary of Agriculture or Small Business Administration (SBA) disaster declarations, which are issued under other authorities. Declarations after 1974 were issued under PL 93-288 (Disaster Relief Act), as amended by the Robert T. Stafford Disaster Relief and Emergency Assistance Act (1988) and the Disaster Mitigation Act (2000).**			
****Indicates federal declaration number assigned by FEMA or its predecessor agencies**			
*****Declarations since 1977 were issued under 1976 PA 390, as amended (Michigan Emergency Management Act).**			

Sources: Sources: FEMA https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties and Michigan State Police 2019 Michigan Hazard Analysis (MHA) pub. 103

Hazard Descriptions

Manistee County is vulnerable to a wide range of natural hazards. Hazard events have the potential to impact community residents and visitors, economic drivers in the community, critical infrastructure, the built environment, and the natural environment. Manistee County Emergency Management is challenged with managing these threats to protect life and property. This plan includes a profile for each hazard event Manistee County is likely to face. Each profile includes the location, extent, previous occurrences, probability of future events, and a vulnerability assessment.

- **Location** is the geographic areas within the planning area that are affected by the hazard, such as a floodplain. The entire planning area may be uniformly affected by some hazards, such as drought or winter storm. Location may be described in narrative and or through map illustrations.
- **Extent** is the strength or magnitude of the hazard. Extent can be described in a combination of ways depending on the hazard.
- **Previous occurrences** describe the history of previous hazard events within the county. This information helps to estimate the likelihood of future events and predict potential impacts. The extent of historic events may be included when the data is available. Data is primarily collected from the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI) Storm Events Database.
- **Probability of future events** is the likelihood of the hazard occurring in the future based on previous event occurrences and any trends that may appear. Probability may be defined using historical frequencies or statistical probabilities.
- **Vulnerability assessment** accounts for the type, amount, and value of assets such as: existing and future buildings, infrastructure, critical facilities, populations, recreation areas and environmental features that may be impacted by a hazard, along with existing community assets to mitigate or respond to the hazard.

Data for natural hazard events in Manistee County was compiled from several different sources. Weather event data was collected primarily from the National Centers for Environmental Information through the National Oceanic and Atmospheric Administration's (NOAA) website. All data sources include:

- **Presidential- and Governor-Declared emergencies and disasters -** FEMA's webpage on Disaster Declarations for States and Counties and Michigan State Police's 2019 *Michigan Hazard Analysis*

- **Climate** https://www.weather.gov/wrh/Climate?wfo=apx – Historical local observed weather data; Climate prediction and variability; local high impact event summaries

- **Past Severe Weather Events - NOAA Storm Event Database** https://www.ncdc.noaa.gov/stormevents/ Data available to search beginning in 1950 to within 3 months from present day; however, information for various events is limited and non-contiguous. The database provides local storm reports, damage reports, and recorded event descriptions. The event types researched for Manistee County include the following (the event types in italics are as these types of events are listed in the Storm Events Database):
    - Dangerous Currents (i.e., *Rip Current*)
    - Dense Fog (*Dense Fog*)
    - Drought (*Drought*)
    - Extreme Temperatures (*Cold/Wind Chill, Extreme Cold/Wind Chill, Heat, Excessive Heat)*
    - Extreme Winter Weather (*Blizzard, Freezing Fog, Frost/Freeze, Heavy Snow, Ice Storm, Lake-Effect Snow, Sleet, Winter Storm, Winter Weather*)
    - Flooding *(Flash Flood, Flood*)
    - Hail (*Hail*)
    - Seiche (Seiche)
    - Shoreline Flood (*Lakeshore Flood*)
    - Thunderstorm and High Wind (*Heavy Rain, Lightning, High Wind, Strong Wind, Thunderstorm Wind*)
    - Tornado (*Tornado, Funnel Cloud, Waterspout*)
    - Wildfire (*Wildfire*)

- **Wildfires -** The *Michigan Hazard Analysis*, completed by the Michigan State Police in 2019, was referenced to collect data on wildfires that occurred on State of Michigan owned land between 1981 and 2018 (as reported by the MDNR). Additionally, the 2021 USDA/USFS publication Spatial Wildfire Occurrence Data for the United States, 1992-2018 [FPA_FOD_20210617] was used to collect data on wildfires that occurred on state/private or federally-owned land within the county.

- **Dams** - The websites for the National Inventory of Dams and MI-EGLE's Michigan Dam Inventory were used to collect information on dams in the county.

- **Dangerous Currents** - The National Weather Service's Great Lakes Beach Hazards Incident Statistics indicates current-related fatalities and rescues on the Great Lakes from 2002 to 2020.

- **Drought** - Historical local observed drought data was obtained from the US Drought Monitor.

The NOAA NCEI Storm Event Database is updated on a rolling basis, and thus is always being added to. The most up to date information was added to Table 20, but as events occur the database will change. Thus, additional events will be added in subsequent years. The database indicates that 226 events were reported between 01/01/1950 and 12/31/2022 (26,663 days). There were a total of 187 days with an event, 3 days with an event and death or injury, 34 days with an event and property damage, and 2 days with an event and crop damage. Those events as well as the emergency/disaster declaration events are included in the hazard analysis. It is important to note when viewing the data that most of the events were recorded after the mid-1990's, even though the available search range dates back to 1950. Those events, as well as emergency and disaster declaration events, are included in the hazard analysis.

Table 20: Manistee County Hazard Events by Type, Location, and Year

Type of Event	# of Events	Event Location	Years Event Recorded
Wildfire	54 / 75	MDNR Lands / Federal Lands	1981-2018 / 1994-2017
Extreme Winter Weather (i.e. Ice storm, Heavy Snow, Blizzard)	103	Countywide	*1978, 1997-2016, 2018-2022
Thunderstorms and High Winds	65	Countywide	1964, 1966, 1973, 1975, 1980, 1985, 1987, 1989, 1991, 1997-2003, 2005-2013, 2015, 2017-2019, 2021
Hail	35	Countywide	1973, 1985, 1998-2000, 2003-2005, 2006, 2008, 2011, 2012, 2017, 2019, 2020-2022
Riverine and Urban Flooding	11	Townships of Arcadia, Onekama, Manistee, Filer, Marilla, Dickson, Brown, and Stronach; City of Manistee	*1986, 2000, 2001, 2005, *2008, 2011, 2019
Shoreline Hazard (Lakeshore Flood)	4	Townships of Arcadia, Onekama, Manistee, and Filer; City of Manistee	2019 (2), 2020 (2)
Extreme Temperatures (Heat / Cold)	2 / 3	Countywide	2001, 2018 / 2007, 2014, *2019
Shoreline Hazards (Dangerous Currents)	2	City of Manistee	2007, 2009
Lightning	2	Countywide	2000, 2016
Tornado	2	Townships of Onekama, Bear Lake, Pleasanton, and Stronach	*1956; 2008
Dense Fog	1	Countywide	2010
Drought	1	Countywide	*1977
Public Health Emergency	1	Tribal, State, and National Declarations	*2020
Invasive Species		Countywide	Ongoing
Shoreline Hazards (Waterspout, Seiche)	0	City of Manistee; Village of Eastlake; Village of Onekama; Townships of Filer, Manistee, Onekama and Arcadia	-

Sources: NOAA National Centers for Environmental Information Storm Events Database; MDNR; USFS/USDA; Michigan State Police-Dept. of Homeland Security; FEMA; NWS Great Lakes Beach Hazards Incident Statistics. Note: * indicates a state or federal declaration of an emergency or disaster

Economic Impact Analysis

Table 21 presents the *reported* deaths, injuries, property damages, and crop damages from hazard events in Manistee County from 1950-2022. There have been 94 deaths, 2 rescues and 3,529 illnesses, which were mostly related to the COVID-19 pandemic. The economic impact of NOAA-recorded hazard events for Manistee County is $6,779,000 in property damages and $10,035,000 in crop damages. It should be noted that many events likely cause numerous amounts of property damage, but these often go unreported.

Table 21: Reported Impact by Event Type, Manistee County

Event	Deaths	Rescue, Injury/ or Illness	Property Damages	Crop Damages
Extreme Winter Weather	0		$350,000	$10,000,000
Thunderstorm and High Wind	2		$645,500	$0
Riverine and Urban Flooding	0		$5,020,000	$0
Lakeshore Flooding	0		$499,000	$0
Tornado	0		$265,000	$0
Hail	0		$0	$35,000
Extreme Temperatures (Heat or Cold)	0		$0	$0
Lightning	1		$0	$0
Wildfire	0		$	$
Rip Current or Structural Current	1	2	$0	$0
Dense Fog	1		$0	$0
Public Health Emergency (COVID-19)	89*	3,529*	N/A	N/A
Invasive Species	N/A		N/A	N/A
TOTAL	**94**	**3,531**	**$6,779,000**	**$10,035,000**

Sources: NOAA's National Centers for Environmental Information; NWS Great Lakes Beach Hazards Incident Statistics; *State of Michigan https://www.michigan.gov/coronavirus/stats reported confirmed deaths and cases in Manistee County as of December 31, 2022.

Table 22 provides an overview of each potential hazard's estimated impact on the State Equalized Values (SEV) for real and personal property (residential and commercial). SEV is equal to half the true value of the property.

Table 22: Hazard Impacts by Location (referencing Hazard Areas and Vulnerable Population Map in Appendix A)

Hazard Event	Location	State Equalized Value
Extreme Winter Weather, Thunderstorm, Hail, Lightning, Tornado, Extreme Temperatures, Dense Fog, Drought	County-wide	$ 1,508,634,900.00
Inland Flooding	Manistee River communities: portions of the City of Manistee, Village of Eastlake, and the Townships of Filer, Manistee, Stronach, Brown, Norman, Dickson and Marilla.	$ 118,114,815.60
Wildfire (Recent Fire Incidents)	Norman and Dickson Townships	$ 4,470,492.10
Wildfire (High Risk Areas)	Pine forest areas (White, Red and Jack Pine) scattered throughout every community	$ 178,629,944.60
Coastal Hazard Areas: Shoreline Flooding and Erosion	Arcadia Township, Onekama Township, Manistee Township, Filer Township, City of Manistee	$ 302,719,068.50
Tornado, High Wind, Thunderstorm/Wind, Hail, Lightning, Extreme Temps, Wildfire, Flooding	Campgrounds (25) in Village of Eastlake, Village of Kaleva, and townships of Pleasanton, Springdale, Manistee, Brown, Stronach, Dickson, and Norman.	$3,030,929.20
Tornado, High Wind, Thunderstorm/Wind, Hail, Heavy Snow	Mobile/Manufactured Home Communities (4) in Village of Eastlake, Manistee Township, Arcadia Township, and Pleasanton Township	$1,975,118.10
Invasive Species	Countywide	N/A

Source: Manistee County Equalization

Extreme Winter Weather

The National Weather Service defines a winter weather event as: *a winter weather phenomenon (such as snow, sleet, ice, wind chill) that impacts public safety, transportation, and/or commerce. It typically occurs during the climatological winter season between October 15 and April 15.* The Extreme Winter Weather category in this Plan's hazard analysis includes the following subcategories: winter weather, winter storm, ice storm, heavy snow, blizzard, frost/freeze, and lake effect snow. Blizzards are the most perilous snowstorms and are characterized by low temperatures, strong winds, and enormous amounts of fine, powdery snow. Snowstorms have the potential to reduce visibility, cause property damage, and loss of life.

According to the 2019 Michigan Hazard Analysis, the 29 counties of the Northern Lower Peninsula of Michigan have an annual average of 79 snowstorm events, with 0 average annual deaths or injuries, $6.53 million in average annual property damage and $20 million in crop damage. Michigan experiences large differences in snowfall over short distances due to the Great Lakes. The average annual snowfall accumulation ranges from 30 to 200 inches with the highest accumulations 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. For example, the average snowfall ranges from 141 inches in the Gaylord area to 101 inches in Traverse City.

Ice and sleet storms generate sufficient quantities of ice or sleet that result in hazardous conditions and/or property damage. Ice storms occur when cold rain freezes on contact with the surface and coats the ground, trees, buildings, and overhead wires with ice. Ice storms are often accompanied by snowfall, which can cause property damage, treacherous conditions, and power loss. When electric lines are down, households are inconvenienced, and communities experience economic loss and the disruption of essential services. Conversely, sleet storms are small ice pellets that bounce when hitting the ground or other objects. The ice pellets do not stick to objects, but can cause hazardous driving conditions.

According to the 2019 Michigan Hazard Mitigation Plan, Michigan has 16 average annual ice and sleet storm events with 0.2 average annual deaths, 0.5 average annual injuries, and $11.4 million in average annual property and crop damage.

Location

Extreme winter weather events are regional events that are not confined to geographic boundaries and can affect several areas at one time with varying severity depending on factors such as elevation and wind patterns. All of Manistee County is at risk from the occurrence and impacts from extreme winter weather. The coastal communities are more susceptible to lake-effect snow due to proximity to Lake Michigan.

Extent

Snowstorms can be measured based on snowfall accumulations or damages. The average annual snowfall in Manistee County is 80.9 inches. On March 2, 2012 Manistee County had $350,000 in property damages caused by heavy snow. Extreme winter weather events in total caused $350,000 in property damages and $10,000,000 in crop damages between 1997 and 2022 (Table 23).

Table 23: Extreme Winter Weather Events and Impacts, Manistee County

Event Type	Number of Events	Property Damage	Crop Damage	Event Year(s)
Winter Weather	1	$ -	$ -	2006
Winter Storm	51	$ -	$ -	1997-1999, 2003-2016, 2018, 2019, 2021, 2022
Ice Storm	5	$ -	$ -	2001, 2002, 2005, 2008, 2022
Heavy Snow	30	$ 350,000	$ -	1997-2002, 2004-2009, 2011, 2012
Blizzard	6	$ -	$ -	1978, 1997-1999, 2002, 2019
Frost/Freeze	1	$ -	$ 10,000,000	2012
Lake-Effect Snow	9	$ -	$ -	2006, 2008, 2010, 2011, 2013, 2015, 2016, 2019
TOTAL	**103**	**$ 350,000**	**$ 10,000,000**	

Source: NOAA: National Centers for Environmental Information; Michigan State Police-Dept. of Homeland Security

Previous Occurrences
Since 1997, there have been 102 extreme winter weather events reported for Manistee County, including heavy snowstorms, ice storms, frost/freeze, blizzards, winter weather, and winter storms (Table 19). Additionally, in 1978, Manistee County, along with the rest of the state of Michigan, received a Presidential Emergency Declaration for a snowstorm and blizzard. In recent years, the more common events are winter storms with moderate snowfall of 5-10 inches. Heavy snow, blizzards, and lake-effect snows have been less common. Nonetheless, extreme winter weather events are the most frequently recorded extreme weather event with the potential to impact the entire county and cause widespread damage. With combined property and crop damages, winter weather events are also the most costly events to occur in the county.

One of the highest-impact snowstorms in recent memory pounded Northern Michigan on the night of March 2, 2012. Low pressure tracked from Missouri, to southern Lower Michigan, and on to eastern Canada, while rapidly strengthening. Precipitation surged northward into the region on the evening of the 2nd. This was primarily snow, except in parts of east central Lower Michigan (especially near Lake Huron), where temperatures were mild enough for rain. Snow wound down on the morning of the 3rd, and though somewhat blustery winds occurred behind the system on the 3rd, blowing snow was limited because the snowfall was so wet. Snow totals ranged from 6 to 14 inches across most of Northern Michigan. Higher amounts fell near and west of Grand Traverse Bay, with a maximum amount of 20 inches near Lake Ann. With relatively warm temperatures, the snow was very wet; Traverse City saw around a foot of snow during the night, with a low temperature of 33 degrees. The snow stuck to everything, with the weight of the snow downing many, many trees and power lines. Power outages were widespread, with an outright majority of Northern Michigan residents losing power at some time during or after the storm. In Benzie County, 95 percent of residents lost power. Outages lasted up to a week in some spots. Great Lakes Energy described it as the worst snowstorm (in regards to power outages) in 30 years. A number of counties and communities opened shelters to aid those without power or heat. Also included in the tree damage was substantial damage to fruit trees in the Grand Traverse Bay region, particularly cherry trees. This event accounts for $350,000 in reported damages.

The frost/freeze event on listed in Table 13 took place on April 27, 2012 across Northwest Lower Michigan. A killing freeze caused extreme damage to agriculture, particularly in the fruit belt of Northwest Lower Michigan. Traverse City saw low temperatures of 25 degrees on the 27th, 31 degrees on the 28th, and 26 degrees on the 29th. These values were not exceptionally colder than normal lows, which are in the middle 30s. Ultimately, the main culprit was a stretch of unprecedented warmth in mid-March, which included five consecutive 80-degree days (17th-21st). This caused fruit trees to bud out far, far ahead of schedule, and left them vulnerable to even relatively normal weather as the spring progressed. The tart cherry crop was a total loss, while other orchard fruits such as sweet cherries, apples, pears, and peaches saw losses in excess of 90% of the expected crop.

Probability of Future Events and Vulnerability Assessment
Between 1997 and 2022, Manistee County has had 102 extreme winter weather events. This averages to about 3.9 events every year. The probability of an event occurring in future years is 100 percent. Heavy snow events have the potential of shutting down towns and businesses for a significant period of time. Blowing and drifting snow with blizzard conditions cause driving hazards. Ice damage may occur when high winds push lake water and ice past the shoreline, causing damage to public infrastructure and residential property. The agriculture industry in Manistee County remains vulnerable to unseasonable temperature fluctuations and ice storms.

During the winter months, the population is largely made up of the base permanent residents. However, there is increasing demand from seasonal residents to purchase property and retire or work remotely from highly desirable northern and coastal communities like those in Manistee County. Many aspects of Manistee County, including natural wooded areas and proximity to lakes/rivers, are attractive to prospective buyers. New residents, especially those locating in remote areas, increase the chance of risk to life and property. Winter-related events cause difficult driving conditions and in the event of an emergency, can make travel increasingly difficult for emergency personnel who may be more frequently dispatched to rural areas.

During severe winter weather events, persons most vulnerable in Manistee County include elderly persons; persons living at or below the poverty level; members who live in remote rural areas; those with limited access to technology including cellular phone service and broadband internet; and those without access to an emergency power source. The Community Survey specifically mentioned broadband internet and cell access was an issue, and there were several concerns about access to power in the event of a natural hazard. A representative from Marilla Township indicated in the survey that they “are greatly underserved” for broadband internet access. Ice, heavy snow, and wind storms have the capability to take out power, and cold temperatures can be fatal for members without a backup power source.

Thunderstorms and Severe Winds

The National Weather Service defines a severe thunderstorm as: *a thunderstorm that produces a tornado, winds of at least 58 mph (50 knots or ~93 km/h), and/or hail at least 1" in diameter.* These storms can also produce lightning or heavy rain (that could cause flash flooding). Severe thunderstorms can occur at any time in Michigan, although they are most frequent during the warm spring and summer months from May through September.

High wind events are also included in this hazard category. Long-lived wind events associated with fast-moving severe thunderstorms are known as a *derecho* (pronounced similar to "deh-REY-cho"). According to the National Weather Service, a derecho is a widespread, long-lived wind storm that is associated with a band of rapidly moving showers or thunderstorms. Although a derecho can produce destruction similar to the strength of tornadoes, the damage typically is directed in one direction along a relatively straight swath. As a result, the term "*straight-line wind damage*" sometimes is used to describe derecho damage. By definition, if the wind damage swath extends more than 240 miles (about 400 kilometers) and includes wind gusts of at least 58 mph (93 km/h) or greater along most of its length, then the event may be classified as a derecho. A derecho often occurs during the spring or summer; however, it can occur any time of the year.

Location
Thunderstorms and severe wind are regional events that are not confined to geographic boundaries and can affect several areas at one time with varying severity depending on factors such as elevation and wind patterns. All of Manistee County is at risk from the occurrence and impacts from thunderstorms and severe winds.

Extent
Thunderstorms can be measured based on wind speed or damages. The average wind speed for events in Manistee County is 53 knots. Manistee County had $645,500 in property damages and no reported crop damages caused by thunderstorms and severe winds.

Previous Occurrences
Between the years 1964 and 2022, there have been 65 thunderstorm/wind, high wind, or strong wind events reported in Manistee County (Table 24). This is the second-most frequently occurring type of severe weather event in the county.

The most life threatening event occurred on July 20, 1987. A severe weather outbreak came across Michigan causing property damage across the state. In Manistee County, swimmers were drowned when winds came up suddenly. Two deaths were reported from this storm.

In June 2008, thunderstorms, flooding and tornadoes crossed Manistee County. A large area of thunderstorms developed over Lake Michigan late in the evening on the 12th, as very moist air surged into the region. These storms were severe as they moved onshore, producing damaging winds, large hail, and a brief tornado. However, the biggest impact was from excessive rainfall, which produced unusually severe flooding in West Central Lower Michigan. The Governor of Michigan declared a state of emergency for Manistee and Wexford Counties, along with other counties downstate. This episode featured widespread straight-line wind damage in parts of northwest Lower Michigan, and the largest hail on record in northern Michigan in Ogemaw County. This event resulted in $195,000 in property damages within Manistee County.

Table 24: Thunderstorm and Wind Events Previous Occurrences, Manistee County

Event Type	Number of Events	Deaths	Property Damage	Crop Damage	Event Year(s)
Thunderstorm Wind	56	2	$ 510,500	$ -	1964, 1966, 1973, 1975, 1985, 1987, 1989, 1991, 1997-2003, 2005-2009, 2011-2013, 2015, 2017-2019, 2021
High Wind	7		$ 90,000	$ -	1998, 2001, 2003, 2005, 2010, 2015, 2021
Strong Wind	2		$ 45,000	$ -	2007 (2)
TOTAL	**65**	**2**	**$ 645,500**	**$ 0**	

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment

Between the years 1964 and 2022, there have been 65 thunderstorm/wind, high wind, or strong wind events reported in Manistee County. This averages to 1.1 events per year; therefore the probability of an event occurring in a future year is 100 percent. Damage from straight line winds usually affects multiple counties with the loss of electricity from trees/tree limbs downing power lines; widespread property damage; and potentially exposing people to severe injury or fatality due to flying debris. The magnitude of the impact of thunderstorm/wind, high wind, or strong wind event depends on the seasonal population, seasonal activities, and the spread of development.

During the warm or summer months, the area's population expands to include both the permanent population and visitors. Residents and visitors are attracted to both rural, sparsely populated rural areas and village centers. Mobile home parks and campgrounds (see Table 25), as well and numerous annual special events that draw a large number of tourists to outdoor recreation areas were identified as specific areas of concern.

Thunderstorms can appear quickly and cause significant damage. Aside from the City of Manistee, the county population is geographically spread out and notifying them of tornado warnings or watches can be difficult. Severe thunderstorm/high wind alerts are provided to the public in Manistee County via the CodeRED phone alert system, television and radio announcements. The efficacy of the CodeRED alert system is limited due to the sign up process, as citizens must request to be added to the alert system.

Table 25. Campgrounds and Mobile Home Communities in Manistee County

Community	Campgrounds	Mobile/ Modular Home Community
Village of Bear Lake	Hopkins Park Campground	
Village of Eastlake	The Bluffs Age 55+ RV Park	The Bluffs Age 55+ Mfg. Home Community
	Penny Park Campground	
Village of Kaleva	Kaleva Village Campground	
Arcadia Township		Valleywood Cove, Grebe St.
Brown Township	Matson's Big Manistee River Campground	
	Rally Point Veteran's Campground	
Dickson Township	Tippy Dam Campground	
	R & J Resort Campground	
	Government Landing Campground	
	Manistee National Forest Campsite #21	
Manistee Township	Little River RV Park	River Haven Estates, 24 Caberfae Hwy.
	Insta Launch Campground and Marina	
	Coho Bend Campground	
	Orchard Beach State Park Campground	
Norman Township	Heart of the Forest RV Park	
	Loomis Landing Campground and Marina	
	Twin Oaks Campground & Cabins	
	Sand Lake Campground	
	Pine Lake Campground	
Pleasanton Township	Kampvilla RV Park	Mobile homes along Elsie Ave.
	Crystal Forest Campground	
Springdale Township	Fuzzy Bear Campground	
	Healy Lake State Forest Campground	
Stronach Township	Linde's Rustic Campground	
	Marzinski Horse Trailhead and Campground	
	RV parking area on Old Stronach Rd., across from Little Manistee Weir	

Hail

Hailstorms occur when a severe thunderstorm produces hail that falls to the ground. Hail is formed when the updrafts of the storm carries water droplets above the freezing level, where they form into rounded or irregular lumps of ice that range from the size of a pea to the size of a grapefruit. When the weight of the hail is no longer supported by the air, it falls to the ground and has the potential to batter crops, dent automobiles, and injure people and wildlife. Sometimes, large hail appears before a tornado since it is formed in the area of a thunderstorm that tornadoes are most likely to form.

According to the 2019 Michigan Hazard Mitigation Plan, Michigan has on average 191 hail storms, an expected annual statewide loss of about $16.6 million, no deaths, and approximately 1 injury per year. Despite damaging hail occurring in every part of Michigan, the areas of the state most prone to severe thunderstorms (e.g. the Southern half of the Lower Peninsula) are also most prone to large and damaging hail. The majority of the hailstorms occur during the growing season from May through August when crops have the greatest potential to be damaged by hail.

According to the 2012 Michigan Hazard Analysis, the National Weather Service began recording hail activity in Michigan in 1967. The National Weather Service issues forecasts for severe thunderstorms with sufficient warning time to allow residents to take appropriate action to reduce the effects of hail damage to vehicles and some property. However, little can be done to prevent damage to crops. For example, during September 26-27, 1998, a line of severe thunderstorms moved across northern Lower Michigan producing hail up to 2" in diameter, destroying an estimated 30,000-35,000 bushels of apples at area farms, and damaging several homes and vehicles.

Location
Hailstorms are regional events that frequently accompany thunderstorms, and are not confined to geographic boundaries. The severity of hailstorms may range across the affected areas. All of Manistee County is at risk from the occurrence and impacts from hailstorms. According to the National Weather Service, Manistee County is in an area of the United States that has on average two days of hailstorm events per year.

Extent
According to the NOAA National Centers for Environmental Information, the approximate size of hail is described as follows in Table 26. If a thunderstorm produces hail that is 1 inch in diameter (quarter size) or larger, it is considered to be a severe thunderstorm.

Table 26: NOAA Hail Size Description

Appearance	Approximate Size in Inches
Pea	0.25-0.5 inch
Penny	0.75 inch
Nickel	0.88 inch
Quarter	1.00 inch
Walnut/Ping Pong	1.50 inch
Golf Ball	1.75 inch
Hen Egg	2.00 inch
Tennis Ball	2.50 inch
Baseball	2.75 inch
Tea Cup	3.00 inch
Grapefruit	4.00 inch
Softball	4.50 inch

The greatest extent hail reported in Manistee County was 2 inches on September 26, 1998, near Bear Lake. The storm severely damaged two apple orchards. Around 15,000 bushels of apples were destroyed with an estimated monetary loss of $35,000. The reported hail size was 2", roughly the size of a hen egg.

Hail can damage aircraft, homes and cars, and can be deadly to livestock and people. Hailstorms have caused no deaths or injuries, no recorded property damages, and $35,000 in crop damages in Manistee County.

Previous Occurrences
Between 1973 and 2022, Manistee County had 35 hailstorms reported to NOAA (Table 27).

Table 27: Hail Events, Manistee County

Place	Date	Magnitude
MANISTEE	7/12/1973	1.75
MANISTEE	6/8/1985	0.75
ONEKAMA	8/23/1998	1.75
BEAR LAKE	9/26/1998	2
WELLSTON	9/26/1998	1.25
BEAR LAKE	10/13/1999	0.75
WELLSTON	10/13/1999	0.75
MANISTEE	8/9/2000	0.88
WELLSTON	4/15/2003	1
BEAR LAKE	7/20/2003	0.88
MANISTEE	7/24/2005	0.88
COPEMISH	9/7/2005	0.75
MANISTEE	10/3/2006	0.75
SPRINGDALE	6/14/2008	1
KALEVA	6/14/2008	0.75
WELLSTON	6/14/2008	0.75
NORWALK	5/11/2011	0.75
WELLSTON	5/11/2011	1.25
MANISTEE	5/11/2011	1.5
MANISTEE	5/15/2012	0.88
MANISTEE	5/15/2012	1
WELLSTON	5/27/2012	0.75
STRONACH	8/3/2017	0.75
ARCADIA	5/31/2019	0.75
COPEMISH	5/31/2019	0.88
ARCADIA	4/7/2020	1
BEAR LAKE	4/7/2020	0.75
BEAR LAKE	4/7/2020	1
PARKDALE	9/7/2021	1
HIGH BRIDGE	9/7/2021	1.5
WELLSTON	9/7/2021	1.75
MANISTEE	9/7/2021	0.88
MANISTEE	5/11/2022	0.88
BEAR LAKE	9/21/2022	1
KALEVA	9/21/2022	1.5

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment

With 35 events reported in the past 50 years, Manistee County has a 70% chance of a major hailstorm in a future year. All existing and future buildings, exposed infrastructure, and populations are at risk from hailstorms since hail causes damage to roofs, brick walls, glass, landscaping, crops, and cars. Manufactured homes and campground populations located throughout the county and are more susceptible to impacts from hail. Hail can also damage roads, sidewalks, bridges, and above ground utilities. Hail has the potential to cause injury and death, and populations are advised to take shelter when an event occurs.

Riverine and Urban Flooding

Fluvial, or Riverine flooding occurs when rivers, streams, and lakes overflow into adjacent floodplains due to prolonged, intense rainfall, rapid snowmelt or ice jams. Flooding can damage or destroy property, disable utilities, destroy crops and agricultural lands, make roads and bridges impassable, and cause public health and safety concerns. Floods occur in the early spring, but also occur in the winter due to ice jams, and during the summer or fall from severe thunderstorms. Flooding caused by severe thunderstorms has a greater impact on watercourses with smaller drainage areas.

Pluvial, or *Urban, flooding* occurs when water flows into low-lying areas because it does not have a place to go, due to impervious surface coverage. This flooding occurs from a combination of excessive rainfall, snowmelt, saturated ground, and inadequate drainage, and is becoming more common in Michigan. Since development is occurring in floodplains, the natural landscape is unable to properly disperse the water. Urban flooding also has the potential to overflow onto docks or other structures with electricity running to them, which increases the risk for an electric shock drowning. Additionally, storm and sanitary sewers are unable to handle the water flows associated with storm events, which can result in sewer overflows and affect the water quality of nearby lakes and rivers, as well as structures with basements or shallow groundwater tables.

Dam failure is also a potential source of flooding. Infrastructure in the state is aging and costly to maintain. FEMA provides Federal Guidelines for Dam Safety. These guidelines encourage strict safety standards in the practices and procedures employed by federal agencies or required of dam owners regulated by the federal agencies (2004). The National Inventory of Dams provides a catalogue of dams in the nation with a profile of each. Each profile lists the Hazard Potential Classification. This is a system that categorizes dams according to the degree of adverse incremental consequences of a failure or mis-operation of a dam. The hazard potential classification does not reflect in any way on the current condition of the dam. Three classification levels are adopted as follows: Low, Significant, and High, listed in order of increasing adverse incremental consequences.

According to the 2019 Michigan Hazard Analysis, the most damaging hazard in Michigan, based upon estimated physical damages and known response/recovery costs, appears to be floods. The MSP reports that flooding events have a statewide expected annual loss estimated at more than $100 million ($25.69 million had previously been estimated in the 2014 Michigan Hazard Mitigation Plan, but Federal Disaster 4195 confirmed a higher magnitude more in line with earlier EGLE estimates, as that Metro Detroit flood event was quite similar to Federal Disaster 1346 during the previous decade).

The MSP's 2019 Michigan Hazard Analysis indicates that the Northern Lower Peninsula averages 0.3 annual flooding events, with average annual property and crop damages of $2,591,244 due to flooding.

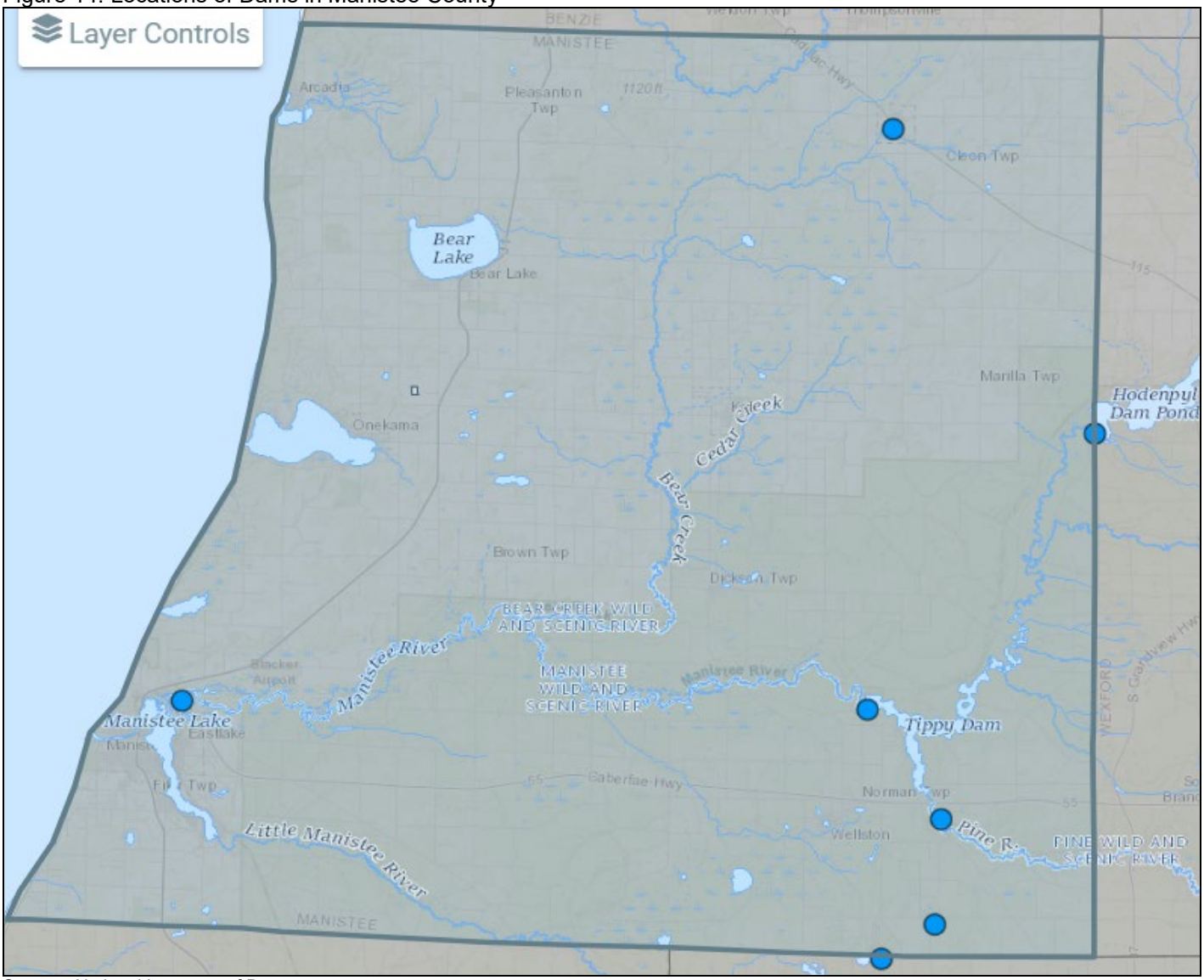
Location

The City of Manistee is the urbanized center of the county and the most likely location to experience both riverine and urban flooding with a large contiguous amount of impervious surfaces. Five of the seven flooding events on record with NOAA for Manistee County occurred in the City of Manistee. Additionally, the county's major river system, the Manistee River, travels west through the city to reach the Lake Michigan. The Manistee River starts in Antrim County to the northeast, travels through Otsego County, Crawford County, Kalkaska County, Missaukee County, Wexford County, and enters Manistee County. The Manistee River then runs through Dickson, Norman, Stronach, and Manistee Townships and ends in the City of Manistee at Lake Michigan. These communities are likely to experience riverine flooding from the Manistee River tributaries.

Additionally, the Townships of Onekama, Pleasanton, and Bear Lake may experience flooding from inland lakes and surrounding tributaries. Other flooding may involve low-lying areas that collect runoff waters; flaws or shortcomings in existing sewer infrastructure; undersized or poorly designed storm water control practices; collective effects of land use and development trends; illegal diversion of water, or actions that interfere with system function.

Manistee County has five (5) dams listed on the National Inventory of Dams: Tippy, Stronach, Peters Bayou, Copemish, and Sunny Brook. The Hodenpyl Dam is located near the county boundary in Wexford County, adjacent to Manistee County. Both the Hodenpyl and Tippy Dams are located on the Manistee River and are high hazard potential dams located upstream of the City of Manistee and Manistee Township, where there is a high concentration of residents and businesses (Figure 14). The other four dams in the county are considered low hazard potential dams and do not require Emergency Action Plans (Table 28).

Figure 14. Locations of Dams in Manistee County



Source: National Inventory of Dams

Table 28. Dams in Manistee County

Name	Hodenpyl Dam	Tippy Dam	Stronach Dam	Sunny Brook Dam	Peters Bayou/ Manistee Game Area Dam	Copemish Dam
Downstream Hazard Potential	High	High	Low	Low	Low	Low
Location	Wexford County (Springville Township)	Dickson Township	Norman Township	Norman Township	Manistee Township	Village of Copemish (Cleon Twp.)
Height (Ft)	90	82	20	8	12	10
Storage (Acre Ft)	39,684	27,620	850	60	595	180
Water Body	Manistee River	Manistee River	Pine River	Pine Creek	Manistee River	First Creek
Owner	Consumers Energy Company	Consumers Energy Company	Consumers Energy Company	Patrick F. Kelley (Private)	MDNR Wildlife	Village of Copemish
Year Completed	1925	1918	1912	1890	1969	1950
Purpose	Hydroelectric	Recreation	Recreation	Other	Other	Recreation
Regulatory Agency	FERC	FERC	None	MI DEGLE	MI DEGLE	None
Condition Assessment	Not Available	Not Available	Not Rated	Satisfactory (4/3/2000)	Unsatisfactory (9/17/2020)	Not Rated
Inspection Frequency	Annually	Annually	5 Years	5 Years	5 Years	5 years
Emergency Action Plan (EAP)?	Yes	Yes	Not Required	Not Required	Not Required	Not Required
Last EAP Revision	10/11/2019	10/11/2019				

Sources: National Inventory of Dams; EGLE Michigan Dam Inventory

Extent

In Manistee County, flood extent can be measured by the amount of property damage and accumulation of rainfall. Flash flood and flood events in Manistee County have caused a total of $5,020,000 in property damages (Table 29). No crop damages were reported and there have been no deaths or injuries from flooding. To date, flooding events account for 74% of all property damages recorded with NOAA for severe weather events in Manistee County.

Previous Occurrences

Table 29: Manistee County Fluvial and Pluvial Flood Events

LOCATION	DATE	EVENT TYPE	DEATHS / INJURIES	PROERTY DAMAGE	CROP DAMAGE	FLOOD CAUSE
Manistee County and several other counties	September 1986*	Presidential Declared Major Disaster (774); Governor Declared Disaster – Flooding and Heavy Rain				Heavy Rain
Manistee / Cadillac	5/12/2000	Flash Flood	0 / 0	$ -	$ -	Heavy Rain
Manistee River Communities	4/12/2001	Flash Flood	0 / 0	$ -	$ -	Snowmelt / Rain
Manistee River Communities	5/19/2001	Flash Flood	0 / 0	$ -	$ -	Heavy Rain
Manistee River Communities	7/24/2005	Flash Flood	0 / 0	$ 500,000	$ -	Heavy Rain
Manistee River Communities	6/12/2008	Flash Flood**	0 / 0	$ 970,000	$ -	Excessive Rain
Manistee River Communities	6/13/2008	Flood**	0 / 0	$ -	$ -	Excessive Rain
City of Manistee	5/11/2011	Flash Flood	0 / 0	$ 40,000	$ -	Heavy Rain
Manistee River Communities	5/11/2011	Flash Flood	0 / 0	$ 10,000	$ -	Heavy Rain
Manistee River Communities	7/20/2019	Flash Flood	0 / 0	$ 3,500,000	$ -	Excessive Rain
Manistee River Communities	7/20/2019	Flood	0 / 0	$ -	$ -	Excessive Rain
TOTAL				**$ 5,020,000**	**$ -**	

Sources: NOAA National Centers for Environmental Information Storm Events Database; Michigan State Police's 2019 *Michigan Hazard Analysis*
Notes:
Manistee River Communities include the City of Manistee, Village of Eastlake, and the Townships of Filer, Manistee, Stronach, Brown, Norman, Dickson and Marilla.
* Event not listed in the NOAA Storm Events Database
**Events associated with 7/14/2008 Presidential Declared Disaster (1777) for Manistee County and 11 other counties as the result of thunderstorms and flooding, and a Governor Declared Emergency for Manistee County and four other nearby counties for thunderstorms.

The most damaging event on record occurred on July 20, 2019, when a large area of regenerating thunderstorms produced excessive rainfall and some severe weather in northern Lower Michigan. Thunderstorms moved repeatedly over Manistee County in the morning and afternoon of the 20th. Excessive rainfall produced substantial flooding across central and southern Manistee County. By late on the 20th, rainfall totals reached 8.90 inches at Parkdale (near Manistee), and 5.95 inches at Wellston. Water entered numerous homes and stores in the greater Manistee area, and in Dublin, resulting in property damage. The campground at Orchard Beach State Park was at one point under four feet of water. Many roads were flooded and closed to travel for several hours. 12th Street in the City of Manistee was washed out. Places near the Manistee River were most susceptible to flooding. This event reportedly caused $3.5 million dollars in property damage.

On June 13, 2008, the Governor declared a state of emergency for Lake, Manistee, Osceola, Ottawa, and Wexford Counties. A large area of thunderstorms developed over Lake Michigan late in the evening on the 12th, as very moist air surged into the region. These storms were severe as they moved onshore, producing damaging winds, large hail, and a brief tornado. However, the biggest impact was from excessive rainfall, which produced unusually severe flooding in West Central Lower Michigan. Spotters in Manistee and Wellston measured around 6 inches of rain in a few hours very late on the 12th into the pre-dawn hours of the 13th. Radar estimated up to 10 inches of rainfall along the southern border of Manistee County. Substantial flash flooding resulted, with considerable soil erosion, thanks in part to the sandy soils of the area. At one point the majority of roads in the south half of Manistee County were under water. High water entered some homes. In the City of Manistee, asphalt, stop signs, and light posts were flushed into Lake Michigan by the raging waters. The county road commission estimated $500,000 in damages to the county road system. This flash flood event reportedly caused a total of $970,000 in damages. These events are associated with the Presidential Declared disaster (#1777) for Manistee County and 11 other counties in the Northern Lower Peninsula.

In September 1986, a Federal Disaster (#774) was declared for 30 counties in Central Lower Michigan, which included Manistee County. A Governor's Disaster Declaration is also associated with this event. This event is not included in the

NOAA Storm Events database. The following is a description of the event according to the Michigan State Police's 2019 *Michigan Hazard Analysis*: "A slow moving low-pressure system produced 8-17" of rainfall over a 60 mile wide/180 mile long area during a 24-hour period. In Big Rapids, 19" of rain fell from September 9-12. The storm resulted in thousands of persons being evacuated due to flooding. Five persons were killed and 89 injured (up to ten were killed if indirect effects are included). Roughly 30,000 homes suffered basement and structural damage and 3,600 miles of roadways were made impassable due to the failure of four primary bridges and hundreds of secondary road bridges and culverts. Eleven dams failed with 19 others threatened. The flood resulted in over $300 million in damages."

The threat of damage to communities along the Manistee River, especially the City of Manistee, is significant. With many of the flooding events the extent of the damage was multiplied by soil erosion, sewer backups, and road washouts. The event narrative for the flash flood event on July 24, 2005 further describes the damages a heavy rainfall can cause. A slow moving thunderstorm dumped over three inches of rain (and hail) on the southwest corner of Manistee County. A spotter in the City of Manistee reported 4.35 inches of rain in two and a half hours. Widespread urban flooding resulted in the city and its environs, with the worst damage along the River Street corridor. Erosion was severe in spots, due to the sandy soils prevalent in the area. Some gravel roads and driveways were washed out; city streets had one to two feet of flowing water in them. Numerous vehicles stalled out in the high water. Basement flooding was also widespread. A hotel had flood waters enter its ground floor, prompting the evacuation of twenty five guests. Sewage system backups contributed to flood damage in the city. This event caused a reported $500,000 in damages.

Probability of Future Events and Vulnerability Assessment

Since 1986, Manistee County has had 11 inland flooding events, indicating there is a 3.4% annual chance of a riverine or urban flood event. The magnitude and severity depend on the area of impact's population, seasonal activity, and the spread of development. During the warm or summer months, the population expands to include both the permanent population and visitors to the area. Areas of urban development are vulnerable to flooding from the Manistee River and/or Lake Manistee within Manistee Township, the City of Manistee, Filer Charter Township, Stronach Township and the Village of Eastlake.

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.

Inland flooding will continue to occur at times in Manistee County. Years with exceptional snowfall levels will likely result in flooding events from snowmelt. Increasing Lake Michigan water temperatures will create more active storm systems and heavier rainfalls. Fluctuating Lake Michigan water levels will also increase inland flooding events as groundwater tables rise. Furthermore, increased development, reduction in green space, and subsequent soil erosion can cause sedimentation to accumulate in river and lake beds reduce the amount of water flow. Rivers and lakes with sedimentation buildup will experience water backups and flooding events unless mitigated.

Also, seasonally high water tables, often occurring in late winter and the spring, can compromise aging or inadequate septic systems, leading to contamination of local lakes and streams.

Members of the Natural Hazards Task Force identified the areas adjoining the Manistee River and Manistee Lake as flood hazard areas, as shown on the Hazard Areas Map provided in Appendix A. It should be noted that the Hazard Areas Map identifies parts of the City of Manistee as having combined sewer overflows; however as of spring of 2023 the City completed all of its multi-phase storm sewer and sanitary sewer separation projects to eliminate combined sewer overflows that historically impacted the water quality of Manistee Lake and Lake Michigan.

The Manistee River corridor is an identified flood hazard area with the added flooding risk of a potential a dam failure at Tippy or Hodenpyl Dams. Both dams are classified as "High Hazard" potential dams, meaning that failure or dam misoperation will probably result in loss of human life. Consumers Energy (CE), as the owner/operator, is required to maintain Emergency Action Plans for the dams on file with the Federal Energy Regulation Commission (FERC).

CE held community input sessions regarding their long-term hydro strategy options for these dams in 2022. The hydro operating licenses issued by FERC to CE for the dams will expire in 2034. Future potential options for the dams include: 1) Relicense the dam, meeting all the new regulatory requirements, and continue to generate power; 2) Surrender the license and sell the dam to a third-party owner, who could maintain the dam structure and impoundment; 3) Remove the dam and return the river to its natural state; or 4) Replace the dam with an alternative structure. In 2023, CE intends to provide their long-term hydro strategy, and between 2023 and 2034, the relicensing and/or retiring process will be

underway, which will continue to include community engagement efforts. Refer to CE's website for updated information: https://www.consumersenergy.com/company/electric-generation/renewables/hydroelectric/hydro-future

While dams can provide flood protection, energy supply, and water security, they also pose a significant threat to freshwater species. Dams block fish from moving along their natural pathways between feeding and spawning grounds, causing interruptions in their life cycles that limit their abilities to reproduce. The Manistee River is a Blue Ribbon Trout Stream, a top-quality stream able to support excellent stocks of wild resident trout and have excellent water quality, while being able to support trout habitat and food sources. In addition to trout, the Manistee River also supports the lake sturgeon population. The Little River Band of Ottawa Indians' Lake Sturgeon Rehabilitation Program identifies the river area below the Tippy Dam as a larval drifting area. The Manistee River's native aquatic species are vulnerable to potential flooding and dam failure.

The Infrastructure Map included in Appendix A illustrates the locations of road/stream crossings, bridges and Michigan-regulated dams with their currently available condition rating. It should be noted that data is not available for every infrastructure location. The Townships of Bear Lake, Brown, Cleon, Dickson, Manistee, Maple Grove, Marilla, Norman, Pleasanton, Springdale and Stronach have road/stream crossings that are rated as having a "moderate" or "severe" condition. The US-31 Bridge over the Manistee River in the City of Manistee has a "poor" condition rating. The Kurick Road Bridge over the Betsie River in Springdale Township is in "poor" condition, and the Leffew Road Bridge over Bear Creek in that township is indicated as "closed".

Areas of New Development in Manistee County

Since the completion of the 2015 Manistee County Hazard Mitigation Plan, there has been some new development within some areas in the county located near or within FEMA-designated FIRM flood zones:

- City of Manistee: Construction of additional residential units at the "Joslin Cove Townhomes" condominium complex on US-31 (Arthur St.). Part of this development either adjoins or is located within Flood Zone AE on Manistee Lake.

- City of Manistee: A new clean water recovery facility opened in 2023 at the Manistee Wastewater Treatment Plant, which adjoins Flood Zone AE on Manistee Lake. This new facility eliminates sewage overflows to Manistee Lake.

- Village of Eastlake: New residential development has occurred at the "The Bluffs on Manistee Lake" mobile home and RV Resort. This development adjoins Flood Zone AE on Manistee Lake.

Much of the developable areas on the Lake Michigan and inland lake coastlines had been built out as of 2015.

NFIP Participation Status

Manistee County communities participating in the National Flood Insurance Program (Table 31) received an updated Flood Insurance Study and digital flood maps in 2021. Community input and coordination with FEMA will determine the extent, if any, of future mapped flood areas.

The Village of Eastlake is a community that had a FIRM issued for it in 2021; however, the community is listed as a non-participant in the NFIP as they have not submitted documentation of local adoption of the FIRM(s) to FEMA. During the development of this hazard mitigation plan, inquiries were made with local government officials at the Village as to the reason why they are a non-participant. No response was received.

FEMA defines a "repetitive loss property" as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling ten-year period since 1978 (the year at which consistent claims data collection began). Twenty-two claims have been paid since 1978 (Table 29). FEMA defines a "repetitive loss property" as any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period since 1978 (the year at which consistent claims data collection began). According to the Cadillac/Gaylord District Floodplain Engineer with MI EGLE's Water Resources Division, there have been no repetitive flood loos properties in Manistee County. Information from FEMA regarding repetitive loss properties in the county was not received by the time the final draft of this Plan was completed. The *2019 Michigan Hazard Analysis*, completed by the Michigan State Police provides the following National Flood Insurance statistics for Manistee County:

Table 30. National Flood Insurance Statistics, Manistee County

Total Premium	Policies	A-Zone Policies	Total Coverage	Claims since 1978	Total Paid Since 1978
$37,059	35	22	$7,082,100	22	$165,160

Source: MSP 2019 *Michigan Hazard Analysis*

Table 31: NFIP Information for Manistee County Communities

Municipality	Community ID	NFIP Participant?	Floodplain Management /FIRM Map Adoption*	Current Effective Map Date	Reg- Emerg Date**	Implementation Method***
Arcadia Township	260306A	Y	Y	6/2/2021	9/1/1986	Building permits issued according to the Michigan Building Code; Local zoning ordinance provisions
Filer Charter Township	260130A	Y	Y	6/2/2021	7/1/1991	Filer Charter Township Ordinance No. 2021-04, Ch. 11, Construction Code Administration and Enforcement; Local zoning ordinance provisions
Manistee Township	260132A	Y	Y	6/2/2021	11/15/1989	Building permits issued according to the Michigan Building Code; local zoning ordinance provisions for floodplain setback requirements
City of Manistee	260131A	Y	Y	6/2/2021	3/18/1987	Building permits issued according to the Michigan Building Code - City of Manistee Codified Ordinance #14-Building and Housing Code Chapter 1420 Stille-Derossett-Hale Single State Construction Code; also local zoning ordinance provisions for floodplain setback requirements
Onekama Township	260276A	Y	Y	6/2/2021	5/1/1978	Building permits issued according to the Michigan Building Code; Local Zoning Ordinance provisions for floodplain setbacks
Village of Onekama	261935A	Y	Y	6/2/2021	5/25/2021	Building permits issued according to the Michigan Building Code; Local zoning ordinance provisions for floodplain setbacks
Stronach Township	260801A	Y	Y	6/2/2021	9/30/1988	Building permits issued according to the Michigan Building Code
Village of Eastlake	261934A	N	N	6/2/2021	6/2/2022 (Sanction Date)	Building permits issued according to the Michigan Building Code; Local zoning ordinance

Notes:

* Adoption of NFIP minimum Floodplain management criteria via local regulation.

** The date the community first joined the NFIP.

*** How local floodplain management regulations are implemented and enforced in Special Flood Hazard Areas.

Data Source: FEMA Community Status Book Report, Accessed 6/21/2023

Table 27, continued: NFIP Information for Manistee County Communities

Municipality	Appointed Designee****	Implementation of Damage Provisions*****
Arcadia Township	Michigan Dept. of Licensing and Regulatory Affairs, Bureau of Construction Codes; Manistee County Planning Dept. Staff serves as Zoning Administrator	Section 25.4 of the Zoning Ordinance: *If a nonconforming use or nonconforming building/structure is damaged or destroyed by fire, flood, wind, or other calamity to the extent of 50% or more of its fair market value at the time of such damage or destruction, the use/building/structure shall not be repaired or otherwise reconstructed or restored except in conformity with this Ordinance. Where such damage or destruction is less than 50% of the fair market value of the use/building/structure at the time of such damage or destruction, the use/building/structure may be repaired or otherwise reconstructed or restored so as to be not more nonconforming than at the time of the damage or destruction.*
Filer Charter Township	Michigan Dept. of Licensing and Regulatory Affairs, Bureau of Construction Codes; Township Zoning Administrator	Section 31.8 of the Zoning Ordinance: *Should any such building or structure be destroyed by any means to an extent of more than 50 percent of its replacement cost at the time of destruction, it shall not be reconstructed except in conformity with the provisions of this chapter. that the cost of such repair, reinforcement, improvement, rehabilitation or compliance shall not exceed 50 percent of the reproduction value of such building at the time such work is done, except the repair, maintenance, or replacement of oil, gas, or brine wells; connecting pipelines and related valves or other equipment, existing at the effective date of this chapter, in the interest of health, safety and welfare, shall not be subject to the 50 percent reduction in value limitation, provided that the owner or operator files written documentation with the zoning administrator setting forth the reason for such repair, maintenance or replacement and proof that such has been done in accordance with law, regulation, governmental order or demand, or industry standards; and provided, further, there shall be no change of use of such building at the time such work is done. The original dimension of the nonconforming building or structure shall not be increased.*
Manistee Township	The township issues building permits	*Article 8001.7, c and d: A nonconforming structure or structure that contains a nonconforming use which is unsafe or unlawful due to a lack of repairs or maintenance, as determined by the Zoning Administrator or Building Official, may be restored to a safe condition. Where enlargement or structural alteration is necessary to allow compliance with health and safety laws, the cost of such work shall not exceed 40 percent of the replacement cost of the existing structure, as determined by the Township Assessor. Termination by Destruction: In the event that a nonconforming structure or structure containing a nonconforming use is destroyed by any means to an extent of more than sixty (60) percent of the replacement cost of the existing structure, as determined by the Township Assessor, the structure shall not be restored or reconstructed except in conformity with the requirements of this Ordinance*

Municipality	Appointed Designee****	Implementation of Damage Provisions*****
City of Manistee	The City Engineer assists in enforcing the requirements of the floodplain ordinance and Michigan Building Code. The City Engineer will coordinate with the City's Building Inspector and Planning and Zoning Administrator on any new construction or substantial construction to be performed within a mapped Special Flood Hazard Area (SFHA) as shown on the DFIRM.	Per the State of Michigan Building Code, if more than 50% of a building is damaged, it would need to be brought up to current construction code standards.
Onekama Township	Michigan Dept. of Licensing and Regulatory Affairs, Bureau of Construction Codes; Manistee County Planning Department Staff serving as Zoning Administrator and Floodplain Administrator	
Village of Onekama	The Village has an intergovernmental agreement with the Michigan Dept. of Licensing and Regulatory Affairs-Bureau of Construction Codes to provide Floodplain Administration; Manistee County Planning Department Staff serves as Zoning Administrator	
Stronach Township	Michigan Dept. of Licensing and Regulatory Affairs, Bureau of Construction Codes; Manistee County Planning Department Staff serving as Zoning Administrator	
Village of Eastlake	Michigan Dept. of Licensing and Regulatory Affairs, Bureau of Construction Codes; Manistee County Planning Department Staff serving as Zoning Administrator	

Notes:

**** The designee or agency that is appointed to implement the addressed commitments and requirements of the NFIP.

***** How participants implement the substantial improvement/substantial damage provisions of their floodplain management regulations after an event.

Data Source: FEMA Community Status Book Report, Accessed 6/21/2023

Lightning

Lightning is a random and unpredictable discharge of electricity in the atmosphere between the clouds, air, or ground to equalize the charged regions in the atmosphere. It is still being debated how the electrical charges build up in the clouds. Lightning generally occurs during thunderstorms; however, it can occur without a thunderstorm, such as during intense forest fires and heavy snowstorms. Lightning that occurs without nearby rain is most likely to cause forest fires.

Location
Lightning is not confined to geographic boundaries and is a regional event. Since lightning occurs randomly, it is impossible to predict where lightning will occur and how severe it will be. All of Manistee County is at risk from the occurrence and impacts from lightning.

Extent
Lightning can be measured by damages-caused including deaths, injuries, property damages, and/or crop damages. Since 1950, two lightning events have been reported to NOAA in Manistee County. Those events have caused $0 in property or crop damages, no injuries, and one fatality. The fatality occurred on September 6, 2016 where a Texas man was struck and killed by lightning while on the North Country Trail in Dickson Township. The lightning strike was accompanied by a line of strong to severe thunderstorms that crossed northern Lower Michigan during the afternoon.

Previous Occurrences
There have been two lightning strikes reported to NOAA since 1950. There was one fatality. There have been no other reports of damages or injuries from lightning. Table 32 is a record of lightning events in Manistee County.

Table 32: Lightning Events

LOCATION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE
County/Region	9/1/2000	0	0	$0
High Bridge (Dickson Township)	9/6/2016	1	0	$0
TOTAL		**1**	**0**	**$0**

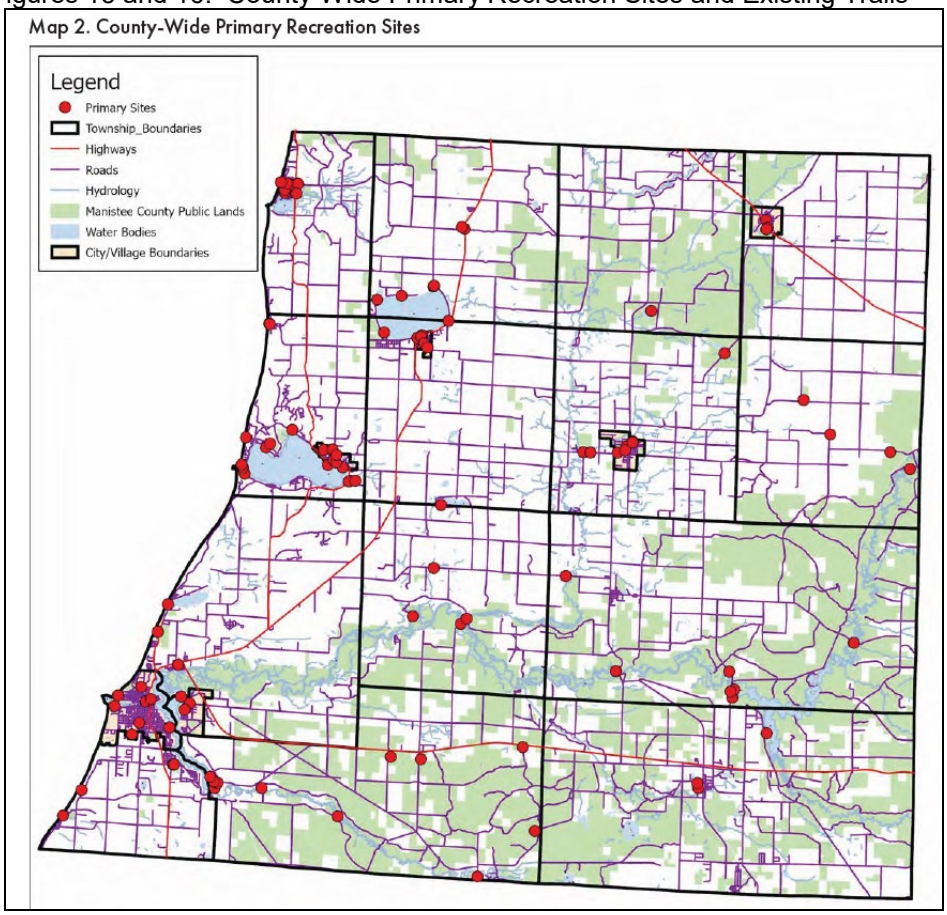
Source: NOAA: National Centers for Environmental Information

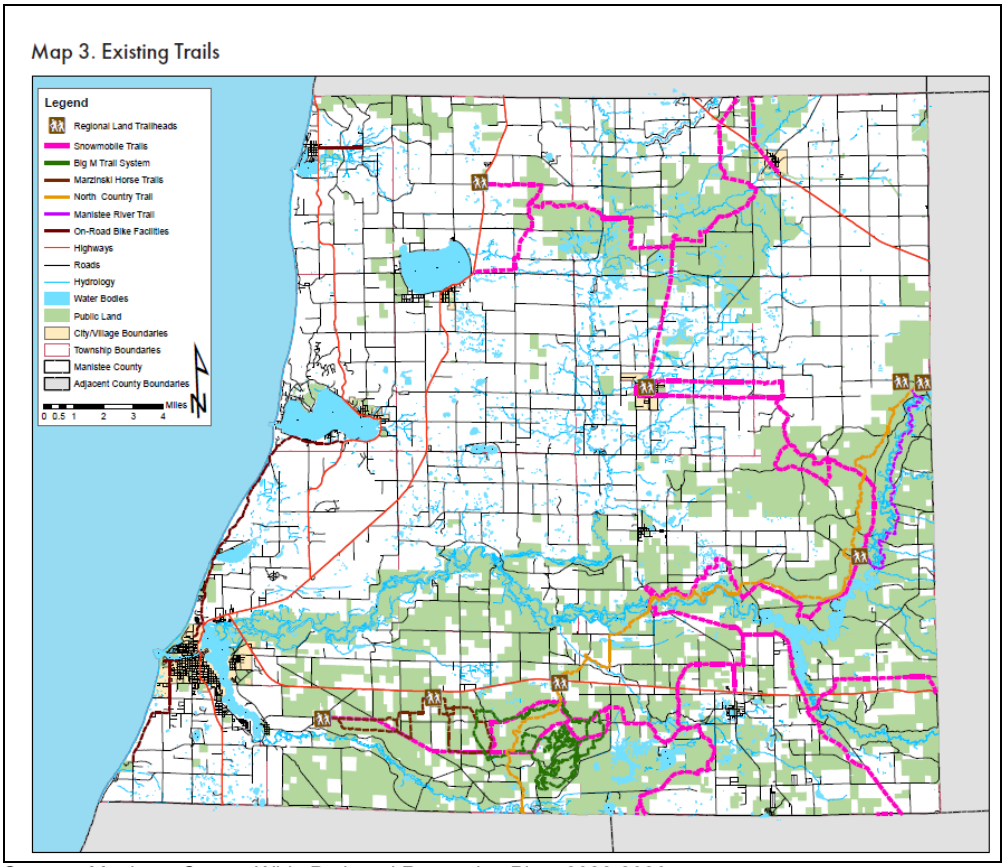
Probability of Future Events and Vulnerability Assessment
There have been two impactful lightning events reported in the last 23 years for Manistee County. This indicates there is an 8.7% chance of an impactful lightning strike occurring in a given year. However, it is assumed that not all lightning events have been reported since events with injuries, deaths, and extensive damages tend to be the only ones reported. Therefore, the number of lightning events and damages may be higher.

Vegetation (especially in dry soils), buildings and infrastructure are at risk from damage from lightning events since it may cause structural and wildland fires, loss of electrical and telecommunications equipment, and damage to buildings or vehicles from falling trees struck by lightning. Considering the instance of a fatality caused by lightning in 2016, people that work outside or participate in outdoor recreation activities are at a higher risk to be struck by lightning.

Manistee County is rich in land and water-based outdoor recreation areas. According to the most recent Manistee County-Wide Park and Recreation Plan, federal lands contained within the Manistee National Forest account for about 24% of the land area in Manistee County, and state-owned lands (MDNR property) represent about 6.8% of the county's total land area. Figures 15 and 16 illustrate the locations of primary recreation sites (located in every community) and existing trails throughout the county.

Figures 15 and 16. County-Wide Primary Recreation Sites and Existing Trails





Source: Manistee County-Wide Park and Recreation Plan, 2022-2026

Tornado

Tornadoes are rapidly rotating columns of air that impact the ground after forming from some of the severe thunderstorms that occur during Michigan's warm months. Tornadoes can cause catastrophic damage to either a limited or an extensive area. A tornado can have winds exceeding 200 miles per hour and can have widths over one mile. These storms are the most violent of the atmospheric storms since they have the potential to destroy buildings, uproot trees, hurl objects, and cause loss of life.

According to the National Oceanic and Atmospheric Administration/National Weather Service's Storm Prediction Center, tornadoes cause approximately 60 deaths and hundreds of millions of dollars in property damage each year. The Michigan State Police's *2019 Michigan Hazards Analysis*, Michigan is located on the northern fringe of the nation's tornado belt, and since 1996 has averaged about 18 tornadoes per year. The longer term annual average (since 1950) is 8 injuries and one death per year, and over $17 million in property damages statewide.

Between 1999 and 2019, Michigan has had 314 reported tornado events with 52.9% as EF0 (weak) or EF1 (moderate), 38.9% reported as F0 or F1 (weak), 6.7% as EF2 (significant) or EF3 (severe), and 1.6% as F2 (strong). In Northern Michigan, tornados are most likely in the summer months, although some have occurred in the spring and fall.

Location
Tornadoes are a regional event that are not confined to geographic boundaries and can affect several areas at one time. Also, the magnitude of tornadoes may range across the affected areas. All of Manistee County is at risk from the occurrence and impacts from tornadoes. It is impossible to predict where and with what magnitude a tornado will touch down. Approximate trajectories of recorded tornadoes with NOAA are illustrated on the Hazard Areas Map in Appendix A.

Extent
The Fujita Scale (Table 33) categorizes tornado severity based on observed damage. The six-step scale ranges from F0 (light damage) to F5 (incredible damage). As of February 2007, the National Weather Service uses the Enhanced Fujita Scale (EF Scale). This new scale ranges from EF0 to EF5. Based on the Fujita Scale, Manistee County's most damaging tornado occurred on April 3, 1956 with winds ranging from 210-261 mph. It caused no injuries or deaths, but $250,000 in property damages.

Table 33: Fujita and Enhanced Fujita Scale Comparison

Fujita Scale		EF Scale	
Fujita Scale	**3-Second Gust Speed (mph)**	**EF Scale**	**3-Second Gust Speed (mph)**
F0	45-78	**EF0**	65-85
F1	79-117	**EF1**	86-109
F2	118-161	**EF2**	110-137
F3	162-209	**EF3**	138-167
F4	210-261	**EF4**	168-199
F5	262-317	**EF5**	200-234

Source: FEMA

Previous Occurrences
Since 1956, Manistee County has had two reported tornadoes touch down, causing over $265,000 in property damage (Table 34). As a result of these tornadoes, there were no deaths, no injuries, and no reported crop damage.

An F4 tornado occurred in 1956. It touched down north of Portage Lake in Onekama Township and headed northeast through Bear Lake Township and Pleasanton Township, ending in Benzie County. This tornado caused $250,000 in property damage.

An EF0 tornado occurred in 2008 in Stronach Township, south of M-55, at Skocelas Road, with estimated wind speeds of 75 to 85 mph. Numerous trees and large tree limbs were downed. This tornado was accompanied by a large area thunderstorm with damaging winds, large hail, and excessive rainfall (as reported as a flash flooding/flooding event in Table 29), and is associated with the governor-declared State of Emergency at that time for Manistee and Wexford Counties.

Table 34: Tornado Events in Manistee County

LOCATION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE
Onekama Township, Bear Lake Township, Pleasanton Township	4/3/1956	F4	0	0	$250,000
Stronach Township	6/12/2008	EF0	0	0	$15,000
TOTAL			**0**	**0**	**$265,000**

Source: NOAA - National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment
Since there have been two tornadoes events reported in the last 67 years, the data shows that there is a 3% annual chance a tornado would occur in a future year. While the chance for a tornado is low, if an event occurs, there is potential for a higher magnitude tornado to touch down. All reported historic events have caused significant property damage. The City of Manistee and adjoining communities, where the densities of population and developed lands are highest, would bear the greatest amount of impact from a tornado.

Tornados can appear quickly and cause significant damage. Aside from the City of Manistee, the county population is geographically spread out and notifying them of tornado warnings or watches can be difficult.

Manistee County currently uses CodeRED phone alert system, which is limited in efficacy as citizens must sign up for the service's phone alerts. As mentioned previously, outdoor recreation areas are abundant in every community in the county.

Other emergency public notification methods available include:

- Integrated Public Alert & Warning System (IPAWS): FEMA's national system for local alerting that provides authenticated emergency and life-saving information to the public through mobile phones using Wireless Emergency Alerts, to radio and television via the Emergency Alert System, and on the National Oceanic and Atmospheric Administration's Weather Radio.
- The FEMA Mobile App: provides real-time weather alerts, locations of emergency shelters, and allows for notifications to be sent to loved ones.
- NOAA Weather Radio All Hazards: a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service office. NWR broadcasts official Weather Service warnings, watches, forecasts and other hazard information 24 hours a day, 7 days a week.
- The Manistee Township Fire Department has a manually operated tornado siren.

Extreme Temperatures

Prolonged periods of very high or very low temperatures are often accompanied by other extreme meteorological conditions, such as high humidity, drought, heavy snowfall, or high winds. Extreme heat or extreme cold primarily affect the most vulnerable segments of the population, such as the elderly, children, impoverished individuals, and people in poor health.

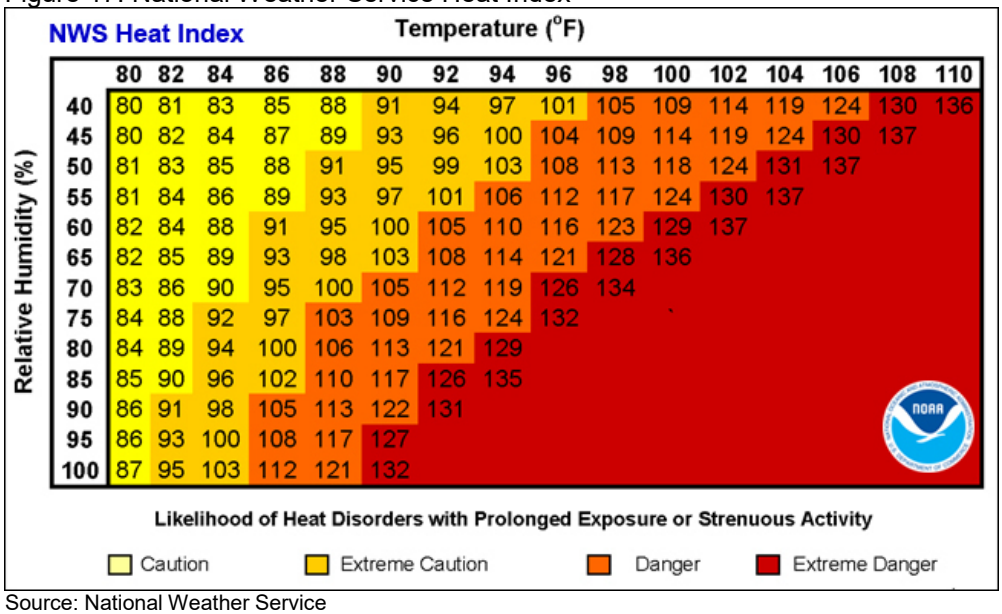
Nationwide, there have been approximately 175 deaths per year that are attributable to extreme heat according to the 2019 Michigan Hazard Analysis. The threats from extreme heat are heatstroke, sunstroke, muscle cramps, heat exhaustion, and fatigue. It is hazardous to livestock and agricultural crops, causes water shortages, exacerbates fire hazards, exacerbates respiratory problems, prompts excessive electrical energy demands, and causes infrastructure failures. Urban areas experience the most serious extreme heat with the combined high temperatures and high humidity that produce a heat-island effect.

According to the 2019 Michigan Hazard Mitigation Plan, Michigan has 11 average annual extreme heat events with 0.4 average annual deaths and 41 average annual injuries.

In the United States, approximately 700 people die each year as a result of severe cold temperature-related causes according to the 2019 Michigan Hazard Analysis, with a significant number of deaths occurring due to illnesses or disease that are negatively impacted by severe cold weather, such as stroke, heart disease, and pneumonia. Exposure to extreme cold temperatures can be life threatening and can cause hypothermia and frostbite. According to the 2019 Michigan Hazard Mitigation Plan, Michigan has 35 average annual extreme cold events with 1 death, 9.4 average annual injuries, and $6.4 million in average annual property and crop damage. Extreme cold affects transportation modes and power utilities, resulting in dead vehicle batteries and loss of power/heat.

Measuring Extreme Temperatures (Extreme Heat and Extreme Cold)
Extreme heat is measured with the National Weather Service's Heat Index Chart (Figure 17). The chart uses relative humidity and air temperature to determine the likelihood of heat disorders with prolonged exposure or strenuous activity. Individuals are unable to shed excess heat from their bodies when they experience prolonged exposure to hot temperatures, which results in heat disorders.

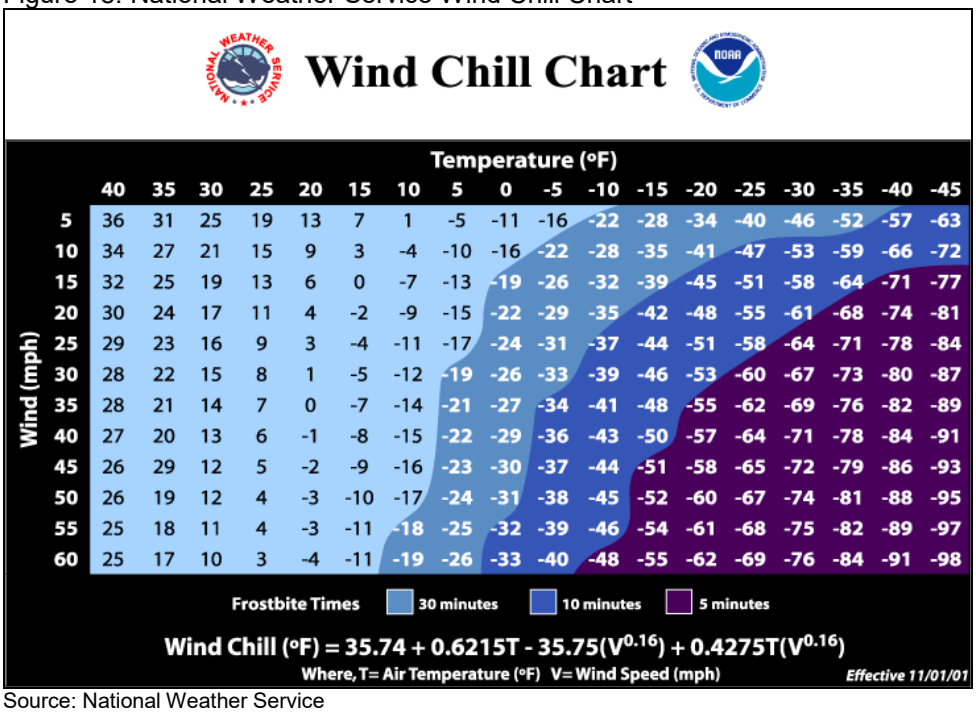
Figure 17: National Weather Service Heat Index



Source: National Weather Service

Extreme cold is measured with the wind chill index, which is a measure of the rate of heat loss from exposed skin caused by the combined effects of wind and cold. As the wind increases, heat is carried away from the body and reduces the external and internal body temperatures. Figure 18 shows the NOAA Wind Chill Chart as it corresponds to various temperatures and wind speeds.

Figure 18: National Weather Service Wind Chill Chart



Wind Chill Chart

Wind (mph) \ Temperature (°F)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	29	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes | 10 minutes | 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

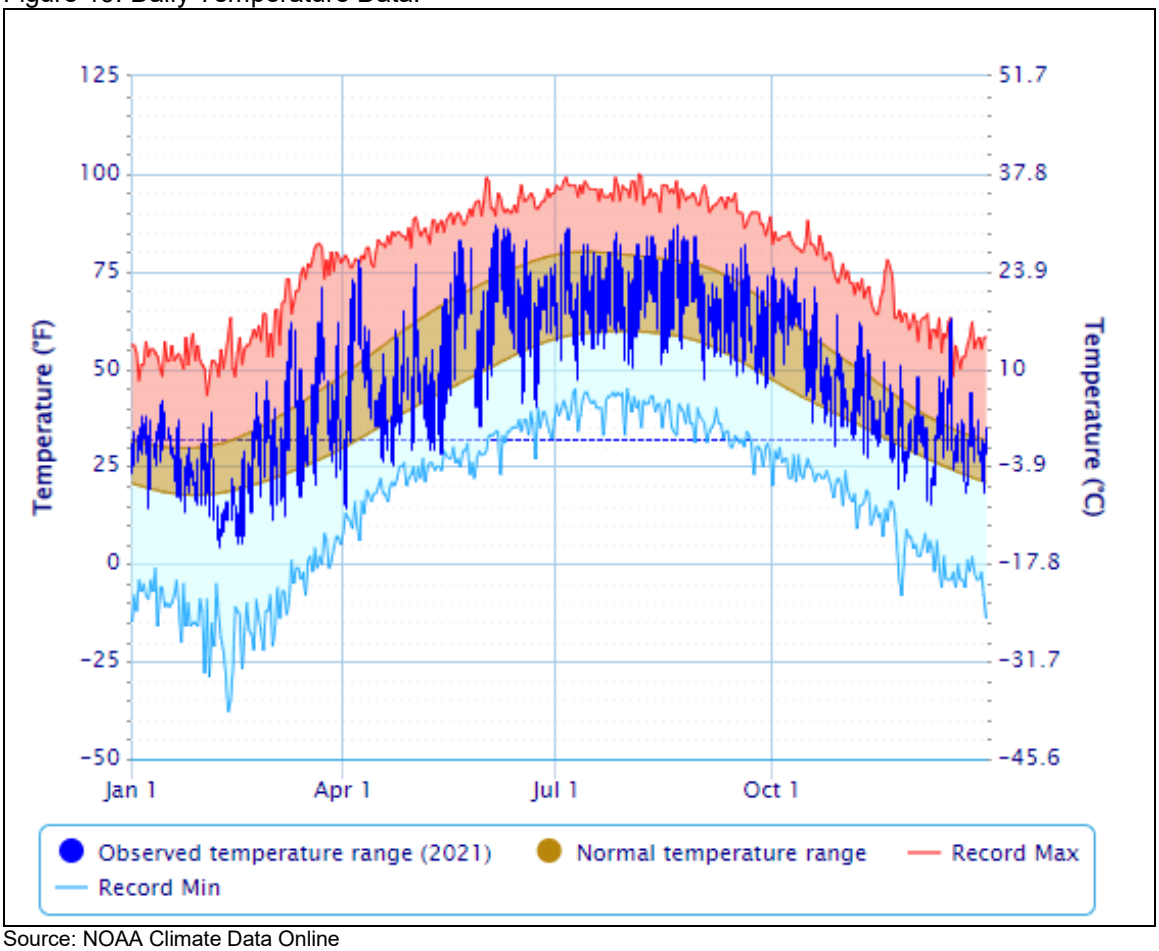
Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Source: National Weather Service

Figure 19 illustrates the observed temperatures at Manistee 3SE for 2021. The dark blue line shows temperatures recorded between January 1 2021 and December 21, 2021. The red line above shows record high temperatures for that day, and the light blue line below indicates record low temperatures for that day.

Figure 19: Daily Temperature Data:



Source: NOAA Climate Data Online

Location and Extent
Extreme temperatures are a regional event that are not confined to geographic boundaries and range in severity across the affected areas. All of Manistee County is at risk from the occurrence and impacts from extreme temperatures.

Previous Occurrences
Manistee County has had two extreme heat events in 2001 and 2018 (Table 35). The events were not associated with any reported deaths, injuries, or property/crop damages. The heat events consisted of hot and humid conditions that caused outdoor events to be modified and attendance at outdoor events to be lower than normal.

The first instance of reported excessive heat occurred on August 1, 2001. Excessive Heat was a problem the first two weeks in August across all of northern Michigan. Temperatures reach the mid to upper 90s, on average, a few days each year; however, for a 5 day (8/5 - 8/9) stretch overnight low temperatures failed to fall below the lower 70s in most areas. This very humid air mass was unusual for northern Michigan, an area which typically sees cool nighttime temperatures and for this reason has very few homes with air conditioners. No heat related deaths or injuries were reported; however, most outdoor events were modified due to the forecasts of hot and humid conditions. County fairs sent animals home, yet still there were livestock losses at fairs in Otsego and Alcona counties. Attendance at county fairs was well below normal and this was attributed to the heat. This period of excessive heat also brought on a drought event at the same time.

The second instance of reported excessive heat occurred on June 30, 2018. The month of June closed with one of the hottest days in recent memory. Highs were well into the 90s, including 99 at Alpena, and 98 at Traverse City and Gaylord. The National Weather Service office near Gaylord also hit 98; that was (by several degrees) the warmest reading recorded at that location since observations began there in the late 1990s. Heat indices exceeded 105 degrees across most of northern Lower Michigan, and some locations exceed 110. The warmest reported heat index on the day was 114 near Indian River. There were estimated to be between 25 and 30 individuals who visited local hospitals due to heat-related illnesses.

Table 35: Extreme Heat Events, Manistee County

LOCATION	DATE	EVENT TYPE	INJURIES, DEATHS, DAMAGES	EVENT DESCRIPTION
MANISTEE (ZONE)	8/1/2001	Heat	0	Excessive Heat was also a problem the first two weeks in August across all of northern Michigan. Temperatures reach the mid to upper 90s, on average, a few days each year; however, for a 5 day (8/5 - 8/9) stretch overnight low temperatures failed to fall below the lower 70s in most areas.
MANISTEE (ZONE)	6/30/2018	Excessive Heat	0	Highs were well into the 90s, including 98 at Traverse City and Gaylord. The National Weather Service office near Gaylord also hit 98; that was (by several degrees) the warmest reading recorded at that location since observations began there in the late 1990s.

Source: NOAA: National Centers for Environmental Information

There have been three extreme cold events reported for Manistee County (in 2007, 2014, and 2019; Table 36). The events were not associated with any deaths, injuries, or property/crop damages. The low temperatures caused schools to close. However, since cold temperatures typically occur during winter months, many events may have gone unrecorded.

A Governor Declared Emergency for extreme cold was enacted in January 2019 for all 83 counties in the state.

Table 36: Extreme Cold Events, Manistee County

LOCATION	DATE	EVENT TYPE	INJURIES, DEATHS, DAMAGES	EVENT DESCRIPTION
MANISTEE (ZONE)	2/4/2007	Extreme Cold/wind chill	0	High temperatures on the 4th (Super Bowl Sunday) were around zero, with low temperatures that night from five to ten below zero. Gusty northwest winds produced hazardous wind chills of 20 to 30 below zero, along with blowing and drifting snow. Many area schools closed on the 5th, due to the extreme cold and poor road conditions.
MANISTEE (ZONE)	1/6/2014	Extreme Cold/wind chill	0	One of the most brutal cold air outbreaks in recent memory - the coldest since at least January 1994 - plunged into the Great Lakes region. Near- to below-zero temperatures were accompanied by blustery northwest winds. Away from the warming influence of Lake Michigan, wind chills sunk to 30 below zero or colder. The coldest wind chills observed were -44 near Cedarville, -39 near Engadine, -36 at Sault Ste Marie, and -33 at West Branch and Houghton Lake. All of these were reached in the morning hours of the 7th. As a result, school closings were widespread across northern Michigan on the 7th.
STATEWIDE	1/29/2019	Extreme Cold/wind chill	0	Governor Declared Emergency – Wind chills of 15 to 30 below zero were common in northern lower Michigan. Wind chills were much colder in eastern upper Michigan, including -51 at Kinross, and -42 at Sault Ste Marie and Mackinac Island.

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment
Since 2001, there have been two extreme heat events in Manistee County. This indicates there is a 9% chance than an extreme heat event would occur in a future year.

Since 2007, there have been three extreme cold events in Manistee County. This indicates there is an 18.75% chance an extreme cold event would occur in a future year. Since extreme cold events tend to occur during the winter months and are coupled with blustery winds and snowstorms, these events may have been reported as other hazards or not at all, which means there may have been more extreme cold events in the county.

Extreme heat and cold events are more likely to impact unsheltered populations, such as the urban homeless population and people working or recreating outside. The Little River Casino in Manistee Township can be utilized as an overnight or temporary emergency shelter location for all of Manistee County in the event of an extreme heat/cold emergency. Also, the Wagoner Community Center (utilized by the Manistee County Council on Aging) in Manistee is utilized as a temporary emergency warming/cooling center. In addition, the Manistee County Emergency Management Department maintains agreements with public schools, local fire departments/government offices and some churches for use of their buildings as secondary shelter sites.

Anecdotally, emergency personnel see more fatalities during extreme temperature events. Vulnerable populations may not be able to find or access heating or cooling stations or are able to communicate their needs. In addition to human vulnerability to extreme temperatures, because heat is an additive, there are also environmental concerns when heat increases the risk of wildfire and drought.

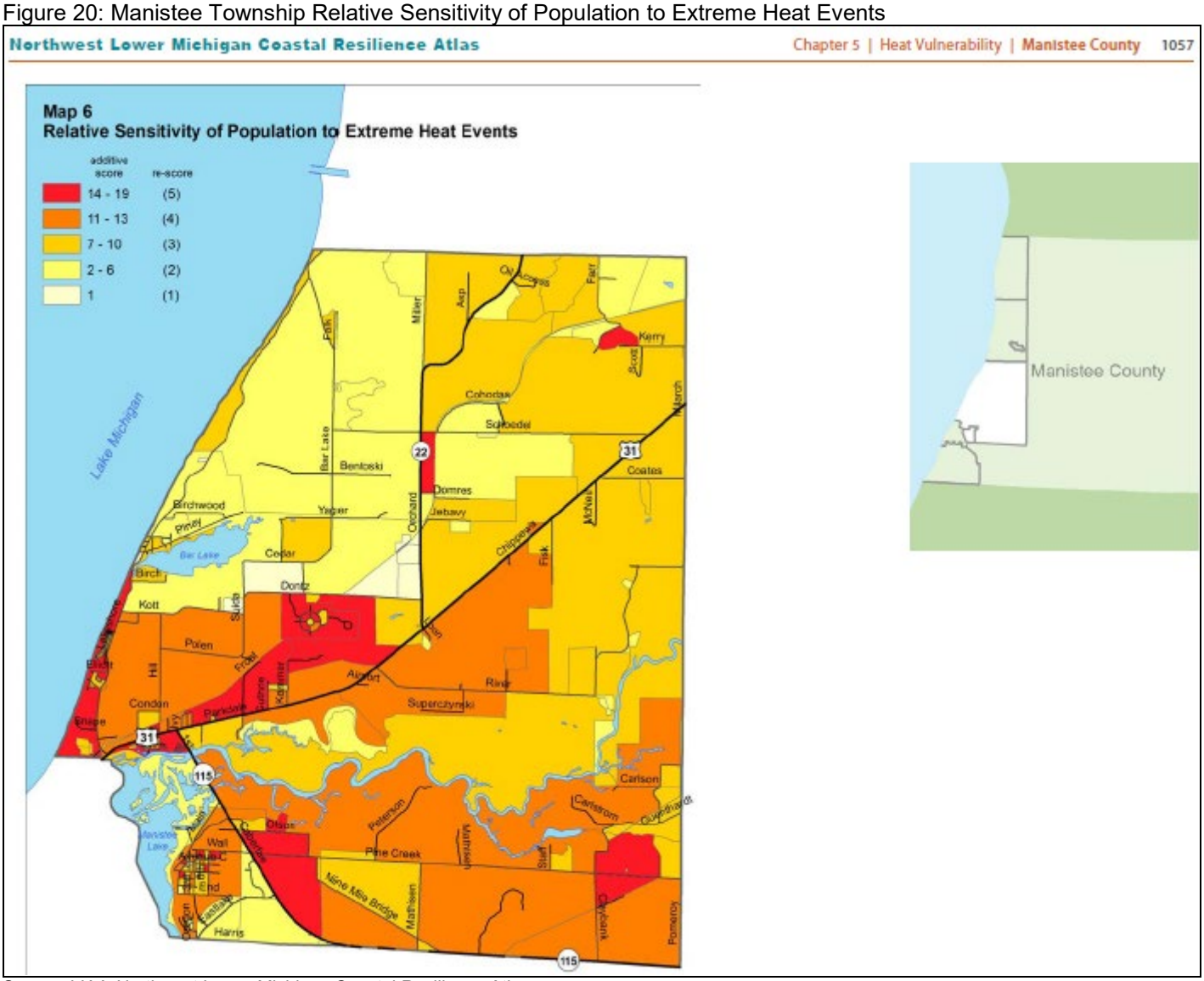
The *Northwest Lower Michigan Coastal Resilience Atlas* written by the Land Information Access Association completed a Heat Vulnerability Assessment[3] of coastal communities. A community's vulnerability is their exposure to the hazard (determined by tree canopy and impervious surface coverage) + their sensitivity. Sensitivity is determined by the folowing factors:

- Persons > 65 years
- Persons living alone
- Minority (non-white) persons
- Persons living below the poverty threshold
- People > age 25 with less than a high school education
- Disability status (i.e., ambulatory difficulty, mental disability)

Figure 20 indicates the Relative Sensitivity of Population to Extreme Heat Events in Manistee Township with the above factors applied to the mapping analysis.

Approximately 25% of Manistee County residents are over age 65; an estimated 42% of the population is either in poverty or is considered "Asset Limited, Income Constrained, and Employed". Additionally, and estimated 63% of the housing stock in the county is over 40 years old and many homes do not have central air conditioning, which may be needed more often with expected increasingly warmer summers in Michigan.

Figure 20: Manistee Township Relative Sensitivity of Population to Extreme Heat Events



Source: LIAA *Northwest Lower Michigan Coastal Resilience Atlas*

[3] Land Information Access Association. (2019). *Northwest Lower Michigan Coastal Resilience Atlas.* http://www.resilientmichigan.org/nw_atlas.asp

Drought

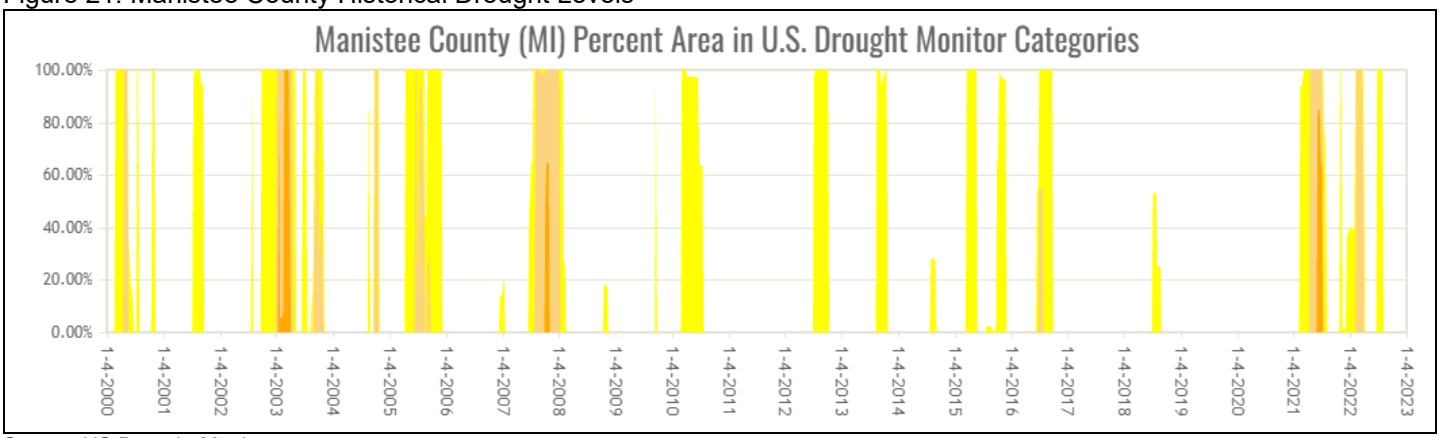
Drought is a normal part of the climate cycle. It is a slow-moving hazard, which causes people to underestimate the damage it can do, but losses from drought are as substantial as those from hurricanes, tornadoes and other faster-moving disasters. Drought can cause agricultural loss; affects domestic water supply, energy production, public health, and wildlife; and contributes to wildfire risk.

Location
Drought is a regional event that is not confined to geographic boundaries and range in severity across the affected areas. All of Manistee County is at risk from the occurrence and impacts from drought.

Extent
The Palmer Drought Severity Index (PDSI) uses readily available temperature and precipitation data to estimate relative dryness. It is a standardized index that generally spans -10 (dry) to +10 (wet). Maps of operational agencies like NOAA typically show a range of -4 to +4, but more extreme values are possible. The PDSI has been reasonably successful at quantifying long-term drought.

The U.S. Drought Monitor (Figure 21) combines several input sources including the PDSI and the Standardized Precipitation Index to prepare a weekly map showing parts of the U.S. that are in drought. The map uses five classifications: abnormally dry (D0), showing areas that may be going into or are coming out of drought, and four levels of drought: moderate (D1), severe (D2), extreme (D3) and exceptional (D4) (Figure 22).

Figure 21: Manistee County Historical Drought Levels



Source: US Drought Monitor

Figure 22: U.S. Drought Categories and Historically Observed Impacts

Michigan

Category	Historically observed impacts
D0	Grass fires increase
	Lawns are brown; landscape and gardens are watered more frequently
D1	Most crops and vegetation are stressed; farmed Christmas trees are stressed
	Well levels decline
D2	Corn and soybean yields are low
	Mature trees are stressed
	Streamflow is extremely low, potentially too low to irrigate

Source: US Drought Monitor

Previous Occurrences
There has been one instance of drought in Manistee County, in 1977. The event was a Presidential Declared Emergency for drought problems affecting 44 counties in Michigan, including Manistee, Lake, Mason, Oceana, and Wexford counties. There are no deaths, injuries, or damages are associated with these this event.

Probability of Future Events and Vulnerability Assessment
There has been one occurrence of a drought incident affecting Manistee County in the past 46 years. This indicates a 2.2% chance of a future annual drought event in Manistee County. In Northern Michigan's forested regions, drought can adversely impact timber and agricultural production and some tourism and recreational enterprises. This can also cause a drop in income, which impacts other economic sectors.

The biggest problem drought presents, however, is the increased threat of wildfire. The southern portions of Manistee County are heavily forested, especially with pine trees which are highly vulnerable to wildfire in drought conditions.

Additionally, the threat to water sources should also be considered. Most residents outside the City of Manistee rely on groundwater wells for potable water consumption. Even drought events in category D1 experience water well level decline. Drought events combined with excessive heat can also have severe impacts on the health of elderly persons.

Wildfire

A wildfire is an unplanned, uncontrolled fire in grassland, brushland, or forested areas. Wildfires can occur in any forest or grassland type under dry conditions; however, some forest types are more susceptible to wildland fires. For example, jack and red pine forest stands have a high risk for wildfires, as they are dependent on fire to provide all the right conditions for regeneration, while aspen and white pine forest stands have a moderate risk.

The primary cause of wildfire is from human activities, specifically burning outdoor debris. Recently, only about 4% of all wildfires in Michigan were caused by lightning strikes, and most other causes have been attributed to human activity. Most Michigan wildfires occur close to where people live and/or recreate, which puts both people and property at risk. The immediate danger from wildfires is the destruction of property, timber, wildlife, and injury or loss of life of persons who live in the affected area or who are using recreational facilities in the area. Long-term effects include scorched and barren land, soil erosion, landslides/mudflows, water sedimentation, and loss of recreational opportunities.

Approximately 55% (20.4 million acres) of Michigan's total land area is forest cover. The vast forests provide Michigan with the largest state-owned forest system in the United States. In addition, Michigan has the fifth largest quantity of timberland acreage, with 19.3 million acres (including hardwoods and softwoods). That vast forest cover is a boon for both industry and recreation, and these areas have been gradually increasing in recent years. However, it also means that many areas of Michigan are vulnerable to wildfires.

Michigan's fire season starts in early spring, when leaves and grasses remain dry from fall and winter and trees are not yet green. Wildfires are often accompanied by drought where dry conditions increase the potential to burn. Often a thunderstorm will roll through and lightning will strike causing sparking of dry leaves and dead wood. High winds can then spread wildfire. Wildfires can become unpredictable in windy conditions or when the wind changes direction suddenly. Cooler nighttime temperatures often help suppress wildfires and the potential for wildfire; however Michigan has had several major fire events.

According to MDNR and U.S. Forest Service records, between 1910 and 1949, over 5.8 million acres of forest were burned in the state of Michigan; an average of 145,000 acres per year. By comparison, it was reported that between 1950 and 1996, the MDNR and U.S. Forest Service were involved in suppressing over 46,100 wildfires that burned 390,000 acres of forest, which averages only 8,300 acres burned per year. This drastic reduction in the acres of timber burned was largely the result of (1) increased use of specialized equipment to suppress the fires, and (2) intensified efforts toward fire prevention.

Location

All Manistee County communities and developed areas are vulnerable to wildfires since the community centers and rural residential developments interface with the high risk forest types (e.g. Red Pine, Eastern White Pine, and Jack Pine). In terms of tree type and coverage, there are 54,514.33 acres of Red Pine, 102.01 acres of Eastern White Pine, and 959.13 acres of Jack Pine in Manistee County. As shown in the Environmental Features map in Appendix A, Red Pine and Eastern White Pine forest types are located throughout the county. Jack Pine forest types are located more sporadically: in the eastern townships, Cleon, Dickson, and Norman, as well as small pockets in Manistee, Onekama, Maple Grove, and Stronach Townships, and the City of Manistee. Much of the pine forest areas overlap with designated public lands.

Extent and Previous Occurrences

Extent can be measured by the number of acres burned and the cost of property damage. According to the Michigan State Police's *2019 Michigan Hazard Analysis*, between 1981 and 2018 there were 54 reported fires on land in Manistee County under MDNR jurisdiction. This resulted in 1,070.7 acres burned and 28.2 acres burned per year. No property damages were recorded.

According to the 2021 USDA/USFS publication *Spatial Wildfire Occurrence Data for the United States, 1992-2018 [FPA_FOD_20210617*], there were 75 fires that occurred on federal lands in Manistee County between 1994 and 2017, comprising about 238.74 acres of land burned. Additionally, there were 22 wildfires on private land between 2014-2018 in the county, and 180 fires on State, private, or other types of owned land from 1992-2018 (altogether a total of 1,151.61 acres burned). Property damage estimates were not provided. Most of these fires were human-caused and under 5 acres in size. The largest size fire in this records database was the "Warfield Road" fire on April 14, 2003, which burned 764 acres on state or private land. The fire was caused by debris and open burning.

More recently, the community of Dublin (100-150 people) in Norman Township experienced a wildfire event in 2021 that burned around 1,000 acres of land. This area is surrounded by forest that tends to be very dry in certain weather conditions. Additionally, the community consists of an older population and has a neighborhood that is accessible by one street (James Street), with no other access point in or out. The Norman Twp. Fire Chief, in coordination with the County EM and USFS, held a community meeting in Dublin in the spring of 2022 to provide information to residents about fire prevention and preparedness practices, such as utilizing Code RED, conducting neighborhood cleanups to get rid of brush, etc. Discussions have also occurred amongst the Norman Twp. Fire Chief and local partners to determine an alternate fire access route to the neighborhood. Norman Township is also a participant in the "FireWise USA" program.

Additionally, wildfire was identified as the in the community survey as the third most likely type of hazard event that would have the largest impact on the community.

Probability of Future Events and Vulnerability Assessment

There is a 100% annual chance there will be a wildfire on MDNR or USFS lands, and a small chance there will be a wildfire on lands outside of these areas. Forest types (Red Pine, Eastern White Pine, and Jack Pine) within Manistee County are susceptible to wildfires; these are scattered throughout every community in the county. However, areas of Manistee County located south of the Manistee River (Filer Township, Stronach Township, Manistee Township, Norman Township, Brown Township, and Dickson Township) have areas that are densely populated with pine trees, and are therefore highly vulnerable to wildfire threats.

Additional factors that increase fire risk include dead or dying trees as a result of disease/invasive species, invasive species itself, lightning strikes, and human factors such as the number of persons residing, camping, or traveling through the County. Historically, Michigan's landscape has been shaped by wildfire; however, over the last several decades, the current landscape has transformed from wildland to residential development. With the increase in residential development in and around rural areas prone to wildfires, there is an increase in the potential for loss of life and property damage. Local fire departments have mutual aid agreements in order to provide additional coverage for rural, sparsely populated, or difficult to reach areas. Residential development in rural Manistee County is often isolated from town centers and emergency services. Many of these areas interface with public lands and local emergency services coordinate fire services with State and Federal fire protection agencies.

As mentioned previously, Norman Township is a participant in the "FireWise USA" program, which serves as a proactive step towards educating residents on how to reduce wildfire risk in the community. Additionally, their township's zoning ordinance includes a section in the General Regulations (Article 10, Section 1043) that outlines "High-Forest Fire Urban Interface Regulations" for new building activities in the township. This zoning ordinance provision serves as an example for other communities in the county that may want to revise their zoning ordinances to ensure that future developed areas are constructed with fire mitigation techniques. An excerpt is provided below[4]:

> *1043. High-Forest Fire Urban Interface Regulations Any structure constructed or altered after the effective date of this Ordinance which is located in a highly combustible vegetation area shall comply with the requirements of this section. "Highly combustible vegetation area" means an area which has predominantly evergreen tree species with lower branches which do not die off and are near to the ground, such as, but not limited to, Jack Pine or Scrub Pine (Pinus banksiana), Scotch Pine or Scotch Fir (Pinus Sylvestris), Red Pine or Norway Pine (Pinus resinosa), Spruces (Picea), Hemlock (Tsuga candensis), and Cedars or Junipers (Pinaceae); and other situations where structures encroach into wildlands.*
>
> *A. Defensible space.*
> *1. A three (3) foot primary fire-defensible space shall be established on all sides of each structure. Primary fire-defensible space shall:*
> *a. not have any combustible materials.*
> *b. have landscaping which includes, but is not limited to, non-combustible materials such as gravel, marble chips, concrete, or mineral soil.*
> *c. not have a cluster of combustible trees, and no Jack Pine or Scrub Pine (Pinus banksiana), and Scotch Pine or Scotch Fir (Pinus Sylvestris) species.*
>
> *2. A thirty (30) foot secondary fire-defensible space within the parcel shall be established on all sides of each structure. The thirty (30) foot secondary fire-defensible space shall be increased by one (1) foot for each one (1) foot where the ground slopes more than 15% down from the structure. Secondary fire-defensible space shall have:*

[4] https://www.normantownship.org/zoning-ordinance

a. tree branches below six (6), or more, feet pruned and removed.
b. trees spaced so the edges of crowns are ten (10), or more, feet apart.
c. household and other debris, brush, ground fuels (leaves and pine needles) removed.
d. landscaping which includes, fire-resistant plants such as those listed in Michigan State University Extension Bulletin E-2948 "Wildfire-Resistant Landscape Plants for Michigan" of 2005, or a manicured lawn or garden.

3. A tertiary space beyond the thirty (30) to one hundred (100) foot secondary fire-defensible space within the parcel shall be established on all sides of each structure. Tertiary space shall have:

a. trees spaced so the edges of crowns are ten (10), or more feet apart and distance from power lines.
b. trees spaced so trunks are twenty (20), or more feet from other trees. tree branches below six (6), or more, feet shall be pruned and removed.
c. household and other debris, brush, ground fuels (leaves and pine needles) removed.

B. A minimum of ten (10) feet shall separate each structure, firewood storage pile, fuel storage, and storage of other flammable items; or they shall be situated outside of the secondary fire-defensible space.

C. Chimneys and flues shall be provided with an approved spark arrester made of 12 gauge welded or woven wire mesh with holes no larger than ½ inch. A ten (10) foot secondary fire-defensible space shall be established on all sides of each chimney, flue, grille or similar structure.

D. In addition to requirements of P.A. 230 of 1972, as amended, (being the Stille Derossett-Hale Single State Construction Code Act of 1972, M.C.L. 125.1501 et seq.) the following design features are recommended:
1. Roofs are designed and constructed to minimize the possibility of ignition from a wildfire and to minimize the spread of a structural fire to the wildland by use of National Fire Protection Association class A standards (metal, fiberglass shingle, clay, or tile).
2. Exterior walls are constructed of at least ½ inch sheathing or an equivalent material. Exterior sheathing shall extend from the roof line to ground level. Preferred siding should be non-flammable materials (such as brick, stone, stucco, or metal).
3. Foundations, crawl spaces enclosures, space under mobile homes; areas under porches, decks, or similar areas are provided with full enclosure skirting constructed of ½ inch nominal sheathing or the equivalent and made of non-combustible material (such as metal, block, cement, stone, stucco). Crawl spaces which have vents through the foundation and other similar openings are enclosed with metal screening with less than inch openings.
4. Vents, eaves, fascias, soffits and other similar openings are enclosed with metal screening with less than inch openings.
5. Windows are double pane glass. All windows, window wells in the foundation wall, and glazed openings within thirty (30) feet of concentrations of vegetative fuels should be provided with closeable, solid, exterior shutters, especially in areas of highly hazardous fuels, such as pine or spruce. Window wells in the foundation are enclosed with fire-resistant screening or other fire-resistant material to prevent collection of flammable debris in the window well.
6. Space under decks are enclosed with fire-resistant screening or other fire resistant material to prevent collection of flammable debris under the deck.

Dense Fog

Fog forms when water vapor condenses into tiny liquid water droplets that remain suspended in the air just above the Earth's surface, reducing visibility to values equal to or below locally/regionally established values for dense fog (usually 1/4 mile or less) and impacting transportation or commerce.

Two ways that air can become saturated with water 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 generally a hazard because it does not actually apply damaging forces, the interaction between humans and fog can be a dangerous situation, sometimes resulting in disastrous consequences. It must be noted, however, that freezing fog (a hazard for which the National Weather Service issues special statements) can cause direct harm by causing slickness on roadways, walkways, bridges, and highway ramps, and therefore leading to serious transportation accidents.

Fog is not so easy to classify as a severe and high-impact hazard, although it has caused costs and casualties in the transportation sector, especially—sometimes with deadly consequences. Fog has played a contributing role in several multi-vehicle interstate highway pileups during recent years. While statistics suggest that highway accidents and fatalities, in general, have fallen, that trend is not evident with respect to accidents and fatalities caused by fog. The vast majority of automotive accidents are caused by unsafe driving habits and risk-taking behaviors, such as following too closely behind another vehicle, driving too fast for weather and visibility conditions, and distracted driving. Airplanes have their own inherent vulnerabilities when foggy conditions develop and make a safe landing more difficult.

Fog can be very dangerous when it reduces visibility. Although some forms of transport can penetrate fog using radar, road vehicles have to travel slowly and use their lights to become visible to each other. Localized fog is dangerous if drivers are surprised by it. At airports, some efforts have been made to develop methods (such as using heating or spraying salt particles) to aid fog dispersal, especially at temperatures near or below freezing.

One severe fog event is estimated to occur in Michigan approximately every two years. Property damage can be significant for vehicles, although real property and structures are usually unaffected. Fog has not yet been identified as one of the most significant hazards in any of Michigan's local hazard mitigation plans.

Location
Dense fog can be a local, regional, or state-wide event that is not confined to geographic boundaries and ranges in severity across the affected areas. All of Manistee County is at risk from the occurrence and impacts from dense fog.

Extent
Dense fog can be measured by damages-caused including deaths, injuries, property damages, and/or crop damages. There has been one significant dense fog event in Manistee County, which impacted seven persons (one of which was reported as an indirect fatality).

Previous Occurrences
On May 22, 2010, a dense fog event was recorded in Manistee County. A charter fishing boat struck a pier at the entrance to Manistee Harbor, took on water, and sank. The seven people on board were pulled from the water by the Coast Guard and a local Good Samaritan. The first mate of the boat, a 55 year old male, was given CPR and later pronounced dead (considered an indirect fatality). Two others were treated at a Manistee hospital, while the other four were treated at the scene. Visibility at the accident site was described as being very poor by local media.

Probability of Future Events and Vulnerability Assessment
There is a record of one dense fog event in Manistee County in the past 13 years. Therefore, there is a 7.7% annual chance of a dense fog event happening in a future year. Fog events are likely to occur more frequently, but go unreported as injuries, deaths and damages do not occur. All of Manistee County is at risk from the occurrence and impacts from dense fog. The Manistee North Pier Lighthouse remains in operation with a fog light; the City of Manistee owns it and the Manistee County Historical Museum maintains it. Additionally, the continued and increased use of NOAA Weather Radio and mobile alert systems can inform people of hazardous conditions and the appropriate precautions to take (such as limiting travel) during a dense fog event.

Coastal Hazards - Dangerous Currents

Dangerous currents and breaking waves are common in the Great Lakes region. Rip currents and other currents found near piers are extremely dangerous for swimmers and can lead to drownings. Currents in the Great Lakes can form from any combination of wind, waves, bottom formation, beach slope, water temperature, man-made structures, and natural outlets. In the Great Lakes, swimmers are most likely to encounter one of five common currents: rip, longshore, structural, outlet, and channel.

During rip currents, the water "piles up" between a sandbar and the beach. It has to find a way back out to sea. After the pressure builds up, the water creates a pathway and gushes from the shore back out to open water. That's a rip current: a narrow but powerful stream of water and sand moving (ripping) swiftly away from shore. Rip currents vary in size and speed and can be found on many beaches every day. They typically extend from the shoreline through the surf zone, and past the line of breaking waves. Typically, they form at breaks in sandbars, and also near structures, such as jetties and piers, as well as cliffs that jut into the water.

Rip currents carry swimmers into deeper water, where they may not be able to get their footing. These currents rarely extend far out, and will not pull a swimmer underwater. Rip currents vary in size from very narrow to more than 50 yards wide. Speeds can also vary. The average speed is 1-2 feet per second, but they have been measured as fast as 8 feet per second.

Longshore currents move parallel to or the "long" way along the shoreline. These currents will exert a force to move along shore, making it difficult to remain in front of a spot on the beach. They often happen between the first and second sandbars near the shore. Longshore currents become more dangerous when they combine with rip currents or structural currents since they can move a swimmer swiftly down a beach and into the path of another current or into a structure (pier or breakwall), making it more difficult to swim to shore.

Structural currents - the currents found alongside or as a result of structures like piers and breakwalls - are usually always present. Structural currents are dangerous on their own, but when paired with others like longshore or rip currents, the combination can create a washing machine effect, moving the swimmer from one dangerous current area to another with no clear path to safety.

Outlet currents can be found where rivers and streams empty into the Great Lakes. The flow of water from the river or stream can move quickly. As it enters the open water of a lake, it may take a while for that current to dissipate. Pair that with currents that are present in the lake and the situation can become dangerous.

Channel currents are like a river running parallel to shore. With a channel current, typically there is an island or structure such as a large group of rocks not far from shore. A channel current forms when the flow of water speeds up as it goes between the island and shore, like a bottleneck. This is made worse by the presence of a submerged or partially submerged sandbar connecting the beach to the island, which allows pressure to build behind the water and waves until it breaks through. When the wind speed increases, the waves also increase in intensity, and this causes the current to become stronger and faster.

According to the Great Lakes Current Incident Database, between 2002 and 2020, there have been 75 deaths and 274 persons rescued from dangerous current incidents along the Lake Michigan coastline of Michigan's Lower Peninsula.

It is important to note that there are no "rip tides" or "undertows" in the Great Lakes. Since there are no tides in the Great Lakes, and rip currents don't pull a person down under the water (it will carry them out to the open water, away from shore), "rip tides" or "undertows" are inaccurate coastal hazard terms.

Dangerous current-related incidents in the Great Lakes most often occur when:

- Winds are blowing towards the shore
- Wave heights reach 3 to 6 feet
- A cold weather front is passing through

Location

Dangerous currents are coastal events that are not confined to geographic boundaries and may occur anywhere in Lake Michigan waters. All coastal areas with beach access in Manistee County are at risk from the occurrence and impacts from dangerous currents.

Extent
The National Weather Service provides a Surf Zone Forecast to measure the risk level associated with rip current hazards. Surf Zone Forecasts contain three levels of Rip Current Outlooks:

- Low Risk: The risk for rip currents is low, however, life threatening rip currents often occur in the vicinity of groins, jetties, reefs, and piers.
- Moderate Risk: Life threatening rip currents are possible in the surf zone.
- High Risk: Life threatening rip currents are likely in the surf zone.

Dangerous currents can be measured by damages-caused including deaths and injuries. There has been one recorded rip current event in Manistee County, associated with one death; and one structural current incident involving the rescue of two persons.

Previous Occurrences
On July 11, 2007, Gusty onshore winds contributed to rip current development on Lake Michigan beaches of Northwest Lower Michigan. A 15 year old boy from a downstate Michigan community, drowned as a result of rip currents at 5th Avenue Beach in the City of Manistee.

Additionally, the Great Lakes Current Incident Database indicates that on August 25, 2009, a 12- year old and 14- year old were rescued on the south side of the pier at Douglas Park in the City of Manistee. Winds were 20-30 mph from the southwest, with 5 to 6 foot wave heights. This was described as a structural current related incident.

It is likely that more rip current events have occurred and gone reported. There are instances of fatalities from rip currents in nearby coastal counties including Benzie, Emmet, and Leelanau Counties.

Probability of Future Events and Vulnerability Assessment
Two dangerous current events have occurred in Manistee County since 2007. This equates to a 12.5% annual chance of a dangerous current event happening future year. Dangerous current events are likely to occur more frequently, but often go unreported as injuries and deaths do not occur. Strong currents are dangerous to all swimmers, especially those who are unprepared to be swept up in them. Many Lake Michigan beaches do not have a lifeguard on duty who may identify potential hazardous swimming conditions. Swimmers who are caught unaware may panic when caught up in the fast-moving water, tire as they try to swim against the current, and drown. Public beaches with Lake Michigan access in Manistee County are located in the City of Manistee, Manistee Township, Filer Charter Township, Onekama Township and Arcadia Township.

Coastal Hazards - Seiche

According to the National Weather Service, a seiche is a standing-wave oscillation in any enclosed lake that continues after a forcing mechanism has ceased and results in shoreline flooding and/or damage. In the Great Lakes and large inland lakes, large pressure differences, high winds, or fast-moving squall lines may act as the forcing mechanism. In addition, earthquakes or debris flows can initiate a seiche. When the forcing mechanism ends, the water sloshes back and forth from one end of the lake to the other, causing water level fluctuations of up to several feet before damping out.

A seiche is usually limited to partially or fully enclosed basins, such as Lake Erie. Lake Erie is known for seiches, especially when strong winds blow from southwest to northeast. In 1844, a 22-foot seiche breached a 14-foot-high sea wall killing 78 people and damming the ice to the extent that Niagara Falls temporarily stopped flowing. As recently as 2008, strong winds created waves 12 to 16 feet high in Lake Erie, leading to flooding near Buffalo, New York.

In some of the Great Lakes and other large bodies of water, the time period between the "high" and "low" of a seiche can be as much as four to seven hours. This is very similar to the time period between a high and low tide in the oceans, and is often mistaken as a tide.

According to the NOAA-NCEI Storm Events Database, there have been 15 seiche events in Michigan since 1998. There are no deaths, no injuries, and $31,000 in property damages due to seiche events.

Location
A seiche is a coastal event that is not confined to geographic boundaries and may occur anywhere in Lake Michigan waters or on large inland lakes. All coastal areas are at risk from the occurrence and impacts from a seiche.

Extent and Previous Occurrences
Seiche events can be measured by damages-caused including deaths, injuries, and property damages. There are no seiche events on record for Manistee County in the NOAA Storm Events Database.

Probability of Future Events and Vulnerability Assessment
Seiche events have likely occurred along the Lake Michigan coastline in Manistee County, but may have been unreported if injuries, deaths, or significant property damages did not occur. However, persons and property along the lake shore, particularly marinas (such as those in the City of Manistee, Onekama Township/Village and Arcadia Township), are vulnerable to high waves caused by a seiche. Seiche events are also dangerous to all swimmers, especially those who are unprepared to be swept up in the current. Many Lake Michigan beaches do not have a lifeguard on duty who may identify potential hazardous swimming conditions. Public beaches with Lake Michigan access in Manistee County are located in the City of Manistee, Manistee Township, Filer Charter Township, Onekama Township and Arcadia Township.

Coastal Hazards - Waterspout

NOAA defines a waterspout as a "funnel which contains an intense vortex, sometimes destructive, of small horizontal extent and which occurs over a body of water." Tornadic waterspouts generally begin as true tornadoes over land in association with a thunderstorm, and then move out over the water. They can be large and are capable of considerable destruction, and are often accompanied by high winds and seas, large hail, and frequent dangerous lightning.

Fair weather waterspouts, on the other hand, form only over open water. They develop at the surface of the water and climb skyward in association with warm water temperatures and high humidity in the lowest several thousand feet of the atmosphere. They are usually small, relatively brief, and less dangerous. The fair weather variety of waterspout is much more common than the tornadic.

Waterspouts occur most frequently in northern Michigan during the months of August, September, and October, when the waters of the Great Lakes are near their warmest levels of the year. Waterspout formation typically occurs when cold air moves across the Great Lakes and results in large temperature differences between the warm water and the overriding cold air. They tend to last from about two to twenty minutes, and move along at speeds of 10 to 15 knots.

There are five stages of waterspout formation:

1. Dark spot. A prominent circular, light-colored disk appears on the surface of the water, surrounded by a larger dark area of indeterminate shape and with diffused edges.
2. Spiral pattern. A pattern of light and dark-colored surface bands spiraling out from the dark spot which develops on the water surface.
3. Spray ring. A dense swirling annulus (ring) of sea spray, called a cascade, appears around the dark spot with what appears to be an eye similar to that seen in hurricanes.
4. Mature vortex. The waterspout, now visible from water surface to the overhead cloud mass, achieves maximum organization and intensity. Its funnel often appears hollow, with a surrounding shell of turbulent condensate. The spray vortex can rise to a height of several hundred feet or more and often creates a visible wake and an associated wave train as it moves.
5. Decay. The funnel and spray vortex begin to dissipate as the inflow of warm air into the vortex weakens.

According to NOAA's National Weather Service, the best way to avoid a waterspout is to move at a 90-degree angle to its apparent movement.

Location, Extent and Previous Occurrences

Waterspouts are a common occurrence posing a great threat to marine traffic. According to the MSP's 2019 *Michigan Hazard Analysis*, Michigan waterspouts have been noted by National Climatic Data Center between 1993 and 2001. Many additional events have occurred since, which NCDC has classified according to the corresponding lake location rather than as part of Michigan itself. Waterspouts are less frequent on Lake Superior (8 events since 2001) than on Lakes Huron (23 events) or Michigan (51 events).

There are no Great Lakes waterspout events on record with NOAA's NCEI Storm Event Database for Manistee County.

Waterspouts typically last from about two to twenty minutes, and move along at speeds of 10 to 15 knots. They can overturn watercraft and cause damage to bridge structures and According to the MSP's 2019 *Michigan Hazard Analysis*, a waterspout caused $200,000 in damage to a boat house and storage building at Drummond Island (Lake Huron) on July 3, 1999.

Probability of Future Events and Vulnerability Assessment

Despite the lack of a recorded Lake Michigan waterspout event with the NOAA NCEI Storm Event Database for Manistee County, it is likely that waterspouts have occurred in the past, but have not been officially documented.

The National Weather Service (NWS) meteorologists consider forecasting waterspouts during the late summer and fall whenever large, cool air masses overspread the waters of the Great Lakes. Once the NWS has determined that waterspouts are possible, the threat is outlined in the Nearshore Marine Forecast and Hazardous Weather Outlook. The NWS strives to provide this information to the public 12 to 24 hours prior to waterspout occurrence.

When waterspouts have been detected by Doppler radar or reported by local law enforcement or spotters, the NWS issues a Special Marine Warning. Since it is not uncommon for numerous waterspouts to occur simultaneously over a

large area, these warnings tend to cover larger geographic areas than land-based tornado warnings which generally cover a single county.

In most cases, waterspouts which make landfall are much weaker than tornadoes, produce little or no damage, and dissipate quickly. Once on land, they tend not to be a great threat to life and property. In these instances, the NWS issues a Tornado Warning.

A mitigation strategy for marine vessel operators on the Great Lakes includes education and awareness about the prevailing weather conditions, appearance and destructive potential related to waterspouts. When warnings are issued for waterspouts, boaters should prepared to quickly seek safe harbor, or to find shelter out of the path of the waterspout. The best source for waterspout forecast information is NOAA Weather Radio (NWR). These continuous broadcasts from transmitters scattered around the Great Lakes provide forecasts and warnings 24 hours a day. Mobile emergency alert systems can also be utilized as an informational source for waterspout forecasts and warnings.

Coastal Hazards - Coastal Recession and Shoreline Flooding

Coastal recession (erosion) is the wearing away of land, such as loss of riverbank, beach, shoreline, or dune material. It is measured as the rate of change in the position or displacement of a riverbank or shoreline over a period of time. Short-term erosion typically results from periodic natural events, such as flooding, hurricanes, storm surge, and windstorms, but may be intensified by human activities. Long-term erosion is a result of multi-year impacts such as repetitive flooding, wave action, sea level rise, sediment loss, subsidence, and climate change. Death and injury are not typically associated with erosion; however, it can destroy buildings and infrastructure. Waters of the Great Lakes may cause shoreline hazards to occur making the entire northwest Michigan coastline is susceptible to shoreline hazards. As indicated in Figure 23, much of the Lake Michigan shoreline is identified with “High Risk Erosion Areas in 2019.”

Coastal (shoreline) flooding results when Great Lakes water levels rise and push inland, or when rainfall or snowmelt accumulates along the shoreline and is not able to drain properly. Shoreline flooding may also be caused during storms and wind events with high-energy waves.

Most of the northwest Michigan coastline is susceptible to coastal recession and shoreline flooding.

Figure 23: Great Lakes Shorelines with High Risk Erosion Areas, 2019

Location
To reference the 2019 *Northwest Lower Michigan Coastal Resilience Atlas*, "Climate scientists predict that northwest Lower Michigan can expect more frequent storms of increasing severity in the decades ahead. The total amount of rainfall per year in also likely to increase. The potential for substantially larger rain events and severe storms raises concerns of harm to human health and damage to buildings and infrastructure, especially for areas along the Lake Michigan coastline."

Manistee County jurisdictions that may be impacted by shoreline hazards are those along the Lake Michigan coast and direct tributaries to Lake Michigan: the City of Manistee, Manistee Township, Filer Charter Township, the Village of Eastlake, Onekama Township, the Village of Onekama, and Arcadia Township (Figure 24). The Land Information Access Association documented potential shoreline hazards for these communities in the *Northwest Lower Michigan Coastal Resilience Atlas*. Specific areas of shoreline hazards were also identified during the development of this plan. These are marked as a "shoreline erosion" type of hazard area on the Hazard Area Maps in Appendix A.

Figure 24: Manistee County Shoreline Communities in LIAA's Northwest Lower MI Coastal Resilience Atlas

In developing the *Northwest Lower Michigan Coastal Resilience Atlas,* scenario planning was used to determine the potential impact of three differing levels of storms combined with high waters:

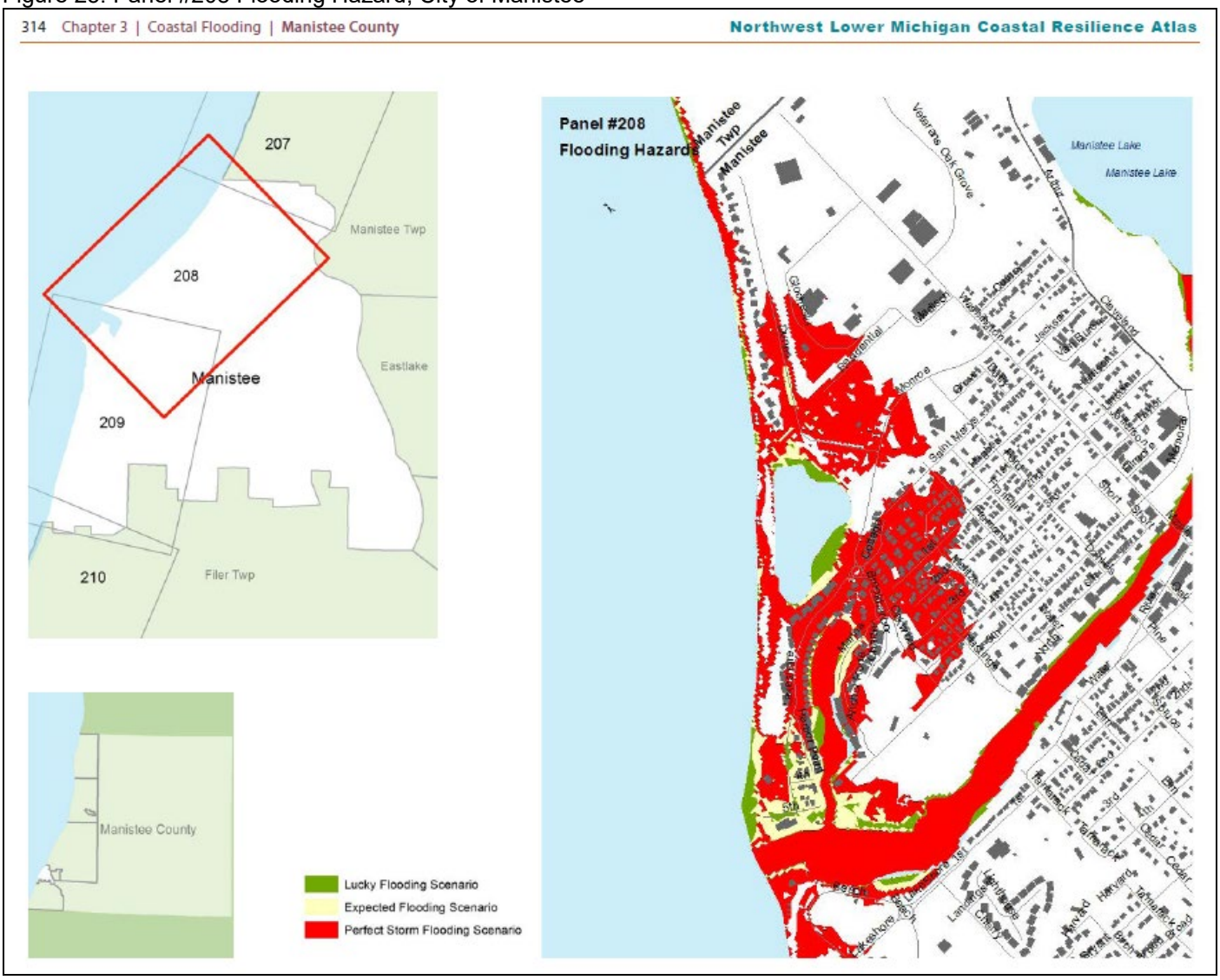
"Lucky" Future: Great Lakes water levels will continue to stay relatively low. Although there will be wave and wind action, major storm events and wave impacts will not encroach on properties landward of current beaches. A Lucky Future projection, indicating the land areas that would be affected by high-energy waves along the shorefront and/or adjacent riverine flooding under these conditions, is shown in green on the maps.

"Expected" Future: Great Lakes water levels will continue to fluctuate according to long-term decadal patterns, including recent extreme storm events incorporated into the ongoing Great Lakes Coast Flood Study being conducted by the Federal Emergency Management Agency (FEMA). Given those ongoing fluctuations, this Climate Future accounts for periods when Great Lakes still-water elevations are closer to the long-term average. In addition, this Climate Future anticipates the so-called "100-year storm event" (or 1% storm) becoming more like a 20- or 50-year storm event (i.e., an expected storm within the normal community planning time horizon) because of increased storminess. The Expected Future projection is shown in yellow on the maps.

"Perfect Storm" Future: Great Lakes water levels will continue to fluctuate according to decadal patterns, consistent with assumptions made for the Expected Future. However, for this Perfect Storm Climate Future, the estimated still-water elevation is set higher than the long-term average and closer to the long-term high (583 feet). In addition, this Climate Future anticipates the occurrence of a so-called "500-year storm event" (or 0.2% storm) occurring within the planning time horizon while lake levels are high. The Perfect Storm Future projection is shown in red on the maps.

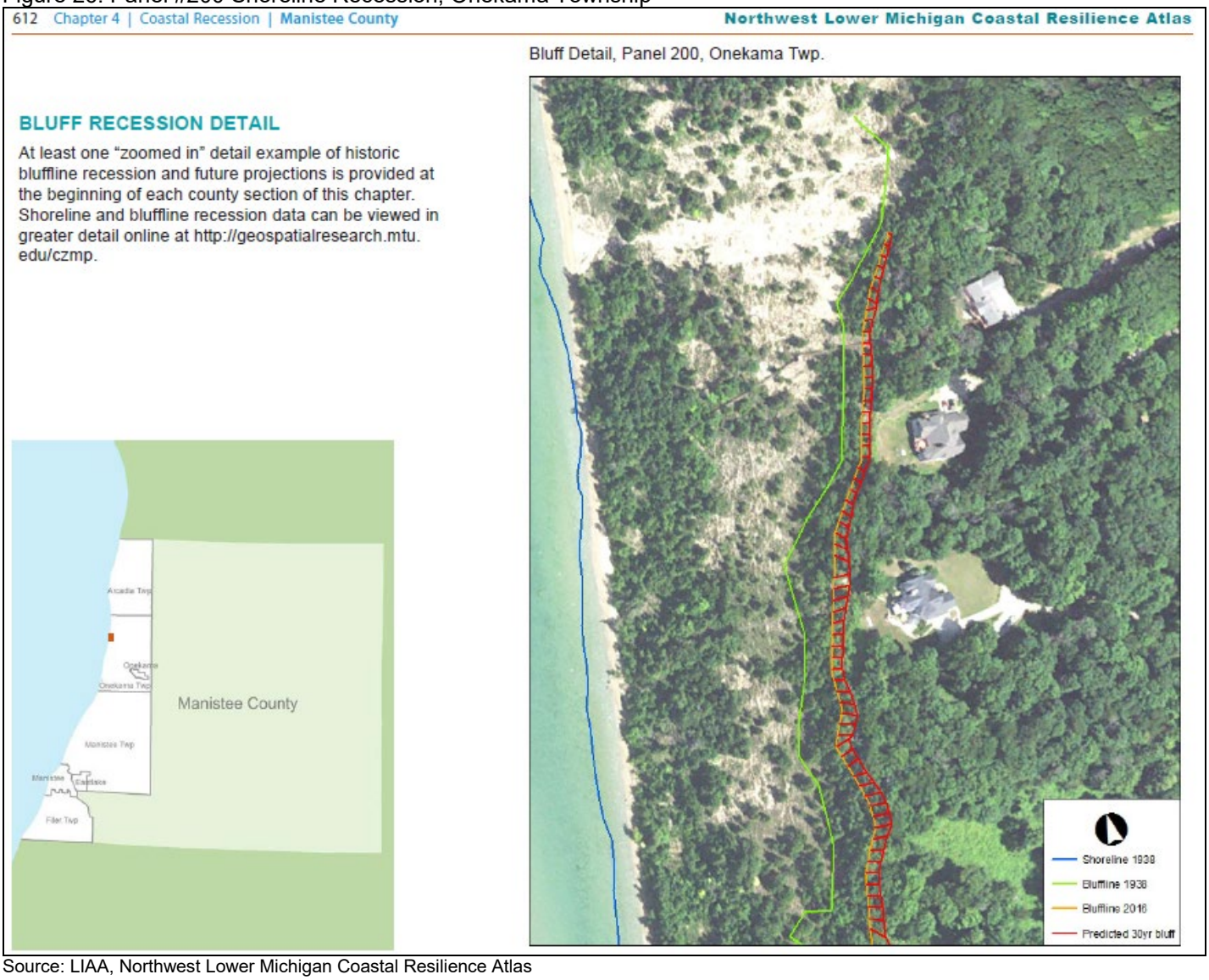
Figure 25 illustrates the three potential flooding scenarios in part of the City of Manistee. “Lucky” scenario flooding is shown in green, “Expected” flooding scenario is shown in yellow, and “Perfect Storm” future scenario is shown in red.

Figure 25: Panel #208 Flooding Hazard, City of Manistee



Coastal recession, or erosion, to Lake Michigan communities is a constant, but small wearing away of the shoreline. The Great Lakes are estimated to lose one foot of shoreline per year to normal wave and wind activity. However, storms and increased wave activity have caused increased coastal recession to varying degrees in Lake Michigan coastal communities. Chapter 4 of the *Northwest Lower Michigan Coastal Resilience Atlas* describes bluffline recession since the 1938 recorded shoreline location. The varying lines are shown in Figure 26 depicting the recession of the bluffline in Onekama Township. The blue line indicates the shoreline in 1938, the green line indicates the bluffline in 1938, the yellow line is the bluffline in 2016, and the red line is the predicted 30 year bluffline.

Figure 26: Panel #200 Shoreline Recession, Onekama Township



Source: LIAA, Northwest Lower Michigan Coastal Resilience Atlas

Additionally, the Manistee County communities of Filer Charter Township, the City of Manistee, Manistee Township, Onekama Township and Arcadia Township contain "High Risk Erosion Areas" (HREAs) along various locations adjoining Lake Michigan. Designated and regulated by the State of Michigan's Department of EGLE, HREAs are shorelines of the Great Lakes where the land is receding at a rate of one foot or more per year for a minimum of 15 years. Recession rates change over time as water levels fluctuate and coastal conditions change. Along these shorelines, new structures are required to meet setbacks for their protection from a changing shoreline. When structures are not in danger, the shoreline does not need to be altered to protect the structure.

A permit is required by EGLE for construction, movement, or enlargement of a structure on any portion of a designated HREA parcel regardless of how far the project is from the lakeshore. Common activities requiring a permit include construction of a new house, commercial building, garage, covered porch or addition; substantial reconstruction of a home; and the installation of a septic system. HREAs are regulated by the Administrative Rules of Part 323, Shorelands Protection and Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Currently EGLE administers Part 323 for all HREAs in the county.

The Manistee County communities of Filer Charter Township, Manistee Township and Onekama Township contain State-designated "Critical Dune Areas" (CDAs), which are a combination of coastal barrier dunes, land that has dune-like features, and unique plant communities along a Great Lakes shoreline. Regulatory authority goes to the water's edge. The CDAs include public lands and private properties where developmental, silvicultural, and recreational activities are regulated and a permit is required under Part 353, Sand Dunes Protection and Management, of the Natural Resources and Environmental Protection Act for activities that significantly alter the CDA, such as the construction of a house or garage, building a road or driveway, installing a septic system, installing retaining walls, and sand removal. The law balances the benefits of protecting, preserving, restoring and enhancing the diversity, quality, functions, and value of the critical dunes with the benefits of economic development, multiple uses, and public access. Currently EGLE administers Part 353 for all CDAs in the county.

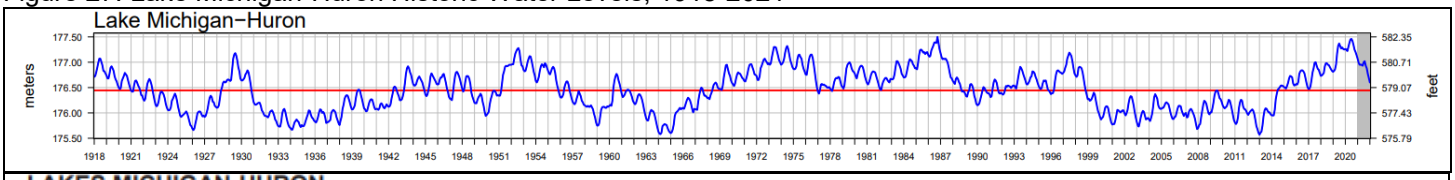
The HREAs and CDAs in Manistee County are shown on the Environmental Features Map are included in Appendix A. Detailed maps of HREAs and CDAs provided by EGLE can be viewed at: https://www.michigan.gov/egle/about/organization/water-resources/shoreland-management/high-risk-erosion-areas/maps and https://www.michigan.gov/egle/about/organization/water-resources/sand-dunes/critical-dunes/maps.

Extent

Shoreline recession can be measured by feet of bluffline retreat and property damages. Bluffline retreat distances vary across the county, and there are no reported damages from bluffline recession. Shoreline flooding can be measured by flood water levels, inches of rainfall, lake water levels (shown in Figure 27), and damages. The four Lakeshore Flooding events in 2019 and 2020 caused $499,000 in property damages in Manistee County (Table 37). As a result, the City of Manistee recently completed a $2 million project to elevate their Riverwalk system, including strategic shoreline protection and concrete walkway reconstruction. A wave analysis and FEMA FIRMs were also utilized to inform the project.

In recent years, the swings in water levels have been unprecedented. In January 2013, Lake Michigan-Huron set an all-time record low of 576.02 feet, and seven years later in July of 2020 Lake Michigan-Huron reached a monthly record high of 582.22 feet, only second to the October 1986 monthly record high of 582.35 feet.

Figure 27: Lake Michigan-Huron Historic Water Levels, 1918-2021



LAKES MICHIGAN-HURON

2021	*580.94*	*580.68*	*580.54*	*580.54*	*580.54*	*580.48*	*580.71*	*580.77*	*580.48*	*580.41*	*579.95*	*579.69*	*580.48*
Mean	**578.48**	**578.44**	**578.48**	**578.77**	**579.07**	**579.30**	**579.40**	**579.33**	**579.17**	**578.94**	**578.77**	**578.61**	**578.90**
Max	581.56	581.53	581.43	581.69	581.96	582.19	582.22	582.09	581.96	582.35	581.96	581.56	
	2020	2020	2020	2020	2020	2020	2020	2020	1986	1986	1986	1986	
Min	576.02	576.08	576.05	576.15	576.57	576.64	576.71	576.67	576.64	576.44	576.28	576.15	
	2013	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964	2012	

Source: US Army Corps of Engineers

Previous Occurrences

In the approximately the past four decades, the Great Lakes experienced record high lake levels in 1985-86, 1997-98, and most recently in 2019-20. Four lakeshore flood incidents have been reported in Manistee County, as described below.

Table 37: Shoreline Flooding Events

LOCATION	DATE	EVENT TYPE	DEATHS / INJURIES	PROERTY DAMAGE	CROP DAMAGE
Manistee County	10/16/2019	Lakeshore Flood	0 / 0	$ 350,000	$ -
Manistee County	10/22/2019	Lakeshore Flood	0 / 0	$ 142,000	$ -
Manistee County	4/13/2020	Lakeshore Flood	0 / 0	$ -	$ -
Manistee County	11/1/2020	Lakeshore Flood	0 / 0	$ 7,000	$ -
TOTAL				$ 499,000	$ -

Source: NOAA NCEI Storm Events Database

The narrative of the October 16, 2019 lakeshore flood event:

> *Northwest to north winds produced high waves and elevated water levels along the northwest Lower Michigan coastline. With Great Lakes water levels at near-record levels, significant coastal flooding and beach erosion resulted. Flooding covered a portion of Lakeshore Drive at 5th Avenue Beach in Manistee. In Parkdale, the beach eroded up to the foundation of several homes, and several trees washed into the lake.*

The narrative of the October 22, 2019 lakeshore flood event:

> *Strong northerly to easterly winds resulted in another round of substantial coastal flooding and beach erosion, this time on both Lake Michigan and Lake Huron, for the 21st into the 22nd. A dock, boardwalk, and beach signage were destroyed in Parkdale.*

The narrative for the two lakeshore flooding events in 2020:

> April 13, 2020: *A strong low pressure passed just north of eastern upper Michigan on the morning of the 13th. Gusty west to northwest winds developed during the day, in the wake of the low. Gusts of 40 to 50 mph were common across northern Michigan, especially during the afternoon. The highest measured wind gust was 58 mph at the airport in Gaylord. Some localized power outages resulted. Lakeshore flooding also occurred along portions of the Lake Michigan coastline of northwest Lower Michigan. The city boat launch in Frankfort experienced flooding of docks and the parking lot. And severe coastal erosion destroyed a portion of the Little Traverse Wheelway between Petoskey and Charlevoix.*
>
> November 1, 2020: *A strong low pressure crossing northern Ontario would drag a cold front across northern Michigan early on the 1st. Gusty southwest winds ahead of the front became even gustier out of the northwest behind the front. Peak measured wind gusts included 58 mph at Leland and Traverse City, 57 mph at Bay Mills, and 54 mph at Pellston. North Lakeshore Drive was flooded near the US Coast Guard Station in Manistee. Streets were covered in water, and the water extended to near the base of some homes.*

The lakeshore flood events in 2019 and 2020 resulted in wave-run up from Lake Michigan into parts of the City of Manistee, with flood levels at 2 to 2.5 feet. Sand and water flooded through the 5th Avenue beach area, impacting the local wastewater treatment plant, the Coast Guard station, and local residences; streets were difficult or impossible to access. The City of Manistee has obtained preliminary engineering estimates for two projects to mitigate future shoreline flooding in this area of the City. One project is the 5th Avenue Flood Mitigation project: construct a wave barrier add a secondary gravity storm sewer and pump station that outlets into the Harbor Village channel. The other project is to construct shoreline protection (~1,023') around the City of Manistee's clean water recovery facility. Details about these proposed projects are included in the Appendix.

Probability of Future Events and Vulnerability Assessment

There have been four lakeshore flooding events in Manistee County in the past four years. These events occurred at the same time as near-record high Great Lakes water levels.

As lake water levels fluctuate and increased storminess occurs, shoreline recession and flooding will continue. In 2021 the level of Lake Michigan began to decline, however, as historic data indicates, the water will begin to rise again. Historic lake level fluctuations have ranged between 3 to 16 year intervals (Figure 26).

Those communities that have already faced shoreline hazards are likely to experience issues in the future. Changes in land use practices and improvements to the shoreline such as natural vegetation plantings or shoreline armoring may reinforce the shoreline for a period of time, but is not a permanent solution.

Shoreline flooding can also result in soil erosion, which carries a risk of loss to shoreline properties. It may necessitate the relocation of homes or other structures as sand or soil is removed by flowing water (lake, river, etc.) and carried away over time. The foundation of a structure, or underground utility pipes in the area, may become fully exposed and vulnerable to weather, extreme temperatures, water damage, or other sources of risk. Shoreline banks that support roadways may erode and cause the road surface to crack, become unstable, or more prone to deposits of sand, snow, water, and ice. Shoreline flooding and erosion is especially relevant to those municipalities that contain residential and commercial development along Lake Michigan that experience seasonal shifts in water levels and possible ice erosion hazards.

Public Health Emergency (Infectious Disease)

Public health emergencies occur when there is a widespread and/or severe epidemic, contamination incident, bioterrorist attacks, or other situation that negatively impacts the health and welfare of the public. These emergencies include disease epidemics, large-scale food or water contamination incidents, extended periods without adequate water and sewer services, harmful exposure to chemical, radiological or biological agents, and large-scale infestations of disease-carrying insects or rodents. A common characteristic of public health emergencies is that they impact or have the potential to impact a large number of people either statewide, regionally, or locally in scope and magnitude. These health emergencies can occur as primary events or as secondary events from another hazard or emergency (e.g. flood, tornado, or hazardous material incident).

Location
Public Health Emergency can be a worldwide, national, state or regional event that is not confined to geographic boundaries and range in severity across the affected areas. All persons in Manistee County are at risk from the occurrence and impacts from an infectious disease. Depending on the type of disease, different populations are more susceptible.

Extent
The extent of a public health emergency can be determined by the number of cases and deaths, and the amount of money spent to prepare for and respond to public health threats. In Manistee County, the District Health Department #10 works with local, state, and federal agencies to prepare for and respond to public health threats. State of Michigan (https://www.michigan.gov/coronavirus/stats) reports, as of December 31, 2022, there were 3,529 cases and 89 deaths confirmed to be attributed to COVID-19 in Manistee County. Of the confirmed deaths, those aged 60 years and older have the most deaths of any age range at 75 deaths. All of the deaths reported were persons 50 years and above. The State of Michigan began collecting data on COVID-19 cases and deaths on March 1, 2020.

Previous Occurrences
Throughout the years, there have been many pandemics. For example, there was an outbreak of severe acute respiratory syndrome (SARS) in 2003. This virus was a new coronavirus that resulted in over 8,000 illnesses worldwide. Of these, 774 died. Since 2012, Middle East respiratory syndrome (MERS), a coronavirus, has been reported in 27 countries where there have been approximately 2,494 people infected and 858 deaths. In 2017, the World Health Organization (WHO) put SARS and MERS on its priority pathogen list to spur further research into coronaviruses. More recently in 2020, a Presidential and Governor Emergency was declared for COVID-19 Pandemic in Michigan. Variants of the coronavirus are still being found two years after the initial spread; vaccinations are available to limit the reaction from exposure and limit the spread of the disease.

Probability of Future Events and Vulnerability Assessment
Naturally occurring pandemics may result in widespread precautions around the world. The Michigan Department of Health and Human Services created a Pandemic Response Plan (Annex 12 of the MDHHS Emergency Operations Plan, June 2023) respond to a large-scale outbreak of influenza and other highly infectious respiratory diseases. The elderly, immune-compromised, and low income populations are most vulnerable to public health emergencies.

Invasive Species

The National Invasive Species Council defines an invasive species as, "A species that is not native and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health." The Council was formed under Presidential Executive Orders 13112 and 13751 to prevent the introduction and spread of invasive species, and to support efforts to eradicate and control invasive species that are established throughout the United States. NOAA's National Ocean Service identifies invasive species as "capable of causing extinctions of native plants and animals, reducing biodiversity, competing with native organisms for limited resources, and altering habitats." There are a wide variety of species considered invasive. Known and monitored species include:

- Mammals
- Birds
- Insects
- Fish
- Crustaceans
- Mollusks
- Worms
- Plants
- Diseases

Invasive species harmful to Michigan and Manistee County may be either terrestrial invasive species (TIS) or aquatic invasive species (AIS). Terrestrial invasive include non-native, land-based plants, insects, animals and diseases that harm Michigan's environment, economy, and human health. Aquatic invasive include non-native, water-dwelling plants, animals, and other organisms that have evolved to live primarily in water (aquatic habitats) rather than on land. Aquatic habitats are habitats that are covered with water all or part of every year. Michigan State Departments cooperated to prepare the Terrestrial Invasive Species State Management Plan and the 2013 Aquatic Invasive Species State Management Plan Update: Prevention, Detection, and Management in Michigan Waters. Each plan outlines a statewide strategy to reduce the environmental and economic damages caused by either TIS or AIS.

Non-native terrestrial and aquatic species are introduced to Michigan and the Great Lakes both intentionally and unintentionally. Aquatic invasive species are the result of unwanted fish and aquatic plants released from home aquariums, travelled across the ocean in ballast water carried by freighters, or entered from the ocean through human-built channels such as the Welland Canal[5].

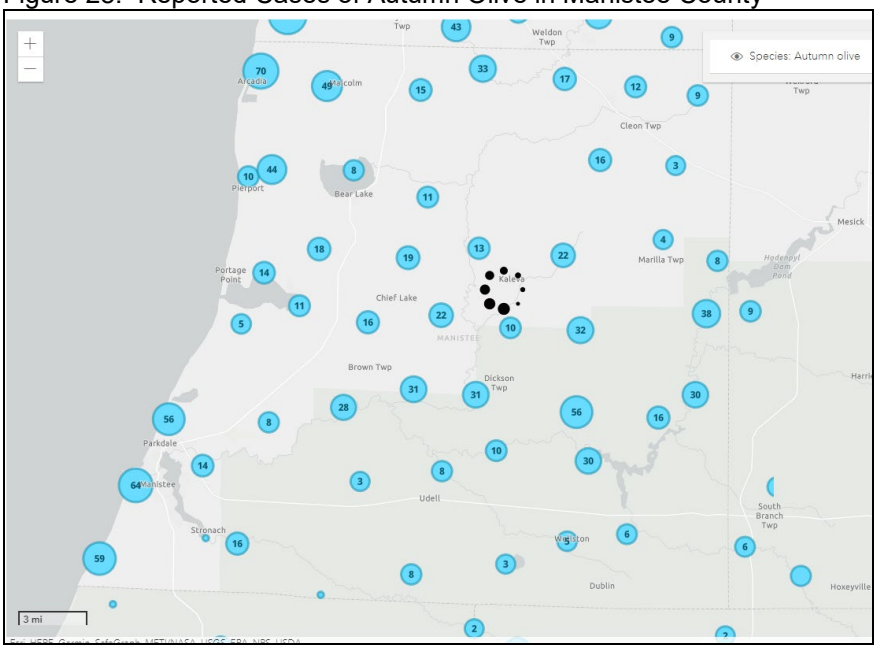
The Midwest Invasive Species Network (MISIN) is a regional effort to develop and provide early detection and response resources for invasive species. Among many tools and resources, the website (misin.msu.edu) provides a catalog of species information and a report of occurrences submitted within each state. Animals, plants, and diseases are included in the catalog. The top five reported species in Michigan are: phragmites (invasive) with 63,018, garlic mustard with 18,368, autumn olive with 16,042, spotted knapweed with 15,436, and brown marmorated stink bug with 13,351.

Location

Terrestrial and aquatic invasive species threaten sensitive ecosystems and may be present in Manistee County forest, wetland, farmland, grassland, aquatic, shoreline, and urban environments. "A Field Guide to Invasive Plants of Aquatic and Wetland Habitats for Michigan" (Campbell, Higman, Slaughter, Schools) identifies the Lake Michigan coastline as particularly vulnerable. "Lake-moderated climates along the Lake Michigan shoreline, Saginaw Bay, the Thumb, Lake St. Clair, and western Lake Erie are much milder than those in the state's interior… These areas have the potential to harbor species typically found far south of Michigan." TIS and AIS designation generally applies, however, several upland species appear to be spreading to wetland and aquatic areas. Regular monitoring and reporting introductions detected is the only way to know where an invasive species has infested. The MISIN website provides reported detections by species name (common and scientific) and family type. Figure 28 identifies reported MISIN Autumn Olive cases throughout Manistee County and in some adjoining counties.

[5] The Welland Canal is a ship canal in Ontario, Canada, connecting Lake Ontario and Lake Erie.

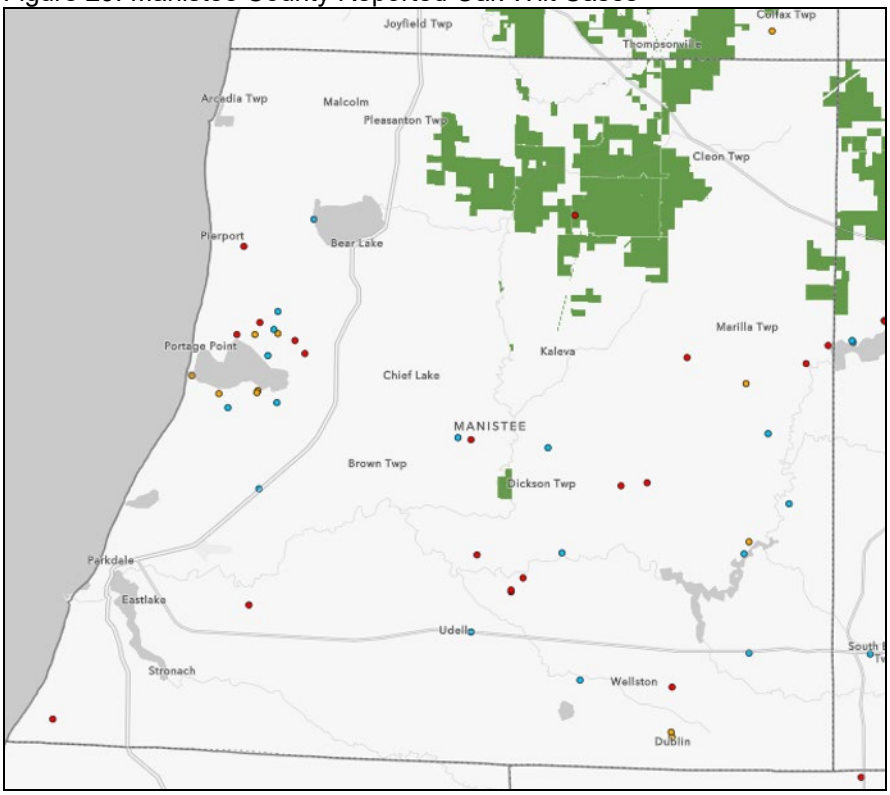
Figure 28: Reported Cases of Autumn Olive in Manistee County



Source: MISIN. Accessed 3/21/2023

Figure 29 is from the MDNR interactive mapping resource “Look for Oak Wilt,” which allows users to submit an Oak Wilt Report throughout Michigan. Multiple Oak Wilt cases have been reported throughout Manistee County. These include trees confirmed positive for the disease and trees that are reported cases.

Figure 29: Manistee County Reported Oak Wilt Cases



Source: MDNR. Accessed 2/16/2023

Extent
Invasive species impact can be measured by its damaging effects. TIS cause billions of dollars in damage annually, are extremely costly to control, and often have irreversible ecological effects. Native habitats, agriculture lands and livestock, and the outdoor recreation economy are threatened or damaged by invasive species. *Michigan's Terrestrial Invasive Species State Management Plan* lists these state impacts:

- The State of Michigan estimates 42% of threatened or endangered species are considered at risk due to non-native species.
- Visitors spent over $22 billion dollars in Michigan in 2014, supporting nearly 327,000 jobs (Tourism Economics 2014). Invasive species impact the use and beauty of Michigan's shorelines, trails and parks, which may result in a reduction in visitor spending and citizen enjoyment
- Michigan's Forest Products Industry supports 96,000 jobs and contributes more than $20 billion to the state's economy each year (Michigan DNR 2015). Invasive forest pests including emerald ash borer, oak wilt and beech bark disease kill trees and significantly impact the value of urban properties, forests and timber resources. The estimated cost of treating or removing dead ash within developed land in Michigan's communities due to emerald ash borer was $230 million in 2009[6]. A map of oak wilt cases in Manistee County is shown as Figure 20.

The costs for some local invasive species management efforts include the following:

- Bear Lake Improvement Board's estimated budget for management of Eurasian milfoil: Bear Lake EWM Program Proposed Cost Estimates for 2023 through 2027 are in the annual range of $46,200 to $46,750.
- The proposed 2022 budget for the Portage Lake Watershed Forever's Water Quality and Environmental Monitoring Committee was $83,600.
- The Grand Traverse Conservation District serves the four counties of Benzie, Manistee, Leelanau and Grand Traverse, and is a partner and fiduciary agent of the Northwest Michigan Invasive Species Network (NWISN). The typical annual budget is around $225,000 for invasive species management efforts in all four counties.

Previous Occurrences
The Department of Environment, Great Lakes, and Energy oversees invasive species programs for the State. The State has produced prohibited and restricted species lists, watch lists, and state management plans for terrestrial and aquatic species. Many of the species listed in this plan are also listed as a prohibited or restricted species: it is unlawful to possess, introduce, import, sell, or offer that species for sale as a live organism, except under certain circumstances. A full list of prohibited and restricted species can be found at Michigan.gov/invasives.

The Northwest Michigan Invasive Species Network (which utilizes the acronym NWISN) works directly with over 60 partners in Benzie, Grand Traverse, Leelanau, and Manistee Counties to manage populations of terrestrial invasive species that threaten northwest Michigan's high-quality natural areas, such as around Lake Michigan coastal dunes and waterways & riparian areas. Figure 30 describes NWISN's top 12 invasive terrestrial species in northwest Michigan that are targeted for management efforts. These species are already established in the region and are prioritized based on their habitat impact and management feasibility. Furthermore, NWISN has indicated that the top priority species particular to Manistee County include: invasive knotweeds, invasive phragmites, Japanese barberry, and hemlock wooly adelgid (HWA – described on the next page.) Dense populations of Japanese barberry have been identified throughout the county, especially in Onekama, where entire hillsides have been seen growing. Invasive knotweeds have the potential for destruction of infrastructure, an ability to spread easily, and have dense growth patterns. Invasive phragmites negatively impact habitat quality and can also restrict beach use and lower property values.

[6] Kovacs, K.F., R.G. Haight, D.G. McCullough, R.J. Mercader, N.W. Siegert and A.M. Liebhold. 2010. Cost of potential emerald ash borer damage in U.S. communities, 2009−2019. Ecological Economics 69: 569-578.

Figure 30. NWISN's Top 12 Invasive Species

One emerging invasive species of concern, known as the hemlock woolly adelgid (HWA) (Adelges tsugae), has been detected on eastern hemlock trees (*Tsuga canadensis*). Often found along ravines, hillsides, and stream banks, eastern hemlock offer habitat for wildlife and provide shade for streams, effectively lowering stream temperatures and increasing oxygen for fish and other aquatic species. Hemlocks provide aesthetic value and are loved by homeowners. It is estimated that Michigan is home to 170 million eastern hemlock trees. Areas near the Lake Michigan shoreline are the most probable for new infestations, as the adelgids tend to favor the temperatures and conditions found near the lake more than those inland. HWA is currently found to the south and north of Manistee County. It is highly suspected that there are HWA populations within Manistee County, and NWISN has not detected them yet.

In 2018, NWISN and regional partners established a map that narrowed down areas that were expected to be denser with hemlock – following the current trajectory of HWA movement in Michigan. Winter surveys took place to minimize any potential spread of the invasive and because it is easier to locate the woolly mass of HWA ovisacs underneath hemlock needles. NWISN's focus was on easier-to-access locations such as public land and conservation easements. The following winter, the focus shifted to private land surveys. Landowners and Homeowner Associations meeting the following requirements are encouraged to complete a landowner survey from NWISN (on their website):

- Property is in Benzie, Grand Traverse, Leelanau or Manistee County *(required)*
- Located within 10 miles of the Lake Michigan shoreline *(required)*
- A hemlock tree you planted was purchased from an online retailer
- ***Special considerations:*** *Property is in Manistee County, along Manistee/Mason county line, or along the Manistee River*

Since 2009, Onekama Township has had annual lake management plans completed by the Portage Lake Watershed Forever (PLWF) group to improve the quality of the water and protect Portage Lake into the future. Each annual plan includes water quality monitoring, surveys of aquatic vegetation, and exotic weed control. These lake improvement activities are funded by assessments on property owners within a special assessment district established under Public Improvements Act 188 of 1954. The PLWF Water Quality and Environmental Monitoring Committee provides technical advice to the township with regard to lake management. Invasive species management on the lake is targeted towards Eurasian watermilfoil, Starry stonewort, Curlyleaf pondweed, Phragmites, Japanese knotweed and Narrow-leaf cattails.

The Bear Lake Improvement Board, with representatives from Pleasanton Township, Bear Lake Township, and the Village of Bear Lake, has been successfully managing Eurasian water milfoil since 2007. The BLIB continues to monitor the lake for water quality, native biodiversity and conducts necessary spot treatments of invasive aquatic plants. They also continue riparian education efforts.

On a regional level, the following terrestrial invasive species are causing significant harm in the northwestern Lower Peninsula:

- Japanese knotweed, Giant knotweed and Bohemian knotweed, *Polygonaceae,* can be a concern to homeowners, and municipalities because of these plants' ability to grow into a structure's foundation, through sidewalks and road surfaces. These plants can also be spread by root fragments and stem sections. It can create monocultures that shade out desirable vegetation, creating poor habitats for native species. This is of particular concern along water bodies and has been shown to be extremely detrimental to waterways in the Eastern US.
- (Invasive) Phragmites is a large-scale clonal grass that rapidly colonizes wetlands. Phragmites crowds out native plants and alters habitat for native fauna. In doing so, Phragmites also alters human access to water resources and has adverse economic effects, including decreasing property value, inhibiting recreational use, and limiting populations of game species. It can become a fire hazard when it dries down
- Cypress spurge is an erect, herbaceous to semi-woody perennial with bright yellow-green flowers that turn to purple-red as they mature. Cypress Spurge is toxic to horses and cows.
- Black Swallow Wort is a rapidly growing, herbaceous perennial in the Milkweed family. However, Black Swallow Wort is toxic to animals and the monarch butterfly.
- Oriental bittersweet is a vine plant that can strangle a tree and causes tree mortality. This impacts ecosystem health and economic health that is associated with trees' health.
- Autumn olive is very widespread in Michigan. It is spread by birds and is recolonizing old farm fields. Its value to wildlife is relatively low (low in protein and other nutrients compared to our natives). It also is known for its nitrogen-fixing abilities. Specific areas of problematic autumn olive infestation provided by a participant in this plan development include these areas of Forest Home Township: properties along Miley Pointe Drive down to Cottage Drive, and along sections of Steiner Road between Clam Lake Road and SE Torch Lake Drive.
- Oak wilt is an infectious vascular disease that can affect all species of oak. Red oaks get the disease more often and succumb more readily than white oak. The disease spreads via root grafts and sap-feeding beetles.
- Beech bark disease is caused by the combination of the *Neonectria* fungus and beech scale. Beech scales are yellow, soft-bodied insects that are 0.5 to 1.0 mm long as adults. The insects, found on the tree trunk and branches, feed on sap in the inner bark. The minute wounds caused by the scale insects eventually enable the Nectria fungus to enter the tree. The Nectria kills areas of woody tissue.
- Garlic mustard is an herbaceous biennial, up to 4 feet in height. Forms round basal rosette the first year, flowers the second year and dies. Grows in forests, particularly floodplain forest, open wetlands, parking lots, campgrounds, paths, and roadsides.

On a regional level, the following aquatic invasive species are causing significant harm in the northwestern Lower Peninsula:

- Didymo or “rock snot” is an aquatic diatom that is brown, tan, or yellow in color. Unlike most algae, it feels like wet cotton and is not slimy. Grows in rivers, streams, and lakes. It occurs particularly in cool, oligotrophic, clear water.
- Purple loosestrife is an herbaceous wetland perennial reaching 5 feet with reddish-purple flowers with five to seven petals are held in dense terminal cluster. Grows in moist soils, in wet meadows and prairies, shallow marsh, ditches, waste areas, and along lakes, ponds, streams, and rivers.
- Eurasian water-milfoil is a submergent, aquatic perennial that reached 3-10 feet or more in length. Grows in ponds, lakes, and low-energy zones in rivers and streams. Specific areas of autumn olive infestation provided by a participant in this plan development include Six Mile Lake in Echo and Banks Townships, the Clam River and Alden Harbor on Torch Lake.

- New Zealand mudsnail is an aquatic mollusk with an elongated shell 1/8 inch long with 7-8 whorls. Shell color varies from gray and dark brown to light brown. Grows in flowing freshwater with silt/sand to very brackish rivers; lives in water as deep as 60 feet in lakes or reservoirs.
- Red swamp crayfish is an aquatic crustacean with a dark red body and claws with spiky, bright red bumps, and black wedge-shaped stripe on underside. Grows in flowing to non-flowing freshwater or salt water; permanent ponds; areas of streams and ditches with organic debris; agricultural areas; wetlands.
- Zebra mussel is an aquatic mollusk with striped shells or dark or light shells with no stripes. They attach to objects (pipe, boats, etc.) causing major damage as colonies can block pipes, affecting power and water-treatment plants.

Many of the species listed above are monitored and managed by NMISN. However, the list of all invasive species impacting the county and region is extensive and many established species are treated on a case-by-case basis. Other species of concern include: Honeysuckle (non-native), Glossy buckthorn, Common buckthorn, Wild parsnip, Multiflora rose, and Periwinkle.

Probability of Future Events and Vulnerability Assessment
The State TIS Management Plan provides a list of eleven terrestrial species on the "watch list", provided below. These are priority species that have been identified as posing an immediate and significant threat to Michigan's natural resources. These species have either not been confirmed in Michigan, have very limited distribution, or are localized. Early detection and timely reporting of occurrences of these species is crucial for increasing the likelihood of stopping an invasion and limiting negative ecological and economic impacts. This list is reviewed and updated periodically, and the most current list is available at www.michigan.gov/invasives.

Common Name - Scientific Name - Category

1. Asian longhorned beetle *Anoplophora glabripenni* Insect
2. Asiatic sand sedge *Carex kobomugi* Plant
3. Balsam woolly adelgid *Adelges piceae* Insect
4. Chinese yam* *Dioscorea oppositifolia* Plant
5. Hemlock woolly adelgid* *Adelges tsugae* Insect
6. Himalayan balsam* *Impatiens glandulifera* Plant
7. Japanese stiltgrass* *Microstegium vimineum* Plant
8. Kudzu* *Pueraria montana* Plant
9. Mile-a-minute weed *Persicaria perfoliata* Plant
10. Nutria *Myocastor coypus* Mammal
11. Thousand Cankers Disease *Geosmithia morbida Pityophthorus juglandis* Tree Disease

Land and water management groups in Michigan are also monitoring for the presence of other invasives that are on the Michigan Watch List, such as:

- Spotted lantern fly which impacts fruit and winery production. Winery and fruit production issues can impact agri-tourism.
- Hydrilla is an aquatic, perennial plant that forms dense mats in slow-moving water of lakes, ponds, stream, and rivers.
- European frog-bit is an aquatic, floating, herbaceous annual that forms large colonies, creating dense mats. Grows in open, still waters.
- Parrot feather water-milfoil is an aquatic, herbaceous perennial that can grow 6.5-16.5 feet in length and forms monotypic stands. Grows in lakes, ponds, slow streams, and mudflats, where the emergent form is found.
- Starry stonewort is an aquatic microalga which forms dense mats that cover lake bottoms. Grows in still or slow moving waters.
- Asian carp (bighead, black, grass, and silver carp) are in direct competition with native aquatic species for food and habitat. Their rapid population increase is disrupting the ecology and food web of the large rivers of the Midwest.
- Beech leaf disease causes dark stripes or banding between leaf veins. A nematode (microscopic worm) is associated with symptoms. Ongoing research is investigating the possibility of other contributing microorganisms.

Potential impact from the species listed on watch list could be catastrophic for Manistee County's natural resources, agriculture, recreation, tourism, and economy. The services provided by the Northwest Michigan Invasive Species Network, Manistee Conservation District, Grand Traverse Regional Land Conservancy and other land and water management agencies are crucial to continuous invasive species management and prevention.

Impacts from Climate Change

Climate describes the average weather conditions for a particular location and over a long period of time. The changing climate impacts society and ecosystems in a broad variety of ways. For example, climate change can alter rainfall, influence crop yields, affect human health, cause changes to forests and other ecosystems, and even impact our energy supply. Climate-related impacts are occurring across the country by increasing the severity of storms and weather-related events. Natural disasters then have a direct impact on our economy.

According to a new comprehensive report from the World Meteorological Organization (WMO), "A disaster related to a weather, climate or water hazard occurred every day on average over the past 50 years – killing 115 people and causing $202 million (US $) in losses daily The number of disasters has increased by a factor of five over the 50-year period, driven by climate change, more extreme weather and improved reporting. But, thanks to improved early warnings and disaster management, the number of deaths decreased almost three-fold[7]" (World Meteorological Organization, 2021).

The impacts of climate change already are, and continue to be, deep and widespread in the Great Lakes Region and Michigan as a whole. The National Climate Assessment (NCA) assesses the science of climate change and variability and its impacts across the United States, now and throughout this century. Chapter 21 of the NCA *Fourth National Climate Assessment Volume II: Impacts Risks, and Adaptation in the United States reports,* the Great Lakes influence regional weather and climate conditions and impact climate variability and change across the region. The lakes influence daily weather by:

1) Moderating maximum and minimum temperatures of the region in all seasons,
2) Increasing cloud cover and precipitation over and just downwind of the lakes during winter, and
3) Decreasing summertime convective clouds and rainfall over the lakes.

The Great Lakes Integrated Sciences and Assessments (GLISA) is one of 11 NOAA Regional Integrated Sciences and Assessments teams that focus on helping the nation prepare for and adapt to climate variability and change. A summary of findings from NCA and the GLISA report, *Climate Change in the Great Lakes Region*[8], are provided to show the impacts of climate change throughout the state of Michigan.

Temperature
Warm-season temperatures are projected to increase more in the Midwest than any other region of the United States.[9] Since 1951, annual average air temperatures have increased by 2.3°F (1.3°C) in the U.S., Great Lakes region. By mid-century (2050), average air temperatures are projected to increase by 3°F to 6°F (1.7°C to 3.3°C). By end of century (2100), average air temperatures are projected to increase by 6°F to 11°F (3.3°C to 6.1°C).

The frost-free season is projected to increase 10 days by early this century (2016–2045), 20 days by mid-century (2036–2065), and possibly a month by late century (2070–2099) compared to the period 1976–2005 according to the higher scenario (RCP8.5).[10]

Precipitation
Since 1951, total annual precipitation has increased by 14% in the U.S., Great Lakes Region. Future projections suggest more precipitation on average, but not necessarily during all seasons (summer to be drier) and not for all locations depending on which model is used. Reduced lake ice cover and enhanced evaporation may lead to increased lake-effect snowfall in the near-term, but rising temperatures will cause more winter precipitation to fall as rain as opposed to snow across the region by late century.

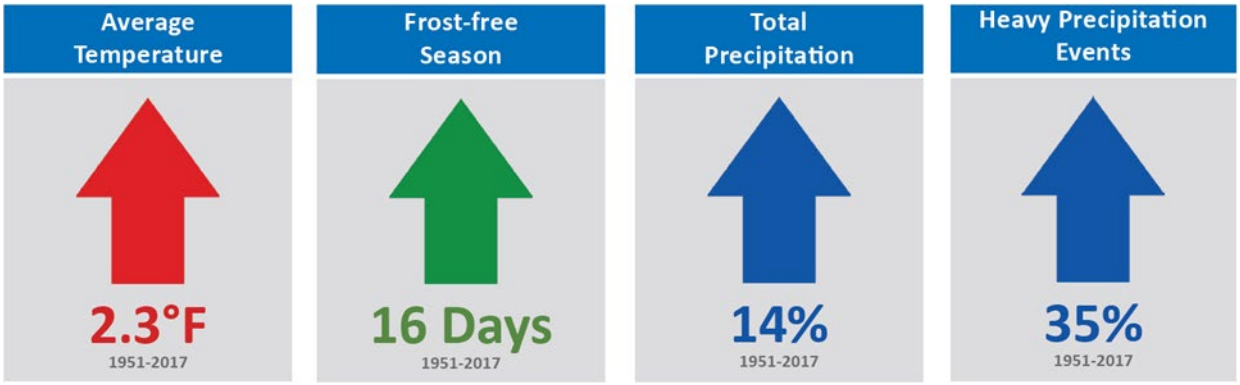
[7] *World Meteorological Organization*. (2021, August 31). Retrieved from Weather-related disasters increase over past 50 years, causing more damage but fewer deaths: https://public.wmo.int/en/media/press-release/weather-related-disasters-increase-over-past-50-years-causing-more-damage-fewer

[8] (2019, February 14). Retrieved from Climate Change in the Great Lakes Region: https://glisa.umich.edu/wp-content/uploads/2021/04/GLISA-2-Pager.pdf

[9] Vose, R. S., D. R. Easterling, K. E. Kunkel, A. N. LeGrande, and M. F. Wehner, 2017: Temperature Changes in the United States. *Climate Science Special Report: Fourth National Climate Assessment, Volume I*. Wuebbles, D. J., D. W. Fahey, K. A. Hibbard, D. J. Dokken, B. C. Stewart, and T. K. Maycock, Eds., U.S. Global Change Research Program, Washington, DC, USA, 185–206. doi:10.7930/J0N29V45.

[10] Hibbard, K. A., F. M. Hoffman, D. Huntzinger, and T. O. West, 2017: Changes in Land Cover and Terrestrial Biogeochemistry. *Climate Science Special Report: Fourth National Climate Assessment, Volume I*. Wuebbles, D. J., D. W. Fahey, K. A. Hibbard, D. J. Dokken, B. C. Stewart, and T. K. Maycock, Eds., U.S. Global Change Research Program, Washington, DC, USA, 277–302. doi:10.7930/J0416V6X.

From 1951-2017, the United States, Great Lakes Region, overall, has seen increases in average temperature, frost-free season, total precipitation, and heavy precipitation events.



Snow, Ice Cover and Lake Temperature
Summer lake surface temperatures have been increasing faster than the surrounding air temperatures, with Lake Superior increasing by 4.5°F between 1979 and 2006. Annual average ice cover on the Great Lakes shifted from higher amounts prior to the 1990s to lower amounts in recent decades. There remains strong year-to-year variability, and high ice years are still possible. Lake-effect snowfall has increased in northern areas and may continue to increase through mid-century.

Extreme Weather
The frequency and intensity of severe storms has increased. This trend will likely continue as the effects of climate change become more pronounced. The amount of precipitation falling in the heaviest 1% of storms increased by 35% in the U.S. Great Lakes region from 1951 through 2017. More severe storms may have a negative economic impact due to resulting damages and increased costs of preparation, clean up, and business disruption.

According to the NCA *Fourth National Climate Assessment Volume II: Impacts Risks, and Adaptation in the United States, "*Climate change is transforming where and how we live and presents growing challenges to human health and quality of life, the economy, and the natural systems that support us. Risks posed by climate variability and change vary by region and sector and by the vulnerability of people experiencing impacts. Social, economic, and geographic factors shape the exposure of people and communities to climate-related impacts and their capacity to respond. Risks are often highest for those that are already vulnerable, including low-income communities, some communities of color, children, and the elderly" (*Ch. 14: Human Health, KM 2*; *Ch. 15: Tribes, KM 1–3*; *Ch. 28: Adaptation, Introduction*).

Climate Change Vulnerability Assessment
A vulnerability assessment in the report *Climate Change in the Great Lakes Region* by GLISA at https://glisa.umich.edu/wp-content/uploads/2021/04/GLISA-2-Pager.pdf lists key challenges from climate change:

- **Public Health**
  - Increased risk of heat waves and increased humidity may amplify the number of heat-related deaths and illnesses.
  - More storm activity and flooding, resulting in increased point- and non-point source pollution, will likely increase watershed contamination and water-borne illnesses, while warmer surface waters amplify the risk of toxic algal blooms and fish contamination.

- **Tourism and Recreation**
  - *Winter recreation/tourism are likely to suffer* due to reduced snow cover and shorter winters. Reduced lake ice cover and enhanced evaporation may lead to increased lake-effect snowfall in the near-term, but rising temperatures will cause more winter precipitation to fall as rain as opposed to snow across the region by late century.
  - Increasing temperatures and a longer summer season may *increase the demand for lake and beach use*.
  - Overall, *summer tourism may grow before temperature rise becomes unfavorable* for outdoor recreation.
  - *The fishing industry* (commercial and recreation) is likely to be impacted by the *decline of coldwater species of fish, such as lake trout and whitefish*.

- **Natural Environment**
  - Despite increasing precipitation, land surfaces in the region are expected to become drier overall due to increasing temperatures and evaporation rates.
  - More frequent summer droughts could affect soil moisture, surface water, and groundwater supply.
  - Increased evaporation rates and sustained levels of high or low water levels may change wetland areas in the region.
  - The rate of warming may *outpace the rate at which ecosystems are able to migrate and adapt*.
  - *Wildlife populations better adapted to cold temperatures will continue to decline* as competing species migrate into the region with rising air and surface water temperatures.
  - *Forest productivity will likely increase in the short term*, until other impacts of climate change such as increased drought, fire and invasive species present additional stressors to forests.

V. Community Vulnerability Analysis

The table on the following pages summarizes much of the information presented in Sections III (Community Profile) and IV (Hazard Identification and Assessments) as it pertains to hazard vulnerabilities and mitigation capabilities for each community in Manistee County.

While many types of hazards considered in this plan could affect every jurisdiction in the County, certain characteristics of the population, governmental regulations, and natural and built environments were considered in the evaluation of each community's unique vulnerabilities and assets related to hazard mitigation.

For reference, the locations of some of these characteristics (i.e., public lands, pine forest area, infrastructure, campgrounds, mobile home areas, hazard areas) are illustrated in the maps provided in Appendix A. Additionally, refer to Appendix F for an outline of goals and objectives in local community plans that support the hazard mitigation strategies (by strategy theme) presented in Section VII of this plan.

Manistee County Community Vulnerability Analysis

	Manistee County Townships/City															Manistee County Villages				
	Arcadia	**Bear Lake**	**Brown**	**Cleon**	**Dickson**	**Filer Charter**	**Manistee**	**Maple Grove**	**Marilla**	**Norman**	**Onekama**	**Pleasanton**	**Springdale**	**Stronach**	**City of Manistee**	**Bear Lake**	**Copemish**	**Eastlake**	**Kaleva**	**Onekama**
Population Estimates (2019)	639	1,799	643	788	899	2,641	4,076	1,342	336	1,390	1,320	727	949	825	6,083	203	143	463	436	461
Severe Winter Weather and Extreme Temperature Vulnerabilities																				
Outdoor Recreation Lands	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Est. number of residents > age 65	241	459	166	183	215	696	1,075	283	87	389	394	226	178	235	1,283					
Est. # of jurisdiction residents that are of a minority race (not Hispanic or Latino origin)	26	102	70	21	17	102	947	129	8	37	67	47	11	32	544					
Est. # of jurisdiction residents that are of Hispanic or Latino origin	7	128	0	27	23	44	149	71	0	15	4	39	3	5	257					
Est. # of households that are lower income (ALICE or below poverty level)	88	227	97	138	189	404	502	248	55	275	160	138	147	137	1,223					
Thunderstorm, High Winds, Hail, Tornado Vulnerabilities																				
Mobile Home Neighborhoods	1						1					1						1		
Campgrounds			2		4		4			5		2	2	3		1		1	1	
Outdoor Recreation Lands	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X
Previous Tornadoes		1									1	1		1						
Est. number of residents > age 65	241	459	166	183	215	696	1,075	283	87	389	394	226	178	235	1,283					
Est. # of jurisdiction residents that are of a minority race (not Hispanic or Latino origin)	26	102	70	21	17	102	947	129	8	37	67	47	11	32	544					
Est. # of jurisdiction residents that are of Hispanic or Latino origin	7	128	0	27	23	44	149	71	0	15	4	39	3	5	257					
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Manistee County Community Vulnerability Analysis

	Manistee County Townships/City															Manistee County Villages				
	Arcadia	**Bear Lake**	**Brown**	**Cleon**	**Dickson**	**Filer Charter**	**Manistee**	**Maple Grove**	**Marilla**	**Norman**	**Onekama**	**Pleasanton**	**Springdale**	**Stronach**	**City of Manistee**	**Bear Lake**	**Copemish**	**Eastlake**	**Kaleva**	**Onekama**
Population Estimates (2019)	639	1,799	643	788	899	2,641	4,076	1,342	336	1,390	1,320	727	949	825	6,083	203	143	463	436	461
Lightning Vulnerabilities																				
Campgrounds			2		4		4			5		2	2	3		1		1	1	
Communications Critical Infrastructure	911 Tower	911 Tower							911 Tower	911 Tower										
Energy Critical Infrastructure		Blarney Castle (Natural Gas)				Filer TES (Electricity)													Fischer Tanks (natural gas)	
Outdoor Recreation Lands	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X
Inland Flooding Vulnerabilities																				
Prior Flood Incident Areas			X		X	X	X		X	X				X	X			X		
Communities in the NFIP; FEMA FIRM issued in 2021	X					X	X				X			X	X					X
Communities not in the NFIP, but a FIRM was issued 3/3/2021																		X		
Increased land development in or near flood hazard areas since 2015 HMP							Joslin Cove Townhomes on Manistee Lake; new clean water recovery facility at the Manistee Wastewater Treatment Plant											Additional development at the "The Bluffs on Manistee Lake" mobile home and RV Resort		
Communities downstream of Hodenpyl and/or Tippy Hydropower Dams			X		X		X		X	X					X			X		
# of Road/Stream Crossings with a Moderate to Severe Rating		8 Moderate	3 Moderate; 8 Severe	6 Moderate; 6 Severe	8 Moderate; 5 Severe		2 Moderate; 1 Severe	21 Moderate; 7 Severe	5 Moderate; 3 Severe	4 Moderate; 6 Severe		2 Moderate; 2 Severe	20 Moderate; 7 Severe	6 Moderate; 2 Severe					1 Moderate	
# of Bridges with Poor, Serious, Critical or Closed Ratings													Leffew Rd. bridge over Bear Creek is closed; Kurick Rd. over Betsie River in poor condition		US-31 Bascule Bridge in Poor Condition					
Est. number of residents > age 65	241	459	166	183	215	696	1,075	283	87	389	394	226	178	235	1,283					
Est. # of residents that are of a minority race (not Hispanic or Latino origin)	26	102	70	21	17	102	947	129	8	37	67	47	11	32	544					
Est. # of residents of Hispanic or Latino origin	7	128	0	27	23	44	149	71	0	15	4	39	3	5	257					
Est. households that are lower income	88	227	97	138	189	404	502	248	55	275	160	138	147	137	1,223					

Manistee County Community Vulnerability Analysis

	Manistee County Townships/City															Manistee County Villages				
	Arcadia	**Bear Lake**	**Brown**	**Cleon**	**Dickson**	**Filer Charter**	**Manistee**	**Maple Grove**	**Marilla**	**Norman**	**Onekama**	**Pleasanton**	**Springdale**	**Stronach**	**City of Manistee**	**Bear Lake**	**Copemish**	**Eastlake**	**Kaleva**	**Onekama**
Population Estimates (2019)	639	1,799	643	788	899	2,641	4,076	1,342	336	1,390	1,320	727	949	825	6,083	203	143	463	436	461
Lake Michigan Vulnerabilties: Shoreline Erosion/Flooding; Dense Fog; Dangerous Currents; Seiche; Waterspout																				
Shoreline Flooding/Erosion	X					X	X				X				X					X
Dangerous Current Incident															2					
Dense Fog Incident															1					
Waterspout/Seiche Incident																				
Lake MI Public Beach Access	X					X	X				X				X					
Critical Dune Areas						X	X				X									
High Risk Erosion Areas	X					X	X				X				X					
Communities in the NFIP; FEMA FIRM issued in 2021	X					X	X				X			X	X					X
Wildfire Vulnerabilities																				
Pine Forest	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X
Campgrounds			2		4		4			5		2	2	3		1		1	1	
Recent Large Fire Incidents					1					2										
Est. number of residents > age 65	241	459	166	183	215	696	1,075	283	87	389	394	226	178	235	1,283					
Est. # of residents that are of a minority race (not Hispanic or Latino origin)	26	102	70	21	17	102	947	129	8	37	67	47	11	32	544					
Est. # of residents of Hispanic or Latino origin	7	128	0	27	23	44	149	71	0	15	4	39	3	5	257					
Est. # of households that are lower income	88	227	97	138	189	404	502	248	55	275	160	138	147	137	1,223					
Drought Vulnerability																				
Public Outdoor Recreation Lands	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Agricultural Land	X	X	X	X	X	X	X	X	X	X	X	X	X							
Invasive Species Concerns																				
Locations of particular concern	Hemlock Wooly Adelgid (HWA) watch area along coastline; aquatic invasives in Arcadia Lake	Aquatic invasives in Bear Lake	HWA Watch Area along Manistee River		HWA Watch Area along Manistee River	HWA Watch Area	HWA Watch Area along coastline and Manistee River; Aquatic invasives in Bar Lake and wetlands				HWA watch area; Japanese Barberry; Aquatic invasives in Portage Lake	Aquatic invasives in Bear Lake			HWA watch area; aquatic invasives in Mansistee River/Manistee Lake	Aquatic invasives in Bear Lake				HWA watch area; Japanese Barberry; Aquatic invasives in Portage Lake
Public Health Emergency Vulnerabilities																				
Assisted Living Facility							Manistee County Medical Care Facility; Maple Ridge Manor ALF								Green Acres ALF					
Est. number of residents > age 65	241	459	166	183	215	696	1,075	283	87	389	394	226	178	235	1,283					
Est. # of jurisdiction residents that are of a minority race (not Hispanic or Latino origin)	26	102	70	21	17	102	947	129	8	37	67	47	11	32	544					

Manistee County Community Vulnerability Analysis

	Manistee County Townships/City															Manistee County Villages				
	Arcadia	**Bear Lake**	**Brown**	**Cleon**	**Dickson**	**Filer Charter**	**Manistee**	**Maple Grove**	**Marilla**	**Norman**	**Onekama**	**Pleasanton**	**Springdale**	**Stronach**	**City of Manistee**	**Bear Lake**	**Copemish**	**Eastlake**	**Kaleva**	**Onekama**
Population Estimates (2019)	639	1,799	643	788	899	2,641	4,076	1,342	336	1,390	1,320	727	949	825	6,083	203	143	463	436	461
Est. # of residents of Hispanic or Latino origin	7	128	0	27	23	44	149	71	0	15	4	39	3	5	257					
Est. # of households that are lower income (ALICE or below poverty level)	88	227	97	138	189	404	502	248	55	275	160	138	147	137	1,223					

Manistee County Community Vulnerability Analysis - Assets

	Manistee County Townships/City															Manistee County Villages				
	Arcadia	Bear Lake	Brown	Cleon	Dickson	Filer Charter	Manistee	Maple Grove	Marilla	Norman	Onekama	Pleasanton	Springdale	Stronach	City of Manistee	Bear Lake	Copemish	Eastlake	Kaleva	Onekama
Population Estimates (2019)	639	1,799	643	788	899	2,641	4,076	1,342	336	1,390	1,320	727	949	825	6,083	203	143	463	436	461
Community Capabilities (Assets)																				
Fire Stations	X	X		X	X	X	X	X		X	X			X	X	X	X	X	X	X
Police Department															X					
EMS Station					Fire/EMS		MMR Ambulance Station								City Fire/EMS					
County Sheriff's Dept. Coverage	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LRBOI Tribal Police							X													
Shelter Sites	Fire Station	Fire Station		Fire Station	Fire Station; Public School	Fire Station	Fire Station; Little River Casino	Fire Station		Fire Station	Fire Station			Fire Station	Fire Station; Wagoner Community Center; 5 public school sites	Fire Station; Public School	Fire Station	Fire Station	Fire Station	Fire Station; Public School
Health Care Facilities							Munson Hospital; Manistee County Medical Care Facility; District 10 Health Dept. Office													
5-Year Capital Improvements Plan (updated annually)						X									X					
County Planning Commission	Yes																			
Manistee County-Wide Park & Rec. Plan, 2022	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Local Zoning Ordinance	X	X	X	X	X	X	X	X	X	X	X	X	No Township Zoning -only DNR Natural River Zoning along and within 500' of the Betsie River	X	X	X	X	X	X	X
Local Planning Commission and Master Plan	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X
Manistee County 2023 HMP Mitigation Strategies with related goals/objectives in local plans (see Appendix F)	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X
State Soil Erosion, Sedimentation, and Stormwater Control Act 91 of the NREPA (enforced/permitted by Manistee County)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
State of Michigan Construction Codes Enforcement	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Administration of the Portage Lake Overlay Zone in Local Zoning Ordinance																				X
District Health Dept. #10 Sanitary Code for Manistee County requires a "time of transfer" evaluation of onsite water/sewage disposal systems	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Local Floodplain Management Ordinance (NFIP participant; FIRMs issued 6/2/2021)	X					X	X				X				X					X

Manistee County Community Vulnerability Analysis - Assets

	Manistee County Townships/City															Manistee County Villages				
	Arcadia	Bear Lake	Brown	Cleon	Dickson	Filer Charter	Manistee	Maple Grove	Marilla	Norman	Onekama	Pleasanton	Springdale	Stronach	City of Manistee	Bear Lake	Copemish	Eastlake	Kaleva	Onekama
Population Estimates (2019)	639	1,799	643	788	899	2,641	4,076	1,342	336	1,390	1,320	727	949	825	6,083	203	143	463	436	461
Community Capabilities (Assets)																				
Fire Stations	X	X		X	X	X	X	X		X	X			X	X	X	X	X	X	X
Police Department															X					
EMS Station					Fire/EMS		MMR Ambulance Station								City Fire/EMS					
County Sheriff's Dept. Coverage	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LRBOI Tribal Police							X													
Shelter Sites	Fire Station	Fire Station		Fire Station	Fire Station; Public School	Fire Station	Fire Station; Little River Casino	Fire Station		Fire Station	Fire Station			Fire Station	Fire Station; Wagoner Community Center; 5 public school sites	Fire Station; Public School	Fire Station	Fire Station	Fire Station	Fire Station; Public School
Health Care Facilities							Munson Hospital; Manistee County Medical Care Facility; District 10 Health Dept. Office													
Communities not in the NFIP, but a FIRM was isssued 6/2/2021																		X		
State Designated Critical Dunes Areas - EGLE permits required						X	X				X									
State Designated High-Risk Erosion Areas - EGLE Permits Required	X					X	X				X				X					
Outdoor burning regulations	DNR posts current status on burning allowances/requirements for each township at https://www.dnr.state.mi.us/burnpermits/														City codified ordinance Ch.674 Safety Sanitation and Health, Sec. 674-01 Open burning; permit required; issuance by Director of Public Safety				Local zoning ord. Sec. 10, 1003 D	Village Ordinance # 34
Zoning Ordinance includes High-Forest Fire Urban Interface Regulations										X										
Lake Management / Watershed Associations	Bear Lake Watershed Alliance	Bear Lake Watershed Alliance; Bear Lake Improvement Board				Little Manistee Watershed Conservation Council				Little Manistee Watershed Conservation Council	Portage Lake Assn.; Portage Lake Watershed Forever; Bear Lake Watershed Alliance	Bear Lake Watershed Alliance; Bear Lake Improvement Board		Little Manistee Watershed Conservation Council		Bear Lake Watershed Alliance; Bear Lake Improvement Board				Portage Lake Assn.; Portage Lake Watershed Forever

VI. Goals and Objectives

The mission of the Manistee County Natural Hazards Mitigation Plan is to protect the health and safety of the public and property in the County which includes prevention of: injury, loss of life, property damage, liability issues, a breakdown in vital services like transportation and infrastructure, economic slumps, and tourism loss. This is done by taking action to permanently eliminate or reduce the long-term risks from natural hazards.

Specific goals and objectives have been established based upon the community's natural hazards analysis, as well as input from the Task Force participants and the public through meetings, request for comments on the draft plan, and the presentation of the plan to the Local Emergency Planning Team.

Goal 1: Increase local awareness and participation in natural hazards mitigation strategies
Objectives:

- Encourage cooperation and communication between planning and emergency management officials
- Encourage additional local governmental agencies to participate in the natural hazards mitigation process
- Encourage public and private organizations to participate in the natural hazards mitigation process
- Encourage use of the "Firewise Communities Program" (www.firewise.org) which offers both workshops and web-based interactive training geared toward homeowners, forestry professionals, firefighters and others on a variety of wildfire safety topics.

Goal 2: Integrate natural hazards mitigation considerations into the community's comprehensive planning process
Objectives:

- Enforce and/or incorporate natural hazards mitigation provisions in building code standards, ordinances, and procedures; and into the county's comprehensive master plan
- Incorporate natural hazards mitigation into basic land use regulation mechanisms
- Update or create zoning ordinances to reflect any new building codes, shoreline protection rules, etc.
- Incorporate natural hazard area classifications into standard zoning classifications
- Improve community education about hazard preparedness and prevention
- Increase public awareness and use of available emergency warning systems
- Integrate natural hazards mitigation into the capital improvement planning process so that public infrastructure does not lead to development in natural hazard-prone areas
- Encourage county agencies to review local roads, bridges, dams, and related transportation infrastructure for natural hazards vulnerability

Goal 3: Utilize available resources and apply for additional funding for natural hazards mitigation
Objectives:

- Provide a list of desired community mitigation measures to the State for possible future funding
- Encourage the application for project funding from diverse entities

Goal 4: Develop and complete natural hazards mitigation projects in a timely manner
Objectives

- Encourage public and business involvement in natural hazards mitigation projects

VII. Mitigation Strategies

Types of Mitigation Actions

The mitigation planning regulations requires that each participating jurisdiction identify and analyze a comprehensive range of specific mitigation actions and projects to reduce the impacts of the hazards identified in the risk assessment. The emphasis is on the impacts or vulnerabilities identified in the risk assessment, not on the hazards themselves. The types of mitigation actions can be classified into the following types:

- Local Plans and Regulations
- Building and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs

Furthermore, a set of evaluation criteria was developed to determine which mitigation strategies were best suited to address the identified problems in Manistee County.

- The measure must be technically feasible.
- The measure must be financially feasible.
- The measure must be environmentally sound and not cause any permanent, significant environmental concerns.
- The measure must be acceptable to those participating in the strategy and/or primarily affected by the strategy.

By anticipating future problems, the County can reduce potential injury, structure losses, loss of utility services such as electric and internet connectivity, and prevent wasteful public and private expenditures. The County Infrastructure, Vulnerability, and Hazard Maps in Appendix A can assist with the determining future problem areas.

Emergency Warning System Coverage and Shelter Sites

Integrated Public Alert & Warning System (IPAWS)

- FEMA's national system for local alerting that provides authenticated emergency and life-saving information to the public through mobile phones using Wireless Emergency Alerts, to radio and television via the Emergency Alert System, and on the National Oceanic and Atmospheric Administration's Weather Radio.

Mobile Warning Systems

- Manistee County uses the CodeRED Emergency Communications Network, which is an electronic, high-speed, outbound notification service available to the general public. The system notifies a participant via their mobile or land-line phone. Additionally, the LRBOI Tribe utilizes the “Fast Command” Emergency Communications Network, which is an electronic high-speed outbound notification service available to Tribal members and employees. Both of these services require users to sign up for the service.
- The FEMA Mobile App is also a publicly available mobile warning system providing real-time weather alerts, locations of emergency shelters, and allows for notifications to be sent to loved ones.
- The National Weather Service may concurrently utilize their mobile warning notification system when deemed necessary in severe weather event situations to send phone notifications to users within signal of a cellular tower.

Radio Warning Systems

- Manistee County uses radio channels 580 AM and 103.5 FM for emergency weather alerts.
- NOAA Weather Radio All Hazards is a nationwide network of radio stations broadcasting continuous weather information directly from the nearest National Weather Service office. NWR broadcasts official Weather Service warnings, watches, forecasts and other hazard information 24 hours a day, 7 days a week.

Tornado/Severe Weather Warning Systems

- The CodeRED system is primarily used in the event of a potential or current severe weather event.

Flood Warning Systems

- For dam failures/flooding downstream an active warning system is pre-determined utilizing geographic boundary information and the CodeRED Emergency Communications Network.
- The Federal Energy Regulatory Commission requires hydroelectric facilities to be able to quickly notify residents and visitors of any developing emergency at the plants. Consumers Energy maintains four (4) emergency warning sirens on the Manistee River to alert the public of impending danger from rapidly rising waters due to an emergency at the Hodenpyl or Tippy Dams. The sirens are activated, accompanied with instructions, during an actual dam emergency. The sirens are located near the Tippy Dam, the High Bridge U.S. Forest Service boat

launch, the Hodenpyl Dam, and the Red Bridge U.S. Forest Service boat launch. In an emergency, the sirens would only be used if the threat of a dam failure is imminent at one of the facilities. At that time, anyone on or near the river should evacuate at once to high ground. The sirens can be controlled physically on-site or remotely from Manistee County Central Dispatch. The siren systems are tested each August and December. Information related to a dam breach would be provided on local radio and television stations.

Website and Social Media Platforms

- Manistee County 911/Dispatch Department does not currently post emergency preparedness information or emergency alerts on their website or via social media.
- Local police and the county Sheriff's Department, in coordination with the County Emergency Manager, post information on emergency events and preparedness on the county Sheriff's Department Facebook page.
- Some local fire departments maintain webpages and social media accounts for disseminating public information.

Shelters

- The Little River Casino in Manistee Township can be utilized as an overnight or temporary emergency shelter location for all of Manistee County.
- Local fire departments and local government offices throughout the county are also utilized as needed for temporary warming/cooling shelters.
- The County Emergency Management Department maintains "soft agreements" with public schools and some churches for use of their buildings as secondary shelter sites.
- The Wagoner Community Center (utilized by the Manistee County Council on Aging) in Manistee is utilized as a temporary emergency warming/cooling center.
- Potential future shelter sites that the LRBOI Tribe has identified are their Gathering Grounds (campground) and Aki Community Center in Manistee Township. However, both of these facilities would need backup generators installed. The campground structure would also need retrofitting and expansion to accommodate more persons. These are strategies that the LRBOI are pursuing as stated in their Tribe's 2023 Natural Hazard Mitigation Plan.

Table 34: Shelter Locations in Manistee County

LOCATION	ADDRESS
Arcadia Township Fire Department	3422 Lake St, Arcadia, MI 49613
Bear Lake Township Fire Department	777 Lake St, Bear Lake, MI 49614
City of Manistee Fire Department	281 1st St, Manistee, MI 49660
Cleon Township Fire Department	16505 Imoff Dr., Copemish, MI 49625
Dickson Township Fire Department	4465 Wingert St, Brethren, MI 49619
Eastlake Fire and Rescue	290 4th St, Eastlake, MI 49626
Filer Township Fire Department	2706 Nelson Street Manistee, MI 49660
Manistee Township Fire Department	1331 Hill Rd, Manistee, MI 49660
Maple Grove Township Fire Department	17010 Lincoln Rd, Chesaning, MI 48616
Norman Township Fire Department	17206 8th St, Wellston, MI 49689
Onekama Township Fire Department	5435 Main St, Onekama, MI 49675
Stronach Township Fire Department	2471 Main St, Manistee, MI 49660
Wagoner Community Center	260 St Mary S Pkwy, Manistee, MI 49660
Little River Casino	2700 Orchard Hwy, Manistee, MI 49660

Source: Manistee County Office of Emergency Management

Mitigation Strategies

Strategies were developed based on discussions amongst the Task Force, local officials and a review of FEMA best practices for hazard mitigation. A list of alternative strategies considered is included as Appendix D. The strategies table is grouped according to purpose. Purpose types include: Awareness & Preparation, Shelters, Buildings & Development, Utilities & Technology, and Environment & Natural Resources. The table also includes: a description of each strategy; what natural hazards they address; where the strategy applies; who is responsible for implementing the strategy; how the strategy will be implemented (what resources are available to help execute the strategy); when the strategy could feasibly begin; the level of priority; and what type of strategy it is. Strategies are intended to be action items completed during the 5-year timeframe in which the plan is active. Some strategies may extend beyond the 5-year timeframe due to feasibility or level of difficulty.

Appendix C provides a review of mitigation strategies included in the 2015 plan, their current status, and how they have or have not been incorporated into the 2023 plan. Note that the 2015 mitigation strategies were not given a priority level of "high", "medium", or "low", as they are in the 2023 plan. The 2015 strategies were simply listed under the "top five" natural hazards priority areas of Flooding, Coastal and Shoreline Erosion, Wildfire, Severe Winter Weather and High Winds.

Rationale for Prioritizing the Strategies

The Manistee County Emergency Manager and Local Emergency Planning Committee considered factors like level of need, economic impact, ease of execution/level of effort, cost, and range of benefit (short term, long-term, small group/area, large group/area) when determining the level of priority for each strategy. In general, strategies were given either a high, medium, or low priority level based on the following rationale:

PRIORITY LEVEL	RATIONALE
HIGH	High priority strategies often address human health, community safety, and protecting property and maintaining critical infrastructure. They are associated with a high level of community need, anticipated economic impact, and/or an immediate large benefit to public health or safety if the hazard event were to occur. High priority strategies are considered critical to preserve life and property, and will have the largest impact on the community.
MEDIUM	Many of these strategies focused on education or planning efforts. The hazards addressed did not appear to have immediate impacts to public health or safety, but may have impacts to specific residents or visitors. Medium priority strategies are generally considered to be ongoing efforts to maintain a safer environment for the community.
LOW	The probability of an event occurring in the geographic area is low, but not impossible, so it should be considered. Low priority strategies may also benefit a small amount of the county's population. Low priority strategies are also considered to be long-term mitigation efforts that will be worked on as resources (such as staff, volunteers, materials and financing) become available. The strategy's priority level may also change based on natural events or time.

The key for the strategy types in the far right columns of the strategies table are as follows:

STRATEGY TYPES

1	**Local Planning & Regulations**
2	**Building & Infrastructure Projects**
3	**Natural Systems Protection**
4	**Education & Awareness Efforts**

		MANISTEE COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE										WHERE - Affected Locations or Groups	WHO - Responsible Parties (**Lead** entity is in **Bold** font)	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Public Health Emergency						1	2	3	4
Awareness and Preparation	**1**	**Incorporate the County Hazard Mitigation Plan's strategies** into elements of **County and local master plans.**	X	X	X	X	X	X	X	X	X	X	Countywide	**County Planning Commission; All local jurisdictions except Springdale Twp**. (no planning or zoning)	A, B, C	Ongoing	**High**	**X**	**X**	**X**	**X**
	2	**Continue to pursue interdepartmental cooperation and coordination of police, fire, rescue and EMS services** to achieve community-wide coverage availability.	X	X	X	X	X	X	X	X	X	X	Countywide	**Local fire/EMS**; **Manistee County Central Dispatch/911**, County Sheriff's Office, USFS and MDNR Fire Management	A-D	Ongoing	**High**	**X**			**X**
	2a	**Consider a county-wide millage to fund local ambulance service**	X	X	X	X	X	X	X	X	X	X	Countywide	**County EM,** Local fire/EMS; Manistee County Central Dispatch/911, County Sheriff's Office	A	0-5 years	**Medium**	**X**			**X**
	2b	**Pursue funding and programs available for training, recruitment and retainment of first responder professionals.**	X	X	X	X	X	X	X	X	X	X	Countywide	**Local fire/EMS; Manistee County Central Dispatch/911,** County EM, County Sheriff's Office, USFS and MDNR Fire Management	A - D	Ongoing	**High**	**X**			**X**
	3	**Continue to increase participation in the CodeRED mass notification system.**	X	X	X	X	X	X	X	X		X	Countywide	**County EM**	A	Ongoing	**High**				**X**
	4	**Inform the public about emergency events and shelter sites** via utilization and promotion of the CodeRED and IPAWS mass notification systems, NWS weather radios (as a good backup plan) and websites/social media.	X	X	X	X	X	X	X	X		X	Countywide	**County EM**	A-F	Ongoing	**Medium**				**X**
	5	**Post MDNR/USFS Fire Danger Status via CodeRED messaging and social media (Facebook).**			X								Countywide	**County EM**	A-D	Ongoing	**Medium**				**X**
	6	**Continue to develop Emergency Action Plans as needed for large public events.**	X	X	X	X	X	X		X		X	Countywide	**County EM**	A	As needed	**Medium**	**X**			
	7	**Assess local fire suppression access points and equipment regularly**; pursue improvements as needed			X								Countywide	**Local Fire Chiefs**; County EM; MDNR; USFS, LRBOI	D	Annually	**Medium**	**X**	**X**	**X**	
	8	**Stay informed about future plans for the Tippy Dam and Hodenpyl Dam**; participate in public meetings organized by Consumers Energy.				X					X		Downstream communities: Townships of Marilla, Dickson, Norman, Brown, Manistee; Village of Eastlake; City of Manistee	**County EM,** local governments	A - C, Q	Ongoing	**High**		**X**	**X**	**X**
	9	**Provide information on fire safety at parks and campgrounds**			X								Countywide	**County EM,** local fire departments, **USFS, MDNR,** private/local government campgrounds	A - D, O, P	Ongoing	**Medium**			**X**	**X**
	10	**Work with campground managers to ensure they are aware of evacuation plans/routes and areas of refuge.**	X	X	X	X	X	X		X		X	Countywide		A-D	Ongoing	**Medium**	**X**			**X**

		MANISTEE COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE										WHERE - Affected Locations or Groups	WHO - Responsible Parties (**Lead** entity is in **Bold** font)	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Inland Flooding and Erosion	Coastal Hazards: Flooding, Erosion, Currents, Seiche, Waterspout	Extreme Temperatures	Drought	Dense Fog	Invasive Species	Public Health Emergency						1	2	3	4
Awareness and Preparation	11	**Promote awareness of vegetation/fuel management for fire prevention around homes and other structures.**			X								Countywide	**County EM**, **local fire departments**, local governments	A-D	Ongoing	**High**			**X**	**X**
	12	**Consider revising local zoning codes in fire-prone areas to require a "defensible space" of cleared vegetation around structures.**			X								Fire-prone areas of the County (Townships of Norman, Stronach, Manistee (SE corner), Filer, Brown, Dickson, Marilla)	**Local governments**	A, B, D, O, P, O1	As needed	**Medium**	**X**		**X**	**X**
	13	**Continue Norman Township's participation in the Firewise USA program.**			X				X				Norman Township	**Norman Twp. Fire Dept.;** Norman Twp. residents; MDNR; USFS	D, P	Ongoing	**High**	**X**		**X**	**X**
	14	**Identify other communities with the county that have an interest in becoming a recognized Firewise USA® community.** Each applicant must create a board/committee, complete a community wildfire risk assessment with a 3-year action plan to reduce ignition risk to homes, and complete annual educational and risk reduction actions.			X								Countywide	County EM; **local fire department chiefs**; MDNR; USFS	O, P, O1	Ongoing	**Medium**	**X**		**X**	**X**
	15	**Pursue community engagement efforts related to fire prevention with other rural communities in fire-prone areas of the County**, particularly if they have neighborhoods with a single point of ingress/egress.			X								Communities in Dickson, Norman, Stronach, Brown, and Marilla Twps.	County EM; **local fire department chiefs**; MDNR; USFS	A, B, D, O1	Annually	**High**	**X**		**X**	**X**
	16	**Encourage communities in the County that contain floodplain areas to participate in FEMA's Flood Insurance Program**, if they do not already do so. (The NFIP provides flood insurance to property owners, renters and businesses, and having this coverage helps them recover faster when floodwaters recede. The NFIP also works with communities required to adopt and enforce floodplain management regulations that help mitigate flooding effects. There is no cost for communities to participate.)				X							Village of Eastlake; Township of Norman, Dickson, Brown, Bear Lake, Maple Grove, Marilla, Springdale, Pleasanton	**County EM**, County Drain Commissioner	J1, K1	Ongoing	**Low**	**X**	**X**		**X**
	17	**Continue the preparedness practice of conducting the annual statewide tornado drill.**		X									Countywide	**County EM**	A - C	Annually	**Medium**	**X**			**X**
	18	**Continue to promote participation in the Storm Spotter Training** via partnership with the NWS.	X	X	X	X	X	X	X				Countywide	**County EM**	A, F2	Annually	**Medium**				**X**
	19	**Continue to share the County Road Commission's snow removal and road maintenance schedules/plans with communities**	X										Countywide	**Manistee County Road Commission**	A - D	Ongoing	**Medium**	**X**			**X**

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Awareness and Preparation	**20**	**Evaluate additional designated sites to temporarily store cleanup debris** from downed trees after storm events.	X	X		X							Countywide	**Community DPWs**, **Road Commission**, County EM	B, C	Annually	**Low**	**X**			
	21	Utilize resources offered by the Great Lakes Water Safety Consortium to increase beach **safety awareness and incident prevention at public beaches**					X						Townships of Arcadia, Onekama, Manistee and Filer; Filer Twp.; MDNR (Orchard Beach State Park in Manistee Twp.)	**Local jurisdictions, MDNR,** County EM	G1, H1	Ongoing	**Medium**				**X**
	22	**Ensure that County residents, particularly vulnerable populations, have access to healthy, affordable food options.**							X		X	X	Countywide		E, G, L	Ongoing	**Medium**	**X**	**X**	**X**	**X**
	22a	**Continue to provide the Manistee County Council on Aging's Senior Services Reimbursement Program (includes snow plowing, shopping) and Senior Nutrition Program**	X									X	Countywide	**Manistee County Council on Aging**	E	Ongoing	**Medium**	**X**			**X**
	22b	**Create community gardens in shared open spaces and/or school locations** to promote learning about growing local food, native pollinating plants, and provide access to fresh produce.							X		X	X	Countywide	Local governments, **local schools**, churches, senior living facilities, parks	L	As needed	**Low**		**X**	**X**	**X**
	22c	**Continue to provide and improve food assistance programs and emergency food programs** to help communities prepare for unanticipated pandemics, but also increase regular food accessibility.	X	X	X	X						X	Countywide	**Manistee County Council on Aging; local food pantries; School Districts (school meal programs)**	G	As needed	**Medium**	**X**			**X**
	22d	**Food rescue programs,** involving public/private partnerships between restaurants, hotels and other venues of large food production, **can partner with local food pantries** to make good food more widely available.	X	X	X	X						X	Countywide	**Manistee County Council on Aging; local food pantries; School Districts (school meal programs)**	G	Ongoing	**Low**	**X**			**X**
	23	**Continue collaboration amongst DHD #10 with federal, state, and local partners to coordinate the response to COVID-19 and other issues pertaining to public health**				X						X	Countywide	**DHD #10**, County EM	F	Ongoing	**High**	**X**	**X**	**X**	**X**
	24	**Continue rely on the MDHHS for guidance** via the **State Pandemic Plan** and information about **new or emerging disease threats.**										X	Countywide	**DHD #10**, County Medical Care Facility, Assisted Living Facilities, Munson Hospital, County EM	F	Ongoing	**High**	**X**			**X**
	25	**Maintain proper levels of PPE** for healthcare workers and first responders, and long-term care facilities.										X	Countywide	**County EM; local fire & EMS; Assisted living fac.; Munson Hospital**	A - C, E	Ongoing	**Medium**	**X**			

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Awareness and Preparation	26	**Identify flood-prone areas and areas that have reported repetitive loss damages due to flooding on FIRMs and pursue FEMA hazard mitigation assistance grants related to flood mitigation**, such as innovative stormwater management solutions, property acquisition, structure demolition or relocation, dry flood proofing, structure elevation, or project scoping				X	X						Countywide	**County EM,** Drain Commissioner, MI EGLE	I1, J1, K1-M1	Annually	**Low**	**X**	**X**	**X**	**X**
	27	**Promote the benefits of natural shoreline and streambank restoration; identify priority shoreline and streambank restoration sites.**				X	X						Countywide	**Manistee Conservation District, Little Manistee Watershed Conservation Council,** GTRLC, CRA	C1 - F1	Ongoing	**Medium**	**X**		**X**	**X**
	28	**Consider developing a drought communication plan/early warning system** to facilitate timely communication of local drought conditions/outlook to officials, emergency responders, and the public.							X				Countywide	**County EM**, MCD/USDA-NRCS, MSUE	A - D, M, N, U1	0-5 Years	**Low**	**X**			**X**
	29	**Consider developing agreements amongst landowners for secondary water sources** that could be used in a drought.							X				Countywide	County EM, **MCD/USDA-NRCS**	A - D, M, N, U1	0-3 Years	**Low**	**X**			**X**
	30	**Consider establishing an irrigation time/scheduling program or process so that all agricultural land gets the required amount of water.** Through incremental timing, each area is irrigated at different times so that all water is not consumed at the same time. This may also help with recharge of groundwater.							X				Countywide	County EM, **MCD/USDA-NRCS**	A - D, M, N, U1	0-5 Years	**Low**	**X**		**X**	**X**
	31	**Consider implementing mandatory water conservation measures during drought emergencies, such as:** ▪Developing an ordinance to restrict the use of water resources for non-essential usage, such as landscaping, washing cars, filling pools ▪Adopting ordinances to prioritize or control water use, particularly for fire fighting.							X				Countywide	County EM, MCD/USDA-NRCS, **local governments**	A - D, M, N, U1	0-5 Years	**Low**	**X**		**X**	**X**
	32	**Support the USDA - NRCS's provision of free technical assistance** such as the Conservation Stewardship Program, resource assessment and monitoring, and determination of financial assistance for local farmers, ranchers and forest managers **in the wake of a natural disaster.**	X	X	X	X		X	X		X	X	Countywide	**MCD/USDA-NRCS**	U1	Ongoing	**Medium**			**X**	**X**

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Shelters	**33**	**Maintain an accurate inventory of emergency shelter sites (overnight vs. daily use types);** review annually and update as needed.	X	X	X	X		X		X		X	Countywide	**County EM**; American Red Cross	A	Annually	**High**	**X**			
	34	**Provide local governments or public/private organizations information on funding sources for the installation of generators to enhance capabilities of emergency shelter locations.**	X	X	X	X		X		X		X	Countywide	**County EM**; Local Fire Depts.; Senior Centers; Municipal Offices	L1, M1	Annually	**High**		**X**		**X**
	35	**Evaluate the feasibility and need to construct storm shelters,** such as concrete "safe rooms", **at campgrounds, recreation areas, and mobile/modular home communities.**	X	X	X	X		X					See hazard map for locations of campgrounds and mobile homes	**County EM**; County Building Dept., local govts; private and public campground managers	L1, M1	Ongoing	**Medium**		**X**		
	36	**Continue to establish areas of refuge and evacuation routes** from campgrounds, recreation areas, and other **sites of large outdoor events.**	X	X	X	X		X		X		X	See hazard map for locations of campgrounds and mobile homes	**County EM**; private and public campground managers; local fire depts.	A - C	Ongoing	**Medium**		**X**		**X**
	37	**Create signage in public parks/beaches that illustrate the nearest emergency shelter.**	X	X	X	X		X		X			Countywide	**County and local governments; MDNR; USFS**	A - C, G1, B2	Ongoing	**Low**				**X**
	38	**Maintain and improve procedures for adequate quarantine areas in group living quarters**, such as shelters, medical care and assisted living facilities.										X	Manistee Township	**Manistee County Medical Care Facility; Munson Hospital; LRBOI Casino**	A, F	Ongoing	**Medium**	**X**			
Buildings & Development	**39**	**Review zoning codes to improve structural resilience against natural hazards. For example:** review snow load requirements, lightning protection devices, high-wind and hail protections, and wildland fire risk mitigation practices	X	X	X	X	X	X			X	X	Countywide	**County Planning/Zoning and Local Governments**	A, B, J1 - M1	Ongoing	**Medium**	**X**	**X**		
	39a	**Consider updating zoning ordinances to address development and erosion in coastal areas.**					X						Arcadia, Onekama, Manistee and Filer Townships; City of Manistee	**Arcadia, Onekama, Manistee and Filer Townships; City of Manistee**	B1 - F1	Ongoing	**Medium**	**X**	**X**	**X**	**X**
	39b	**Consider revising building setback requirements for the area of Farm Fox Road in Filer Charter Township.** Some houses are now just five feet from Lake MI due to soil erosion. **Consider requiring homes to be built greater than the min. 60 feet from the high water mark.**					X						Filer Charter Township	**Filer Charter Township**	B1 - F1	Ongoing	**Medium**	**X**	**X**	**X**	**X**
	40	**Continue enforcement of building codes, soil erosion/sedimentation control, and EGLE permitting requirements for Critical Dune Areas and High Risk Erosion Areas relative to new construction or site modification.**	X	X	X	X	X	X			X	X	Arcadia, Onekama, Manistee and Filer Townships; City of Manistee	**County Building Dept.**, County Soil Erosion Officer, **EGLE**, local municipalities	A, B, D1	Ongoing	**Medium**	**X**	**X**	**X**	**X**

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Buildings & Development	**41**	**Continue to enforce the Point-of-Sale Evaluation requirement for Manistee County for the sale of a parcel containing an on-site water supply and/or on-site sewage disposal system**				X	X					X	Countywide	**District Health Dept. #10**	F	Ongoing	**High**	**X**	**X**	**X**	**X**
	42	**Promote the availability of low-cost residential weatherization and home improvement programs.**	X	X	X	X		X				X	Countywide	**Manistee County Council on Aging; County EM, NMCAA**	A - C, E, H - K	Ongoing	**High**		**X**		**X**
	43	**Evaluate the need/potential to provide reduced-cost program to install air conditioning in the homes of low-income senior citizens.**			X			X				X	Countywide	**Manistee County Council on Aging**, County EM	E, B2, N1	Ongoing	**Medium**		**X**		
	44	**Improve ventilation techniques** in areas, facilities, or vehicles that are prone to crowding or that may involve exposure to contagion or noxious atmospheres.										X	Countywide	**Local and county governments, schools, private venues.**	A - C	As needed	**Low**		**X**		
	45	**Continue to pursue opportunities for brownfield and blight clean-up activities, including demolition and clearance of vacant, condemned structures, to remove actual and potential sources of land, water and air contamination.**		X	X	X						X	Countywide	**Manistee County Brownfield Authority**; County Zoning Dept., Local Governments	A - C	Ongoing	**Medium**	**X**	**X**	**X**	
	46	**Complete infrastructure improvements in hazard areas**				X	X						Countywide		A, B, K1 - M1	As needed	**High**	**X**	**X**		
	46a	**Pursue funding for conceptual 5th Avenue Flood Mitigation project in the City of Manistee:** construct a wave barrier and add a secondary gravity storm sewer and pump station that outlets into the Harbor Village channel					X					X	City of Manistee	**City of Manistee**	B, K1, M1	0-3 years	**High**	**X**	**X**		
	46b	**Pursue funding for shoreline protection (~1,023') around the City of Manistee's clean water recovery facility**					X					X	City of Manistee	**City of Manistee**	B, K1, M1	0-3 years	**High**	**X**	**X**		
	46c	**Continue to investigate funding opportunities to relocate or replace aging and/or underutilized railroad bridges in or near the City of Manistee**	X	X		X							City of Manistee, Manistee Township, Stronach Township	**City of Manistee, Manistee Township, Stronach Township**, **CSX Railroad**	A, B, K1, M1	0-3 Years	**High**	**X**	**X**		
	46d	**Inventory and prioritize improvements for flood prone locations in the County's transportation network.** (I.e., upgrading aging stormwater abatement structures, or replacing undersized/aging culverts and bridges.)				X	X						Countywide	**MCRC, MDOT, Villages, Townships, Railroad Companies**, County Drain Commissioner, land management agencies	A, B, I1 - M1, Z1	Annually	**High**	**X**	**X**		

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Utilities & Technology	47	**Continue work amongst the utility companies to clear vegetation** (particularly diseased or dead trees) **along various road and utility right-of-ways** to minimize power outages and road blockages from storm damage.	X	X							X		Countywide	**Road Commission, Local Governments, MDOT, Consumers Energy, Cherryland Electric, Great Lakes Energy**	A - D, R - T	Ongoing	**Medium**		**X**	**X**	
	48	**Continue to maintain effective communications practices between electric utility companies regarding power restoration.** (County EM to post and promote the electrical outage map on social media.)	X	X	X	X		X					Countywide	Consumers Energy, Great Lakes Energy, Cherryland Electric; **Manistee County EM**	A, R - T	Ongoing	**Medium**				**X**
	49	**Investigate opportunities to bury overhead utilities,** such as during new construction or in areas regularly prone to power outages.	X	X	X			X					In commercial/urban areas, where required by local zoning ordinances	Consumers Energy, Great Lakes Energy, Cherryland Electric; **Manistee County Planning Commission; All local jurisdictions except Springdale Twp.**	A - C, R - T	Ongoing	**Low**	**X**	**X**		
	50	**Document occurrences of electrical interruptions** during storms and **work with electric companies to improve the resiliency of the infrastructure** in these areas.	X	X	X	X		X					Countywide	**County EM**, Citizen volunteers, Consumers Energy, Great Lakes Energy, Cherryland Electric	A - C, R - T	Ongoing	**Low**		**X**		**X**
	51	**Promote the use of small-scale renewable energy sources for homes, businesses and governmental facilities** (i.e., rooftop solar, geothermal).	X	X				X					Countywide	**LRBOI, County/Local Governments**	W - Z, C2	Ongoing	**Medium**		**X**	**X**	**X**
	52	**Per their 2020 Master Plan, Manistee Township should continue to allow solar farms in areas of low density residential development and agricultural production.**	X	X				X					Manistee Township	**Manistee Township**	Z	Ongoing	**Medium**	**X**	**X**	**X**	
	53	**Continue to maintain community water and/or sewer systems at acceptable operating standards.**				X						X	City of Manistee, Villages of Onekama and Bear Lake, Filer Township, Manistee Township, Village of Onekama	**Local governments (listed to the left)**	B, C	Ongoing	**Medium**	**X**	**X**	**X**	
	54	**Separate storm and sanitary sewer systems where applicable.**	X	X		X						X			B, C, K1 - M1	Ongoing	**High**		**X**	**X**	
	55	**Identify the locations of where backup generators may be needed for wastewater pump chambers** to alleviate manual pumping/hauling in the event of a power outage, and **apply for funding.**	X	X		X						X			B, C, L1, M1	Ongoing	**High**		**X**	**X**	
	56	**Update and maintain Continuity of Operations plans and alternative remote work schedules.**	X							X		X	County Government and Local Government Agencies; Public Schools	**County Government and Local Government Agencies; Public Schools**	A - C	Ongoing	**High**	**X**			
	57	**Continue collaboration amongst local governments and utility providers to increase the availability of high-speed internet service.**	X	X	X	X	X	X	X	X	X	X	Rural areas of the county, outside the City of Manistee	**Manistee County BOC;** local governments; service providers; Connected Nation MI	A - C, U, V	Ongoing	**High**	**X**	**X**		

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Environment & Natural Resources	**58**	**Evaluate and manage established drainage districts:** **1. Analyze purpose and need, existing use, land uses within districts, current habitat and ecological importance** **2. Notify residents and municipalities of district boundaries** **3. Formulate recommendations for each individual district**				X			X				Countywide	**County Drain Commissioner**	A, I1 - K1, M1	Ongoing	**Medium**	**X**		**X**	**X**
	59	**Continue to monitor, treat and remove aquatic and terrestrial invasive species.**									X		Countywide	GTRLC, **NW MI Invasive Species Network**, NRCS, MSUE, **MNDR, USFS** and **lake associations**	L, P1 - B2, D2 - E2, G2	Ongoing	**Medium**			**X**	**X**
	60	**Continue and improve collaboration regarding technical assistance, outreach and education about aquatic and terrestrial invasive species management.**			X				X		X		Countywide			Ongoing	**Medium**			**X**	**X**
	60a	**Continue participation in EGLE's annual Great Lakes Aquatic Invasive Species "Landing Blitz" event at public boat launches**, emphasizing the need to Clean, Drain, Dry boats whenever they come out of the water, and Dispose of any unwanted bait in the trash.									X		Countywide	**Manistee Conservation District, Manistee County, lake associations**	L, Q1, W1	Ongoing	**Medium**			**X**	**X**
	60b	**Promote MSUE's "Clean Boats, Clean Waters"** comprehensive aquatic invasive species **boater outreach program;** apply for grant funding to communicate aquatic invasive species prevention information through outreach materials and in-person educational events to boaters.									X		Countywide	Manistee Conservation District, **MSUE**, NW MI ISN, GTRLC, lake associations	L, R1	Annually	**Medium**			**X**	**X**
	60c	**Promote EGLE's "NotMISpecies" webinars and resources on invasives control and management**				X			X				Countywide		S1	Ongoing	**Medium**			**X**	**X**
	60d	**Investigate alternative, effective and less expensive invasive species control measures, such as livestock grazing.**									X		Countywide		L, U1, V1	Ongoing	**Low**			**X**	**X**

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Environment & Natural Resources	61	**Consider adoption of local ordinances that regulate activities to prevent the introduction of or the contribution to the spread of invasive species,** such as prohibiting the use of invasive species in landscaping and/or vegetative riparian buffers, **and permit treatment of existing infestations.**									X		Countywide	**All local jurisdictions** except Springdale Twp. (no planning or zoning)	L, P1, G2	Ongoing	**Medium**	**X**		**X**	**X**
	62	**Consider installing permanent boat wash stations at lake access points and boot cleaning stations at trail access points.**									X		Countywide	Manistee County; **Local jurisdictions**; **USFS; MDNR**	Q1, V1, B2	As needed	**Medium**		**X**	**X**	**X**
	63	**Continue to identify and prioritize sites for open space protection/preservation, green infrastructure and/or stormwater management, especially in areas prone to flooding or erosion.**				X	X	X			X		Countywide	Manistee County; Local governments; **GTRLC**	W1 - B2	Ongoing	**High**	**X**	**X**	**X**	
	64	**Incorporate green infrastructure-related goals and objectives in the County and local municipality Land Use Plans.**				X	X				X	X	Countywide	**Manistee County Planning Commission; All local jurisdictions**	A - C, L, W1, A2	Ongoing	**High**	**X**	**X**	**X**	
	65	**Promote EGLE webinars to educate and inform lakeshore residents about** what they can do to help protect their property value and the health of the lake on which they live **by protecting, stabilizing and beautifying their shorelines with nature-based solutions.**				X	X						Countywide	**Manistee Conservation District (MCD)**	A-C, L, S1, U1 - W1, A2, D2, E2	Ongoing	**Medium**		**X**	**X**	**X**
	66	**Continue efforts to clean up river and lake debris.**				X	X						Countywide	**MCD**, River & Lake Associations	W1, Y1, A2, D2, E2	Ongoing	**Medium**			**X**	**X**
	67	**Continue to regularly clean out plugged culverts (due to sediment deposits, beaver activity, invasive species, etc.)**	X	X		X	X				X		Countywide	**Roadway owners/operators: RC, MDOT, City, Villages, USFS**	A - C, Z1	As needed	**High**		**X**	**X**	

Key	Resource	Description	Website	Hazard Type
A	**Manistee County Government**	County staff including Emergency Management	https://www.manisteecountymi.gov/275/911-Dispatch	All hazards
B	**Local government staff**	All local units of government - employees, elected and appointed officials		All hazards
C	**Little River Band of Ottawa Indians**	Tribal staff and members including Emergency Manager	https://lrboi-nsn.gov/	All hazards
D	**Local Emergency Services and Fire Departments**	Local units of government, LRBOI, USFS, MDNR		All hazards
E	**Manistee County Council on Aging**	Provides programs and services to assist seniors with health and well-being: Senior Project FRESH; Senior Center Food Pantry, Senior Nutrition Program, Senior Dining Out Program, Senior Services Reimbursement Program (for transportation, lawn care, snow removal and light housekeeping). Senior Center (The Wagoner Community Center) is also utilized as a community emergency warming/cooling center.	https://www.manisteecountycoa.com/	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures; Public Health Emergency
F	**District Health Department #10**	Provide programs and services such as: immunizations; infectious disease education and prevention; community clinics; school health services; permitting processes for proper location and installation of water wells and septic systems; education about cleaning, monitoring and maintaining septic systems; septic or well repair financial assistance, and the inspection and licensing of food service establishments.	https://www.dhd10.org/	Public Health Emergency
G	**Five CAP, Inc. (Community Action Agency) - Nutrition Programs**	COMMODITY SUPPLEMENTAL FOOD PROGRAM (CSFP) - a USDA funded program providing nutritionally balanced food supplements to senior citizens 60 & over. Must meet income guidelines. THE EMERGENCY FOOD ASSISTANCE PROGRAM (TEFAP) - A USDA funded program providing federally purchased surplus food to low-income families. No age requirement but must meet the income guidelines. EMERGENCY FOOD PANTRY - Funded by the Emergency Food & Shelter Program (EFSP), to provide up to 30 days of food to families and individuals on an emergency needs basis. GARDENING AND FOOD PREPARATION - Funded by the Community Services Block Grant, this program provides plants to families each year with training to encourage gardening and food preservation. The program offers canning, drying and freezing food workshops, as well as loans rototillers to participants.	https://www.fivecap.org/nutrition-programs.html	Public Health Emergency
H	**Five CAP, Inc. (Community Action Agency) - Weatherization Program**	The weatherization of homes benefits income eligible households by conserving energy. Improvements include, but are not limited to: air sealing, caulking, insulation of side walls, attics, and foundations, water heater jackets, and a variety of additional energy and/or health and safety measures. Weatherization is generally a "one time" service for a given home. Funding by the U.S. Department of Energy (DOE).	https://www.fivecap.org/weatherization-and-housing.html	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures; Public Health Emergency
I	**Northern Michigan Community Action Agency Home Improvement**	Weatherization Assistance Program for low- to moderate- income households.	https://www.nmcaa.net/home_improvement.asp	
J	**Low Income Home Energy Assistance Program (LIHEAP)**	This is a D.H.H.S. grant-funded program available to assist Tribal members in the nine-county service area who are experiencing heating and energy crises and meet the program eligibility guidelines.	https://lrboi-nsn.gov/membership-services/members-assistance/	Severe winter weather; Extreme Temperatures; Public Health Emergency
K	**"MI HOPE" Grants (Michigan Housing Opportunities Promoting Energy Efficiency)**	Program for up to $25K to repair or replace roofs, doors, windows, insulation, heating/cooling systems, water heaters, security lighting, Energy Star appliances and electrical systems for eligible low-income residents.	www.michigan.gov/mi-hope	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures; Public Health Emergency
L	**Michigan State University Extension (MSUE)**	Resources available for: training elected and appointed officials, agriculture and food support programs, and natural resources protection.	https://www.canr.msu.edu/outreach/	Inland flooding, shoreline erosion; Invasive Species; Public Health Emergency
		Winter 2023: In Partnership with District Health Department #10, Michigan State University Extension, and Munson Healthcare Prescription for Health: Earn up to $100 in grocery store vouchers for fruits and vegetables by attending the online self-paced class My Way to Wellness OR the in-person class Cooking for One.	https://events.anr.msu.edu/event.cfm?eventID=F38A332D83A3C9BEAEAA81645BE1CBFBB8F44B75D344DF00656D06DFCF6CFA4C	Public Health Emergency
M	**Midwest Agriculture Climate Team**	MAC-T members are Extension specialists and state climatologists from many of the states represented in the Midwest Climate Hub, and NOAA NWS climate and weather specialists. The goal of this team is to share expertise regionally, discuss impacts and opportunities as it relates to agriculture and outlooks, and maintain an open line of communication so when weather/climate events do occur, the Midwest agriculture community is set to respond. The team meets monthly during the growing season regularly, and as needed during the winter season.	https://www.climatehubs.usda.gov/hubs/midwest/topic/midwest-agriculture-climate-team-mac-t	Drought, Extreme Temperatures, Flooding, Severe Winter Weather, High Winds, Hail
N	**NWS Climate Prediction Center**	The U.S. Drought Monitor is a map released every Thursday, showing parts of the U.S. that are in drought. The map uses five classifications: abnormally dry (D0), showing areas that may be going into or are coming out of drought, and four levels of drought: moderate (D1), severe (D2), extreme (D3) and exceptional (D4).	https://www.cpc.ncep.noaa.gov/products/Drought/	Drought
O	**National Fire Protection Association Firewise USA Program**	Firewise USA Program: Each applicant must create a board/committee, complete a community wildfire risk assessment with a 3-year action plan to reduce ignition risk to homes, and complete annual educational and risk reduction actions identified in the plan.	https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA	Wildfire, Drought

Key	Resource	Description	Website	Hazard Type
P	**NFPA Community Wildfire Defense Grants**	Communities can use these grants from the USFS in a variety of ways to reduce the wildfire risk to people and property. One key use is capacity building for wildfire mitigation. For example, communities can use the grants to support the implementation and enforcement of wildfire-related codes and standards; to train people to assess wildfire risk and implement effective mitigation measures; and to perform outreach to community members through programs like Firewise USA®. Communities that build these fundamentals—sound land use and building practices, a skilled workforce, and an educated public—will be better prepared for sustained and effective risk reduction and better equipped to take advantage of future federal grants that prioritize communities with codes in place.	https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire	Wildfire, Drought
Q	**Consumer's Energy Hydro Planning**	Information on planning processes and documents related to the future of hydropower dams in Michigan.	www.consumersenergy.com/hydrofuture	Flooding, Invasive Species
R	**Consumer's Energy Utility Service**	Consumers Energy electrical and natural gas utility service. Energy through renewable energy sources is available. A power outage map is available to track outage locations.	https://www.consumersenergy.com/outagemap	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures, Wildfire
S	**Cherryland Electric Cooperative Outage Center**	Report an outage, check outage status, power outage preparation & safety tips	https://cherrylandelectric.coop/outage/	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures, Wildfire
T	**Great Lakes Energy Cooperative Outage Center**	Report an outage, check outage status, power outage preparation & safety tips	https://www.gtlakes.com/power-outages/	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures, Wildfire
U	**Connected Nation Michigan**	Connected Nation develops and provides the tools, resources, and methods that help states and communities create and implement solutions to their broadband and digital technology gaps. They assess and plan for the expansion of broadband access, adoption, and use. They empower people with technology skills and resources to improve their quality of life, and we develop public-private partnerships to bring technology access to targeted geographies and population.	https://connectednation.org/michigan/	All hazards
V	**Rural Digital Opportunity Fund - Spectrum Internet**	The Rural Digital Opportunity Fund (RDOF) is a Federal Communications Commission initiative focused on bridging the digital divide to efficiently fund the deployment of broadband networks in rural America.1 This includes many unserved and underserved rural communities that do not have Internet service with speeds of at least 25/3 Mbps.	https://www.spectrum.com/cp/build	All hazards
W	**Energy Zones Mapping Tool**	The Energy Zones Mapping Tool is a free online mapping tool to identify potential energy resource areas and energy corridors in the US. The website provides background on the energy resources: Biomass, Coal, Geothermal, Natural Gas, Nuclear, Solar, Storage, Water, and Wind; flexible modeling of power plant and corridor siting factors such as slope and land protections; and tools to generate and analyze potential corridor routes.	https://ezmt.anl.gov/	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures
X	**CBS Solar**	Various solar information/funding resources	https://www.cbssolar.com/resources	Extreme Temps, Severe Winter Weather, Thunderstorms/High Wind
Y	**MSUE Planning and Zoning Guide for Solar Energy Systems**	For local officials and landowners	https://www.canr.msu.edu/resources/planning-zoning-for-solar-energy-systems-a-guide-for-michigan-local-governments	Extreme Temps, Severe Winter Weather, Thunderstorms/High Wind
Z	**Manistee Township 2020 Master Plan**	Page 38, Action 5.5.2: "Manistee Township should continue to allow solar farms in areas of low density residential development and agricultural production. Solar energy should compliment agricultural production by working with landowners to sustain a mode of agriculture that may coexist with solar panels and ancillary equipment."	https://www.manisteecountymi.gov/438/Master-Plans	Extreme Temps, Severe Winter Weather, Thunderstorms/High Wind
A1	**EGLE's Michigan Oil, and Gas and Minerals Division Data Explorer**	Interactive mapping tool to search for oil and gas well facilities and associated records throughout Michigan; list of oil and gas well types and status codes.	Flooding, Lightning, Tornado, Severe Winter Weather, High Winds	https://www.egle.state.mi.us/dataminer/ https://www.michigan.gov/egle/about/organization/oil-gas-and-minerals/oil-and-gas/oil-and-gas-well-type-and-status
B1	**Great Lakes Shoreviewer Tool**	View aerial imagery of Lake MI shoreline and associated risk levels for coastline, infrastructure/roads, and buildings.	http://www.greatlakesshoreviewer.org/	Shoreline flooding and erosion
C1	**LIAA's Northwest Lower MI Coastal Resilience Atlas**	LIAA supports community resiliency and natural resource preservation, and provides community assistance. Their Coastal Resilience Atlas provides maps of coastal flooding and coastal erosion based on three future climate scenarios for communities adjoining Lake MI; and areas of the shoreline population, by census tract, that are most vulnerable to extreme heat events.	http://www.resilientmichigan.org/nw_atlas.asp	Shoreline flooding and erosion, Extreme Heat
D1	**State-designated High-Risk Erosion Areas: programs and maps**	High risk erosion areas are those shorelands of the Great Lakes where recession of the landward edge of active erosion has been occurring at a long-term average rate of one foot or more per year, over a minimum period of 15 years.	https://www.michigan.gov/egle/about/organization/water-resources/shoreland-management/high-risk-erosion-areas	Shoreline erosion

Key	Resource	Description	Website	Hazard Type
E1	**LIAA's Planning for Reslilient Communities Program**	Planning for Resilient Communities is a community engagement and technical services program developed by LIAA with numerous statewide partners. The program is helping citizens, local leaders and public officials plan communities that are more resilient to global challenges such as climate variability, extreme weather events and economic challenges. In collaboration with Michigan's Coastal Management Program, LIAA can help your master plan enhance coastal and community-wide resilience. Coastal Community Resilience Matching Grants are available. LIAA has also compiled a reference library for coastal resilience zoning using 5 key measures.	Shoreline Flooding, Erosion	http://www.resilientmichigan.org/
F1	**Michigan EGLE's Coastal Zone Management Program**	A plethora of resources to improve coastal and climate resiliency through both planning and best management projects.	https://www.michigan.gov/egle/about/organization/water-resources/coastal-management	Shoreline flooding and erosion
G1	**Great Lakes Water Safety Consortium**	A nonprofit community of BEST practice, connecting and serving safety experts & water enthusiasts, educating the public on safer ways to enjoy the water, and encouraging leaders to take bold action to make their shoreline safer for residents and visitors.	https://www.greatlakeswatersafety.org/	Dangerous Coastal Currents
H1	**Great Lakes Beach Hazards and Forecast**	Know before you go! Great Lakes Beach Forecasts & Statements are issued seasonally for the U.S. side of Lake Erie, Lake Huron, Lake Michigan, Lake Ontario, and Lake Superior from roughly Memorial Day weekend through Labor Day weekend (weather dependent). Beach forecasts contain a daily swim risk, which is based on that days threat of high waves and dangerous currents. Beach hazard statements provide additional details on high swim risk days	https://www.weather.gov/greatlakes/beachhazards	Dangerous Coastal Currents
I1	**EGLE's Wetlands Map Viewer**	The WMV application was created for the Department of Environment, Great Lakes, and Energy to provide the public with quick and easy access to wetland spatial data.	https://www.mcgi.state.mi.us/wetlands/mcgiMap.html	Flooding, drought, extreme temperatures
J1	**FEMA Floodplain Management Resources for Local Government Officials**	How to participate with the NFIP and tools and resources to provide higher standards for floodplain management.	https://www.fema.gov/floodplain-management/manage-risk/local	Inland and coastal flooding
K1	**FEMA Flood Mitigation Assistance (FMA) Grant Program**	FMA is a non-disaster, competitive grant program that provides funding to states, local communities, federally recognized tribes. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program.	https://www.fema.gov/grants/mitigation/floods	Flooding
L1	**FEMA Building Resilient Infrastructure and Communities (BRIC) Grant Program**	BRIC is a non-disaster grant program, which provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects prior to a disaster. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.	https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities	All hazards
M1	**FEMA Hazard Mitigation Grant Program (HMGP)**	HMGP is a post-disaster grant program, where funding is only made available under a Presidential major disaster declaration, in the areas of the State requested by the Governor. Federally-recognized tribes may also submit a request for a Presidential major disaster declaration within their impacted areas.	https://www.fema.gov/grants/mitigation/hazard-mitigation	All hazards
N1	**FEMA Fact Sheet: Mitigating the Risk of Extreme Temperatures with Hazard Mitigation Assistance Funds**	FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding for eligible mitigation measures that build climate resilience. These funds can be used to plan for and mitigate risks posed by natural hazards, including extreme temperatures. This fact sheet identifies opportunities for hazard mitigation assistance, provides an overview of considerations and identifies other available FEMA resources.	https://www.fema.gov/sites/default/files/documents/fema_extreme-heat-fact-sheet_102022.pdf	Extreme Temps, Severe Winter Weather, Thunderstorms/High Wind
O1	**HMGP Post-Fire Assistance (PFA) grant program**	This grant funds projects that make a community more resilient after a designated wildfire disaster. States and federally-recognized tribes affected by fires resulting in a Fire Management Assistance Grant (FMAG) declaration on or after October 5, 2018, are eligible to apply.	https://www.fema.gov/grants/mitigation/post-fire	Wildfire, Drought
P1	**State of MI: Resources and Best Practices to prevent and manage invasive species**	Prevention tips and action steps to control or remove invasive species.	https://www.michigan.gov/invasives/take-action	Invasive Species

Key	Resource	Description	Website	Hazard Type
Q1	**Michigan Invasive Species Grant Program**	This program is designed to address strategic issues of prevention, detection, eradication and control for both terrestrial invasive species (TIS) and aquatic invasive species (AIS) in Michigan. Tribal units of government are eligible to apply. Projects must support the overalls goals of the MISGP: Prevent new invasive species introductions. Strengthen statewide invasive species early detection and response network. Limit the dispersal of recently confirmed invasive species. Manage and control widespread, long-established invasive species.	www.michigan.gov/invasives/grants/misgp	Invasive Species
R1	**Clean Boats, Clean Waters Program**	Funding from the Michigan Department of Environment, Great Lakes, and Energy and the Great Lakes Restoration Initiative has enabled Clean Boats, Clean Waters to grow into a comprehensive aquatic invasive species boater outreach program. The program's mission\ to prevent new aquatic invasive species introductions and limit their dispersal from water recreation activities through outreach and engagement. The program promotes understanding of boat cleaning practices and regulations through the distribution of educational materials, an online resource library, boat washing demonstrations, grants and partnerships.	www.canr.msu.edu/clean_boats_clean_waters/index	Invasive Species
S1	**EGLE's "NotMISpecies" webinar series**	This webinar series explores how agencies, universities and locally led organizations are working together to protect Michigan's natural resources through the Michigan Invasive Species Program. If you are concerned about the impacts of invasive species or interested in the techniques used to control them, join us as we examine species-specific actions, innovations in research and technology, and programs designed to help communities prevent and manage harmful invasive species.	https://www.michigan.gov/invasives/take-action	Invasive Species
T1	**MSU Michigan Inland Lakes Partnership**	The purpose of the Michigan Inland Lakes Partnership (Partnership) is to engage state and local agencies, Native American Nations, outreach institutions (universities and other educational institutions), non-governmental organizations (NGOs), businesses, industries and citizens in a collaborative effort to ensure the quality, sustainability and ecological diversity of lakes, while considering society's needs. The Partnership will promote communication and cooperation between partners, communities and citizens interested in the management of Michigan's inland lakes, educating leaders, and strengthening stewardship efforts.	https://www.canr.msu.edu/michiganlakes/convention/	Inland flooding, shoreline erosion; Invasive Species
U1	**USDA Natural Resources Conservation Service (NRCS)**	The NRCS helps America's farmers, ranchers, and landowners conserve our nation's resources through voluntary programs and science-based solutions.	https://www.nrcs.usda.gov/	Drought; Extreme Temperatures; Invasive Species; Public Health Emergency
V1	**Northwest Michigan Invasive Species Network (ISN), a Cooperative Invasive Species Management Area (CISMA)**	A Cooperative Invasive Species Management Area (CISMA) serving Benzie, Grand Traverse, Leelanau & Manistee counties to manage populations of invasive species that threaten northwest Michigan's high-quality natural areas through terrestrial invasive plant management and outreach.	https://www.habitatmatters.org/	Flooding, Coastal Hazards, Invasive Species
W1	**Manistee Conservation District**	MCD connects private landowners to numerous services and information for natural resource concerns, including access to government programs and technical land-management assistance. Our services assist Manistee County residents and landowners in the protection, enhancement and restoration of natural resources.	https://www.manisteecd2.org/	Flooding, Coastal Hazards, Invasive Species, Public Health Emergency

Key	Resource	Description	Website	Hazard Type
X1	**Conservation Resource Alliance** (10-county northwest MI region, along with the southerly adjoining counties of Mason, Lake, Osceola, Oceana and Newaygo.)	Current projects include: Wild Roots, a cost-share program offering native plants to property owners at a greatly reduced rate; and The River Care Program, which ensures that natural resource professionals maintain a consistent and prioritized action plan for each river in the organization's region. River Care professionals not only find and repair physical problems before they become worse, they also team with local agencies, residents, and interest group representatives for fact-based conversations. These cross-functional teams can speak openly and affect change in an agile, efficient and transparent way.	https://www.rivercare.org/	Flooding & Erosion; Invasive Species; Drought; Extreme Heat; Public Health Emergency
Y1	**Little Manistee Watershed Conservation Council**	They monitor the health of the watershed by implementing annual and periodic water quality and wildlife surveys, including assessment of bank erosion, sedimentation from road crossings, and fish habitat degradation. They also identify, recommend to appropriate state and local authorities, secure permits for, fund, and staff various remediation projects or contract for the completion of those projects when necessary, and identify potential funding sources. Partners include the MDNR, CRA, USFS, USF&WS, the Little Manistee River Watershed Restoration/Partnership Committee, and the Little River Band of Ottawa Indians	http://www.lmwcc.org/	Flooding & Erosion; Invasive Species; Drought; Extreme Heat; Public Health Emergency
Z1	**Great Lakes Stream Crossing Inventory**	Previously, individual inventories were conducted by partnership agencies, watershed organizations, and road agencies but were not readily accessible to stakeholders and did not contain comparable information. The newly developed protocol and datasheet are intended to promote consistent data collection, selection criteria for improvement projects, and selection of appropriate Best Management Practices for each project to benefit all stakeholders. Information gathered on the datasheet can and has been used to prioritize structure replacement and successfully seek funding.	https://great-lakes-stream-crossing-inventory-michigan.hub.arcgis.com/	Flooding & Erosion
A2	**Grand Traverse Regional Land Conservancy** (includes Manistee Co.)	GTRLC focuses land conservation efforts on protecting crucial wildlife habitat and corridors, critical watersheds, unique high-quality farm lands, valuable forestland and ecologically significant dunes along Lake Michigan. They protect land in several ways: Working with landowners to permanently protect private land through voluntary conservation easements; Acquiring high quality natural lands by purchase or donation to create Conservancy owned nature preserves; Assisting local units of government in creating or expanding public parks and natural areas that result in enhanced public access to nature and improved recreational opportunities; and Providing technical assistance to local units of government with the administration of farmland protection programs.	https://www.gtrlc.org/	Flooding & Erosion; Invasive Species; Drought; Extreme Heat; Public Health Emergency
B2	**Manistee County Community Foundation**	The mission of the Manistee County Community Foundation is to build community endowment, effect positive change through grant making and provide leadership on key community issues, all to enhance the quality of life for Manistee County. The Foundation is the only entity serving Manistee County that impacts all aspects of life: youth, education, human services, the arts, environment, community development and more.	http://manisteefoundation.org	Flooding & Erosion; Invasive Species; Drought; Extreme Heat; Public Health Emergency
C2	**Groundwork Center for Resilient Communities**	With roots firmly embedded in the pro-health, pro-environment, and pro-economy principles of a local food system, the Groundwork Food and Farming team creates markets for local farmers, and helps connect locally grown food to school children, food pantry clients and families across the state.	https://www.groundworkcenter.org/food-farming/	Public Health Emergency
D2	**Bear Lake Improvement Board**	Established by the three municipalities (Village of Bear Lake, Bear Lake Township and Pleasanton Township) surrounding Bear Lake, the LIB has legal authority to take the necessary steps to treat the lake for invasive aquatic species and to assess those who benefit from the treatment.	http://www.bearlakeimprovement.org/	Invasive Species; Flooding & Erosion, Public Health Emergency
E2	**Portage Lake Watershed Forever**	Since 2009, Onekama Township has had annual lake management plans to improve the quality of the water and protect Portage Lake into the future. Each annual plan includes water quality monitoring, surveys of aquatic vegetation, and exotic weed control. These lake improvement activities are funded by assessments on property owners within a special assessment district. The PLWF Water Quality and Environmental Monitoring Committee provides technical advice to the township with regard to lake management.	https://www.portagelakewatershed.com/	Invasive Species; Flooding & Erosion, Public Health Emergency
F2	**National Weather Service Skywarn Storm Spotter Program**	To obtain critical weather information, the National Weather Service (NWS) established SKYWARN® with partner organizations. SKYWARN® volunteers help keep their local communities safe by providing timely and accurate reports of severe weather to the National Weather Service. Although SKYWARN® spotters provide essential information for all types of weather hazards, the focus is reporting on severe local thunderstorms.	https://www.weather.gov/skywarn	Severe Thunderstorms, Lightning, Hail, Tornados, Flash Flooding
G2	**Crystal Lake Watershed Overlay District Zoning Ordinance**	The Crystal Lake Watershed Overlay establishes uniform zoning regulations that transcend the standard political boundaries and provides special protection for Crystal Lake (in Benzie County). It is administered through ordinances in each of the three townships and one village within the Crystal Lake watershed.	https://crystallakewatershed.org/ordinances/	Invasive Species, Flooding, Erosion, Public Health Emergency

VIII. IMPLEMENTATION

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 and technological hazards. Mitigation is an essential element of emergency management, along with preparedness, response, and recovery. Emergency management includes four phases: actions to mitigate a disaster, a community prepares for a disaster; responds when it occurs; and then there is a transition into the recovery process. The process is cyclical and mitigation measures are evaluated and adopted constantly. The evaluation improves the preparedness posture of the County for the next incident, and so on. When successful, mitigation will lessen the impacts of natural hazards to such a degree that succeeding incidents will remain incidents and not become disasters.

Resources to Assist with Implementing the Strategies
To assist with the funding and/or enacting of the proposed natural hazards mitigation strategies, the Resources Table on the previous pages lists multiple resources that can help fund, staff or otherwise support the implementation of hazard mitigation strategies. Each potential entity or program is assigned a letter code, listed in the "Resources" column of the strategies table.

The following is a general list of some of the financial assistance entities to help fund strategic actions of the Plan.

- Federal Emergency Management Administration – Hazard Mitigation Grant and Building Resilient Infrastructure and Communities Programs
- U.S. Environmental Protection Agency
- U.S. Department of Agriculture Natural Resources Conservation Service
- U.S. Department of Agriculture Rural Development: Rural broadband opportunity – high speed telecommunication funding from the Public Telecommunications Facilities Planning and Construction grants
- U.S. Department of Housing and Urban Development
- Michigan Department of Environment, Great Lakes, and Energy
- Michigan Department of Natural Resources
- National Oceanic and Atmospheric Administration
- Community, Regional Foundations
- Businesses

Plan Review, Monitoring, and Evaluation
This Plan is intended to be a resource for building coordination and cooperation within a community for local control of future mitigation and community preparedness. The County Board will lead the implementation of the Natural Hazards Mitigation Plan with assistance from the Emergency Management Coordinator and the Administration. The Local Emergency Planning Team/Local Planning Team (LEPC/LPT) is an inter-agency partnership led by the county's Emergency Management Coordinator and will collaborate to accomplish the goals and objectives of the Plan. The LEPC/LPT meets on a regular basis to carry out its duties and has expanded its role to function as the Natural Hazards Task Force. The Natural Hazards Task Force will be responsible for monitoring and implementing the mitigation plan. Staff support will be provided by the Manistee County Emergency Management Coordinator and will coordinate with the County Board of Commissioners.

The Natural Hazards Task Force will perform an annual review of the Manistee County Hazard Mitigation Plan and consider the list of mitigation strategies identified in the plan. The Task Force will identify projects that have been completed and identify new projects to be completed. The following agencies have been encouraged to actively participate in revising, updating, and maintaining the plan.

- Manistee County Government Staff
- Townships and Villages
- Manistee County Road Commission
- Manistee Conservation District
- Little River Band of Ottawa Indians
- Grand Traverse Regional Land Conservancy
- Northwest Michigan Invasive Species Network
- Little Manistee Watershed Conservation Council
- Networks Northwest
- District #10 Health Department
- Michigan State University Extension

- Michigan Department of Environment, Great Lakes, and Energy
- Michigan Department of Natural Resources
- U.S. Forest Service
- U.S. Environmental Protection Agency
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture Natural Resources Conservation Service
- U.S. Coast Guard
- Insurance and real estate companies

In addition, the townships and villages (whether or not they have their own zoning) have indicated to the county emergency manager that they will follow the county's lead in identifying mitigation projects and developing grant applications to fund those projects. Land use issues associated with those projects (where applicable) will be handled by each jurisdiction that have an adopted Master Plan and regulate zoning in the project area (all communities except for Springdale Township).

Professional planners assist communities in developing plans and zoning ordinances, provides resource information and technical assistance, and convenes communities to address land use issues of common interest. Manistee County, through service contracts, administers individual zoning ordinances for the City of Manistee; the Townships of Arcadia, Onekama and Bear Lake; and the Villages of Bear Lake, Copemish, Eastlake and Onekama. All remaining Villages and Townships administer their own zoning ordinances and include the Village of Kaleva and the Townships of Filer, Stronach, Norman, Dickson, Brown, Manistee, Maple Grove, Marilla, Cleon and Pleasanton. The Township of Springdale is not zoned outside of the Betsie River Corridor, which falls under the Department of Natural Resources Natural River Zoning Program.

Building permits are issued by the State of Michigan Building Inspection Services for all communities except the City of Manistee, Manistee Township and Springfield Township, which issue their own permits. Soil erosion permits are issued by the Manistee County Planning Department. Permits related to water well and septic systems are issued by the District #10 Health Department. Permits related to State-designated High Risk Erosion Areas and Critical Dune Areas are issued by the Michigan Department of Environment, Great Lakes, & Energy (EGLE).

Plan Integration

All communities, local and state agencies in Manistee County will consider integrating information from the hazard mitigation plan into their comprehensive and operations plans. As part of the education and outreach aspect of the hazard mitigation effort, the local communities will be encouraged to adopt zoning regulations to minimize the effect of hazards.

All natural hazards mitigation planning could be pursued using Michigan Public Act 226 of 2003, the Joint Municipal Planning Act. This Act provides for joint land use planning by cities, villages, and townships, and allows two or more municipalities' legislative bodies to create a single joint planning commission to address planning issues. This tool helps with planning for the "big picture" issues such as natural hazards that cross jurisdictional boundaries.

The intent of this legislation is for local governments to consider the following:

- Individual units of government modifying their ordinances simultaneously to include language that would incorporate aspects of protection
- Developing an overlay zoning district that would cross jurisdictional boundaries which would be incorporated into existing independent units of government's zoning ordinances
- Forming a new joint (multi-jurisdictional) planning commission or zoning board
- Sharing zoning administration and enforcement activities

Five Year Plan Review and Update

The Stafford Act, as amended by the Disaster Mitigation Act of 2000, requires the Antrim County Hazard Mitigation Plan to be updated, adopted, and re-submitted for Federal Emergency Management Agency (FEMA) approval every five years. The plan will be reviewed by the Natural Hazards Task Force every five years in alignment with federal regulations. The update will include determining changes in the county, such as changes in development, an increase in exposure to hazards, an increase or decrease in the communities' capability to address hazards, addition and/or removal of mitigation actions and strategies, reviewing goals, and a change in federal or state legislation. Upon plan review and update completion, the plan will be sent to the State Hazard Mitigation Officer at the Michigan State Police for final review and approval in coordination with FEMA. When the plan has received an "approved pending adoption" status from FEMA, the Manistee County Board of Commissioners can review, approve, and adopt the plan, along with individual local units of government. In order to properly update the plan in the future, Manistee County will need to seek funding from appropriate state and/or federal agencies.

Continued Public Involvement

Manistee County is committed to keeping the public involved in the implementation and update of the Hazard Mitigation Plan. Copies of the plan will be available at the county libraries, county clerk's office, and all township offices, and will be posted on the community websites and/or regional planning agency website. The Emergency Management Office will be responsible for keeping a record of public comments on the plan.

APPENDIX A: MAPS

Due to their large file size, the maps can be viewed through these links:

1. Environmental Features
   https://drive.google.com/file/d/1-tsEz7Qjfkp5F0yTh-UF57OWNNUZ-lvg/view?usp=sharing

2. Infrastructure
   https://drive.google.com/file/d/1T6nIHrQ9rfjGNxyhL89-_OOL5VAKCqnh/view?usp=sharing

3. Hazard Areas
   https://drive.google.com/file/d/13MFJWQXqcW1Te2AzzOfg3QCzIMHazo2D/view?usp=sharing

4. Hazard Areas & Vulnerable Populations
   https://drive.google.com/file/d/1O3gBwh4ig3Y_QzFZRzYh2N4X35BRbxPX/view?usp=sharing

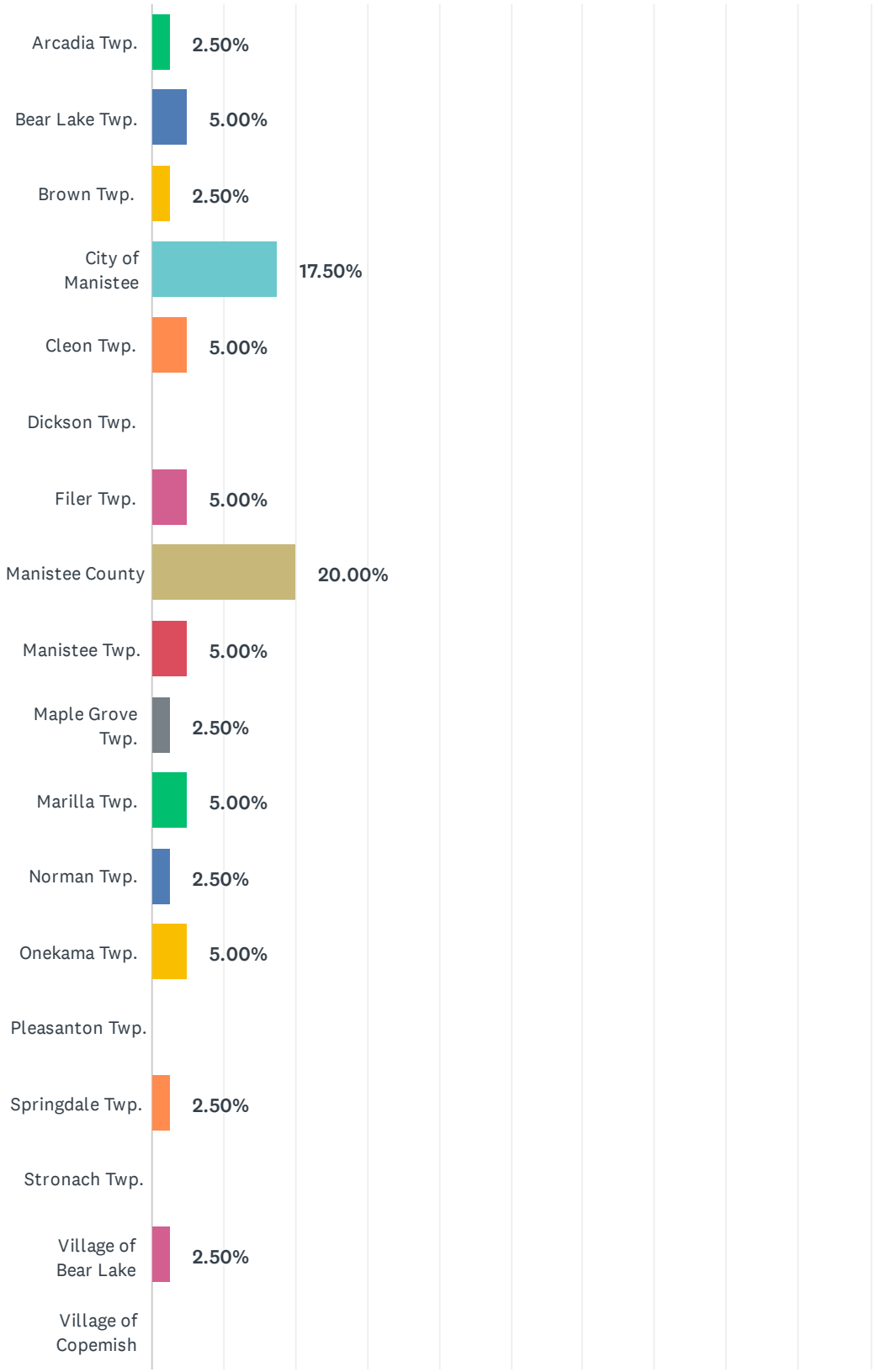
5. Critical Infrastructure Points
   https://drive.google.com/file/d/1_M5sr5vs-HodCvDvbqOpBTrqwnQHcOze/view?usp=sharing

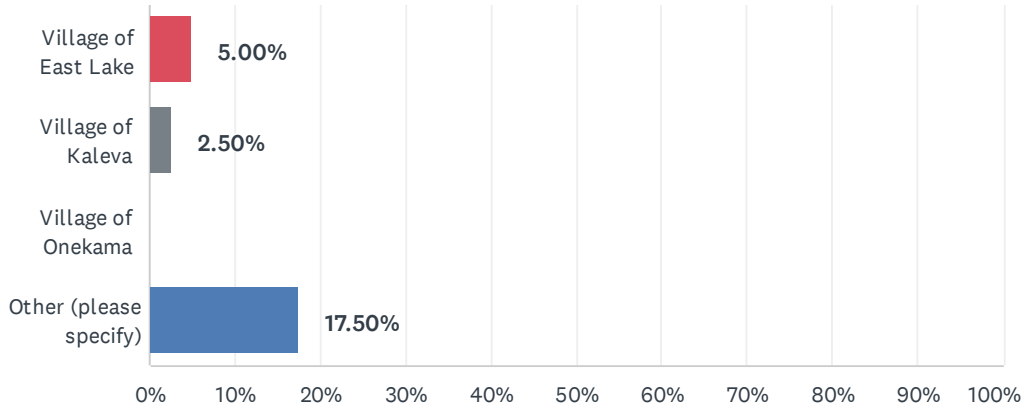
6. Critical Infrastructure and Hazard Areas
   https://drive.google.com/file/d/1kOPpAog-ZS1y2-5Knp8sxrmMjSc64WXq/view?usp=sharing

APPENDIX B: COMMUNITY SURVEY RESULTS

Q1 Please identify the jurisdiction you represent in Manistee County (may select more than one).

Answered: 40 Skipped: 0





ANSWER CHOICES	RESPONSES	
Arcadia Twp.	2.50%	1
Bear Lake Twp.	5.00%	2
Brown Twp.	2.50%	1
City of Manistee	17.50%	7
Cleon Twp.	5.00%	2
Dickson Twp.	0.00%	0
Filer Twp.	5.00%	2
Manistee County	20.00%	8
Manistee Twp.	5.00%	2
Maple Grove Twp.	2.50%	1
Marilla Twp.	5.00%	2
Norman Twp.	2.50%	1
Onekama Twp.	5.00%	2
Pleasanton Twp.	0.00%	0
Springdale Twp.	2.50%	1
Stronach Twp.	0.00%	0
Village of Bear Lake	2.50%	1
Village of Copemish	0.00%	0
Village of East Lake	5.00%	2
Village of Kaleva	2.50%	1
Village of Onekama	0.00%	0
Other (please specify)	17.50%	7
Total Respondents: 40		

#	OTHER (PLEASE SPECIFY)	DATE
1	Manistee County 911	1/5/2022 8:42 AM
2	Michigan State Police - Manistee County	1/4/2022 3:40 PM
3	Manistee Conservation District	12/16/2021 2:49 PM
4	I live in Norman, but do not represent Norman Township	12/4/2021 4:23 PM
5	Manistee Blacker Airport	12/3/2021 2:47 PM
6	Medical Care Facility	12/3/2021 2:07 PM
7	Munson Manistee	12/3/2021 11:35 AM

Q2 What is your role/organizational representation within Manistee County (i.e., citizen, type of local government employee, elected official, etc.)?

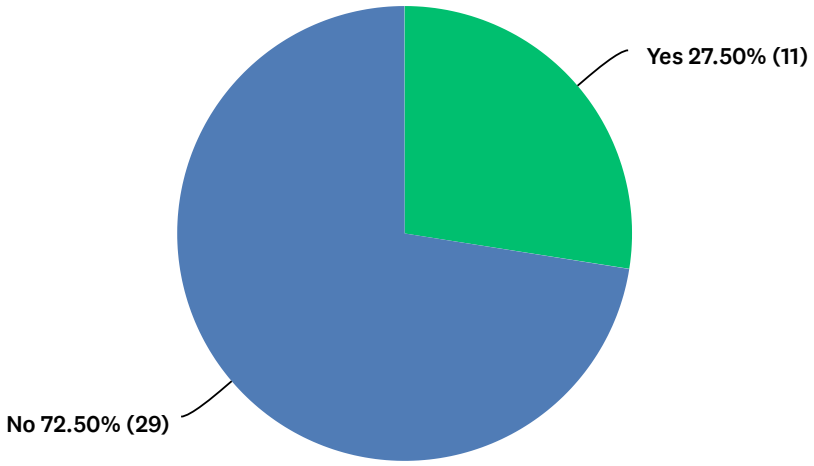
Answered: 39 Skipped: 1

#	RESPONSES	DATE
1	Village employee	2/4/2022 10:13 AM
2	elected official	1/10/2022 10:43 AM
3	elected official	1/6/2022 9:27 AM
4	Township Supervisor	1/5/2022 12:39 PM
5	general law township, supervisor	1/5/2022 9:54 AM
6	Manistee County Emergency Management Coordinator/Manistee 911 Deputy Director	1/5/2022 9:50 AM
7	Township CLerk	1/5/2022 9:04 AM
8	Manistee County 911 Director	1/5/2022 8:42 AM
9	Medical Director - Manistee County Medical Control Authority	1/5/2022 8:38 AM
10	Elected official	1/4/2022 5:04 PM
11	Fire chief Norman township Fire	1/4/2022 4:10 PM
12	Trustee	1/4/2022 4:03 PM
13	Law Enforcement Administrator	1/4/2022 3:40 PM
14	City Council	1/4/2022 2:56 PM
15	Business	12/22/2021 9:40 AM
16	Elected official Township Treasurer	12/17/2021 1:51 PM
17	local government	12/16/2021 2:49 PM
18	Law enforcement	12/14/2021 6:46 PM
19	township clerk	12/11/2021 11:37 AM
20	Planning Commission	12/8/2021 6:19 PM
21	District Health Dept. #10	12/8/2021 1:03 PM
22	Public Works Director	12/7/2021 4:00 PM
23	Village clerk for village of Kaleva	12/7/2021 10:24 AM
24	Clerk	12/6/2021 4:06 PM
25	Maple Grove Township Supervisor	12/6/2021 1:15 PM
26	Citizen; Planning and Zoning Administrator, Manistee County Planning Department	12/6/2021 9:36 AM
27	Cleon Township Clerk	12/6/2021 9:07 AM
28	TES Filer City Station	12/6/2021 8:47 AM
29	Treasurer	12/5/2021 6:33 PM
30	citizen	12/4/2021 4:23 PM
31	Citizen	12/3/2021 11:08 PM

32	Treasurer	12/3/2021 4:02 PM
33	Airport Director	12/3/2021 2:47 PM
34	Medical Care Facility Administrator	12/3/2021 2:07 PM
35	citizen	12/3/2021 1:55 PM
36	American Red Cross Disaster Program Manager	12/3/2021 12:16 PM
37	Manager Safety, Security and Emergency Management	12/3/2021 11:35 AM
38	Township Supervisor	12/3/2021 11:09 AM
39	Elected official.	12/3/2021 10:54 AM

Q3 Are you familiar with the county's Natural Hazard Mitigation Plan?

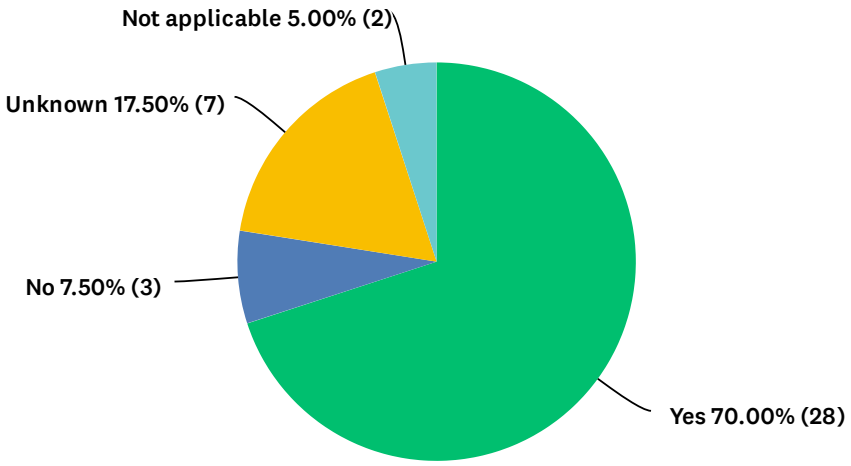
Answered: 40 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	27.50%	11
No	72.50%	29
TOTAL		40

Q4 Does the community you represent have an adopted Master Plan?

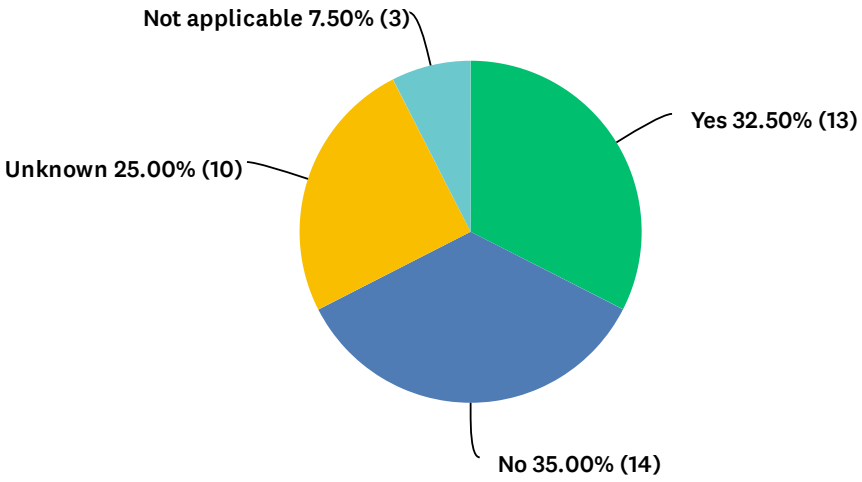
Answered: 40 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	70.00%	28
No	7.50%	3
Unknown	17.50%	7
Not applicable	5.00%	2
TOTAL		40

Q5 Does the community you represent have an adopted Capital Improvements Plan?

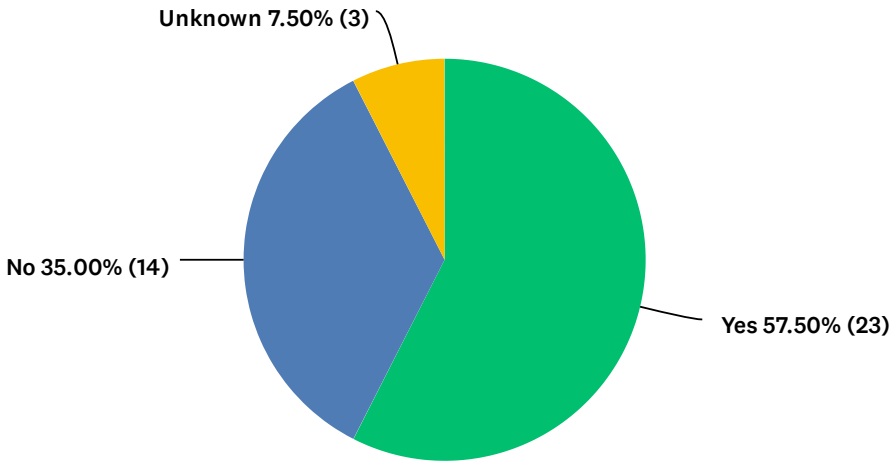
Answered: 40 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	32.50%	13
No	35.00%	14
Unknown	25.00%	10
Not applicable	7.50%	3
TOTAL		40

Q6 Has the community you represent experienced a significant natural hazard event within the last 10 years?

Answered: 40 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	57.50%	23
No	35.00%	14
Unknown	7.50%	3
TOTAL		40

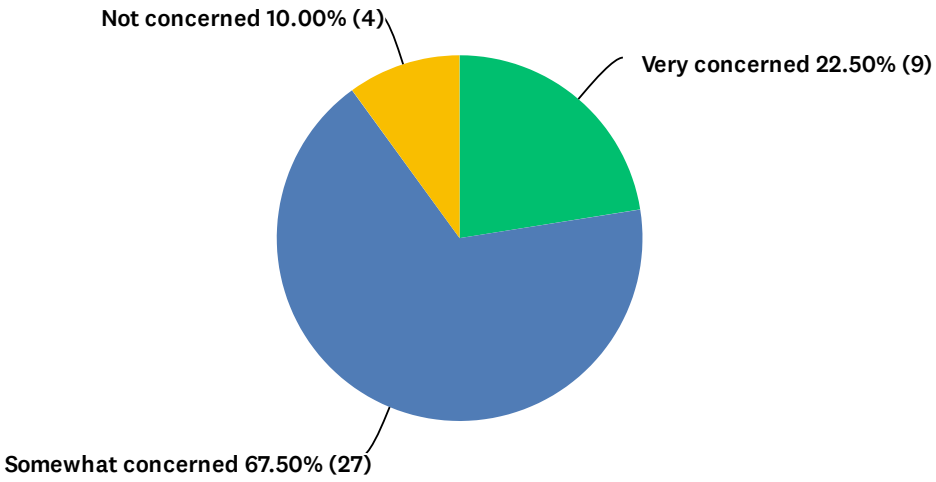
Q7 If so, what was the nature of the event?

Answered: 24 Skipped: 16

#	RESPONSES	DATE
1	N/A	2/4/2022 10:13 AM
2	Flooding	1/10/2022 10:43 AM
3	We lost a valued park and beach access because of the increased water levels of Lake Michigan.	1/5/2022 12:39 PM
4	damage and loss of property due to high water events	1/5/2022 9:54 AM
5	Sieche	1/5/2022 9:50 AM
6	Seiche high water	1/5/2022 8:42 AM
7	We've had bad storms, High winds etc. Covid-19	1/5/2022 8:38 AM
8	Major thunderstorm with straight line winds and heavy rain, about 2009 Frequent high winds and sewer overflow from heavy rains Shoreline erosion, river walk erosion	1/4/2022 5:04 PM
9	Wild land fire	1/4/2022 4:10 PM
10	Flooding, Wind storms, Covid-19	1/4/2022 3:40 PM
11	Weather	1/4/2022 2:56 PM
12	Straight line wind storms (considered an abnormal weather event) took place in late summer 2021. Flooding events partly tied to effects from climate change occurred in 2019 and 2020. Erosion of dunes along Lake Michigan, while a normal part of the ecology of dune ecosystems, may be accelerated due to climate change impacts and has raised concerns in terms of being "hazardous" due to the proximity of structures being so close to eroding dunes along Lake Michigan.	12/16/2021 2:49 PM
13	N/A	12/8/2021 6:19 PM
14	Covid 19	12/8/2021 1:03 PM
15	Meteo Sunami, Straightline winds, Flooding, Winter Storms	12/7/2021 4:00 PM
16	Power outage due to snow	12/6/2021 9:07 AM
17	7/21/2016 ~12" of rain caused localized flooding	12/6/2021 8:47 AM
18	High water	12/5/2021 6:33 PM
19	Greater than 100 year flood event (Pine Creek).	12/4/2021 4:23 PM
20	High water	12/4/2021 9:12 AM
21	winter weather and erosion	12/3/2021 1:55 PM
22	Wildfire, Flood, Lakeshore flooding, straight-line winds, Multi-Family Fires	12/3/2021 12:16 PM
23	Chemical event, Active Shooter, other	12/3/2021 11:35 AM
24	High water levels on Lake Michigan and connecting water ways.	12/3/2021 10:54 AM

Q8 How concerned are you about future natural hazard events impacting your community?

Answered: 40 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very concerned	22.50%	9
Somewhat concerned	67.50%	27
Not concerned	10.00%	4
TOTAL		40

Q9 What type of natural hazard events are likely to have the largest impact on your community, for example fire, high winds, flood, drought, illness outbreak, etc.?

Answered: 40 Skipped: 0

#	RESPONSES	DATE
1	High winds	2/4/2022 10:13 AM
2	illness outbreak	1/10/2022 10:43 AM
3	high winds, flooding, possibly fires	1/6/2022 9:27 AM
4	Lake Michigan water levels for our Municipal Veterans Marina and shoreline access.	1/5/2022 12:39 PM
5	high winds and high water	1/5/2022 9:54 AM
6	High Winds, Flooding, Wild Fires	1/5/2022 9:50 AM
7	All of the above. Depending the severity	1/5/2022 9:04 AM
8	High Winds Flood	1/5/2022 8:42 AM
9	Storms and flooding	1/5/2022 8:38 AM
10	High winds, flood, heavy rain, future pandemics, heavy snowfall	1/4/2022 5:04 PM
11	Wild land fire	1/4/2022 4:10 PM
12	fire & winds	1/4/2022 4:03 PM
13	Flooding, winds, illness	1/4/2022 3:40 PM
14	high winds and floods	1/4/2022 2:56 PM
15	high winds, flood	12/22/2021 9:40 AM
16	High winds, illness outbreak, flood	12/17/2021 1:51 PM
17	High-intensity storms with drought periods between these storms during parts of the summer (i.e., erratic weather patterns), flooding events, and accelerated erosion beyond normal dune erosion, are all concerns.	12/16/2021 2:49 PM
18	Flooding	12/14/2021 6:46 PM
19	fires	12/11/2021 11:37 AM
20	Fire, drought, high winds, electrical outage, dam failure, pollution of waterways, pandemic results	12/8/2021 6:19 PM
21	Power Outage/Winter Storm Illness Outbreak	12/8/2021 1:03 PM
22	High Winds, Flooding	12/7/2021 4:00 PM
23	High winds	12/7/2021 10:24 AM
24	fire, high winds, illness, loss of water to our wells, village storm water drain collapse.	12/6/2021 4:06 PM
25	High Winds, drought, illness	12/6/2021 1:15 PM
26	High winds, flooding, illness outbreak, extreme heat/cold events	12/6/2021 9:36 AM
27	high winds?	12/6/2021 9:07 AM
28	Ice, high winds, illness outbreak	12/6/2021 8:47 AM
29	future high water, high winds	12/5/2021 6:33 PM

30	Forest fire, high winds, blizzard, flood/major rain.	12/4/2021 4:23 PM
31	High water events	12/4/2021 9:12 AM
32	fire, high winds, illness	12/3/2021 11:08 PM
33	Fire, winds, flood, drought, illness and outbreaks.	12/3/2021 4:02 PM
34	fire, high winds, flooding, lightning	12/3/2021 2:47 PM
35	Illness outbreak	12/3/2021 2:07 PM
36	wild fires, dam breeches, erosion, winter weather	12/3/2021 1:55 PM
37	fire, wildfire, flood, straight-line winds, long-term power outage.	12/3/2021 12:16 PM
38	Weather related, Illness outbreak	12/3/2021 11:35 AM
39	Ice storms, high winds/tornados, wildfires, flood.	12/3/2021 11:09 AM
40	Flood and erosion from high Lake Michigan levels.	12/3/2021 10:54 AM

Q10 Does your community have concerns about infrastructure (dams, bridges, utilities, etc.) withstanding a natural hazard event in the future? Please describe.

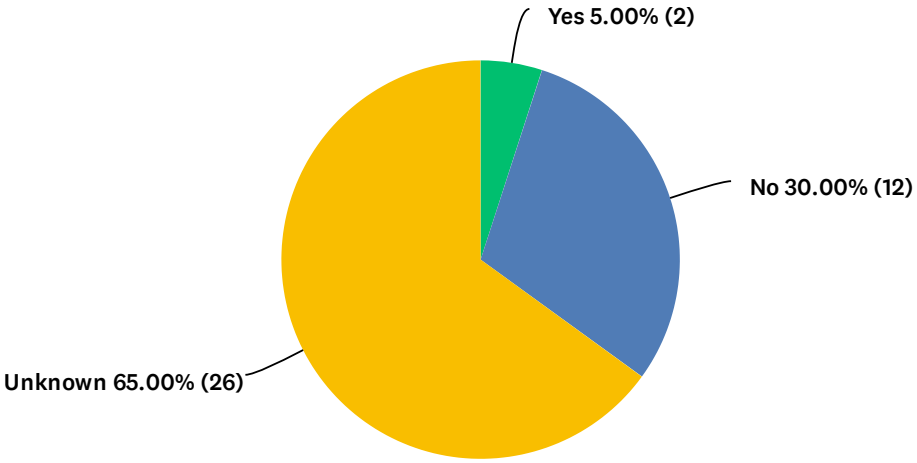
Answered: 35 Skipped: 5

#	RESPONSES	DATE
1	Unable to answer	2/4/2022 10:13 AM
2	Yes. Flood impacting septic systems surrounding the lake	1/10/2022 10:43 AM
3	The biggest issues would be related to power outages due primarily high winds, which would affect the operation of our water and sewer infrastructure.	1/6/2022 9:27 AM
4	Yes	1/5/2022 12:39 PM
5	none at present time	1/5/2022 9:54 AM
6	We are always concerned of a possible dam failure as we have 2 in the county.	1/5/2022 9:50 AM
7	If the Dams failed or the bridges over the river failed	1/5/2022 8:42 AM
8	Tippy Dam and the several bridges across the rivers	1/5/2022 8:38 AM
9	Yes. Utilities, road washouts, downstream from dam, shoreline erosion, aging bridges	1/4/2022 5:04 PM
10	Tippy Dam	1/4/2022 4:10 PM
11	Unknown	1/4/2022 3:40 PM
12	yes	12/22/2021 9:40 AM
13	Utilities	12/17/2021 1:51 PM
14	Yes. Flooding events in combination with erratic weather patterns tied to storms can impact dams and bridges, culverts (particularly those that are improperly sized based on current specifications), and homes. Also dune erosion that exceeds normal historic dune erosion can impact homes and other structures that are close to Lake Michigan.	12/16/2021 2:49 PM
15	Aging infrastructure, such as sewers, bridges ect	12/14/2021 6:46 PM
16	The only dam was Thompsonville dam which was privately owned and blew out many years ago.	12/11/2021 11:37 AM
17	Would like broadband services. We are greatly underserved.	12/8/2021 6:19 PM
18	Yes	12/8/2021 1:03 PM
19	Yes, High Wind events can impact trees, utilities and communication, shoreline flooding and erosion. Heavy rainfalls can exceed capacity of storm water systems and our sanitary sewers can be impacted by illicit connections.	12/7/2021 4:00 PM
20	No	12/7/2021 10:24 AM
21	utilities	12/6/2021 4:06 PM
22	From my experience with MI bridge data, bridges in MI are generally out of date and due for improvement. I would imagine the bridges in the City of Manistee are due for improvement.	12/6/2021 9:36 AM
23	no	12/6/2021 9:07 AM
24	utilities	12/6/2021 8:47 AM
25	no	12/5/2021 6:33 PM
26	Electric and telephone utilities.	12/4/2021 4:23 PM

27	No	12/4/2021 9:12 AM
28	Yes, roads and boat ramp areas	12/3/2021 4:02 PM
29	Without electric service, the Airport can't opperate	12/3/2021 2:47 PM
30	No	12/3/2021 2:07 PM
31	Tippy and Hodynpile Dams.	12/3/2021 1:55 PM
32	Unknown	12/3/2021 12:16 PM
33	None come to mind	12/3/2021 11:35 AM
34	Our township has the Hodenpyle Dam.	12/3/2021 11:09 AM
35	Shore line erosion.	12/3/2021 10:54 AM

Q11 Has your community requested assistance for natural hazard mitigation projects in the past?

Answered: 40 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	5.00%	2
No	30.00%	12
Unknown	65.00%	26
TOTAL		40

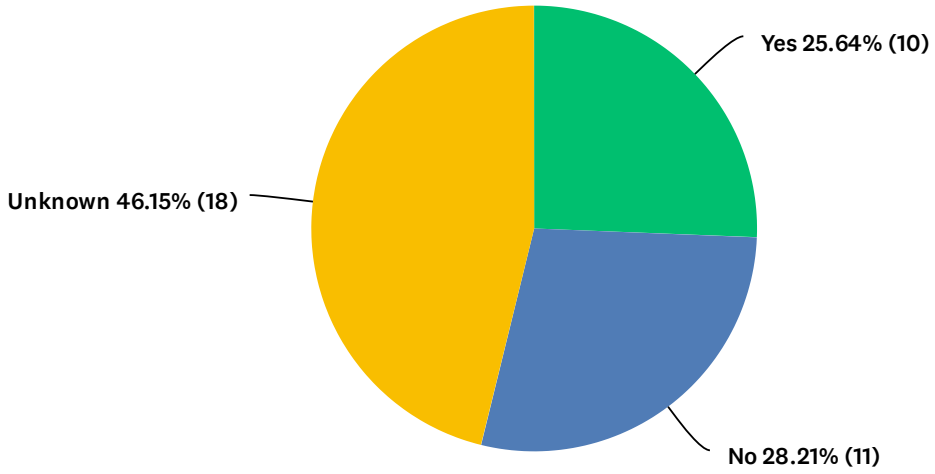
Q12 If so, was your request granted and what type of project did the request include?

Answered: 11 Skipped: 29

#	RESPONSES	DATE
1	Unknown	2/4/2022 10:13 AM
2	Not granted. Sewer System	1/10/2022 10:43 AM
3	Unknown	1/5/2022 9:50 AM
4	unknown	1/5/2022 8:42 AM
5	unknown	1/5/2022 8:38 AM
6	Unknown	1/4/2022 3:40 PM
7	N/A	12/8/2021 6:19 PM
8	unknown	12/7/2021 4:00 PM
9	unknown	12/6/2021 8:47 AM
10	-	12/4/2021 4:23 PM
11	Unknown	12/3/2021 10:54 AM

Q13 Has your community considered mitigation strategies for potential or current hazards?

Answered: 39 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	25.64%	10
No	28.21%	11
Unknown	46.15%	18
TOTAL		39

Q14 If so, please identify potential strategies you would like to explore in the near future.

Answered: 16 Skipped: 24

#	RESPONSES	DATE
1	N/A	2/4/2022 10:13 AM
2	Collaborating with local entities	1/10/2022 10:43 AM
3	Currently working on updating our hazard mitigation	1/5/2022 9:50 AM
4	updating our hazard mitigation Plan	1/5/2022 8:42 AM
5	There are meetings with the staff from the dam about safety & response to crisis	1/5/2022 8:38 AM
6	Explore federal funding options for improving infrastructure. Adjust building codes for flood zones, adjust building codes for higher wind rating. Consider public purchase of damaged structures in flood zones and return them to their natural state	1/4/2022 5:04 PM
7	Evacuations in case of large scale wild land fire	1/4/2022 4:10 PM
8	Unkonwn	1/4/2022 3:40 PM
9	we have plans for flood disasters, and evcauation plans	12/22/2021 9:40 AM
10	Some landowners along Lake Michigan are hiring contractors to modify the slope of their dune, placing riprap, constructing sea walls, or taking other measures to address shoreline erosion on their specific parcel - In the future we would like to increase the frequency of educational events where the topic is the ecology and dynamics of the Great Lakes and shoreline ecosystems, as well as the importance of native plant communities, placement of structures, etc. We would also like to explore financial opportunities for landowners wanting to address shoreline erosion that is causing issues with their structures (such as homes collapsing into Lake Michigan). We would also like to explore and better understand options for landowners whose forests are leveled by abnormal windstorms - this might include options such as disaster relief provided by Farm Service Agency.	12/16/2021 2:49 PM
11	We do recognize and have discussed our lack of tech accessibility.	12/8/2021 6:19 PM
12	flood mitigation projects eliminating illicit connections and implementing a wet weather corrective action program annual tree removal and trimming	12/7/2021 4:00 PM
13	unknown	12/6/2021 8:47 AM
14	-	12/4/2021 4:23 PM
15	More space to spread out people in a congregate setting	12/3/2021 2:07 PM
16	Unknown	12/3/2021 10:54 AM

Q15 Is there any additional information you would like us to consider as we update the county's Natural Hazard Mitigation Plan?

Answered: 19 Skipped: 21

#	RESPONSES	DATE
1	No	2/4/2022 10:13 AM
2	no	1/10/2022 10:43 AM
3	unknown	1/5/2022 9:50 AM
4	none	1/5/2022 8:42 AM
5	not that I can think of	1/5/2022 8:38 AM
6	Not sure of what is available	1/4/2022 4:10 PM
7	No	12/17/2021 1:51 PM
8	No.	12/11/2021 11:37 AM
9	Can't think of any at the moment.	12/8/2021 6:19 PM
10	No	12/8/2021 1:03 PM
11	no	12/7/2021 4:00 PM
12	No thanks	12/7/2021 10:24 AM
13	will each government entity be named? Is this just a blanket covering for the county?	12/6/2021 4:06 PM
14	When working on the Hazard Mitigation plan in Genesee County, the COVID pandemic had just begun. I know that it was a requirement to include pandemics/illness outbreak as a potential natural disaster and include it in the rankings.	12/6/2021 9:36 AM
15	none	12/6/2021 8:47 AM
16	-	12/4/2021 4:23 PM
17	No	12/3/2021 2:07 PM
18	If it is not already included, specific plans for a dam breech.	12/3/2021 11:09 AM
19	How can the Corps of Engineers help control erosion problems along the Lake MI shore line and connecting water ways?	12/3/2021 10:54 AM

APPENDIX C: CURRENT STATUS OF 2015 PLAN STRATEGIES

2015 Manistee County Natural Hazard Mitigation Plan Action Strategies and 2023 Status

2015 Priority Area 1: Flood prevention and Dam infrastructure affecting localized areas (US-31, Tippy and Hodenpyl Dams)				
Flood Mitigation Strategies				
2015 Action Strategies	**Responsible Parties**	**Timeframe**	**2023 Status**	**Related 2023 Plan Strategies and Priority Level**
a. Examine and review historic drainage districts; analyze purpose and need, existing use, land uses within districts, current habitat and ecological importance, notify residents and municipalities of district boundaries, and formulate recommendations for each individual district.	Drain Commissioner, Emergency Management Coordinator, County Planning, Conservation District, State of Michigan DNR, State of Michigan DEQ, United States Forest Service, Soil and Water Conservation District, Local Units of Government	1-5 years after adoption of the plan	This work is ongoing. The Manistee County Drain Commissioner established the following goals in 2017: #1 Identify all drainage districts in Manistee county #2 Update and map all drainage districts in Manistee county #3 Seriously look into closing kettle hole drain #4 Close all drains no longer in use In May 2023, the County Board of Commissioners supported the recommendation from the Drain Commissioner to abandon and vacate the Mud Lake drainage district in Norman Township, as it was no longer deemed useful for its intended purpose.	#58
b. Inventory of "significant " frequently flooded areas	-	-	Local governments along the Lake MI coastline have adopted their revised (in 2021) FEMA FIRMs; these are being used to inform local units of government discussions regarding zoning ordinance changes regarding shoreline protection/property protection measures.	#26, #63
c. Regular inspections of dams	Emergency Management Coordinator, MI Department of Natural Resources, MI Department of Environmental Quality, County Planning, Drain Commissioner, Conservation District	1-3 years from adoption of the plan	The Hodenpyl Dam (in Wexford County) and Tippy Dam (in Dickson Township) on the Manistee River are regulated by the Federal Energy Regulatory Commission (FERC) and have continued to complete annual inspections. Consumer's Energy owns the dams and is evaluating whether to keep or remove the dams in the next 10 years. MI DEGLE regulated dams (Sunny Brook in Norman Township and Peters Bayou in Manistee Township) are required to have inspections every five years. However, the last reported inspection for the Sunny Brook Dam was completed in 2000.	#8
d. Acquisition of flood areas	County Planning, County Conservation District, MI Department of Environmental Quality, MI Department of Natural Resources, Non-profit conservation organizations	Ongoing	The Grand Traverse Regional Land Conservancy's Campaign Projects from July 2015-June 2021 include the following projects in Manistee County: - Four land additions to the Arcadia Marsh Preserve in Arcadia Township - The Lower Bear Creek Easement (private land protection) in Brown Township. Over 320 acres of land, including 3 miles of Manistee River shoreline.	#26, #63

2015 Priority Area 1: Flood prevention and Dam infrastructure affecting localized areas (US-31, Tippy and Hodenpyl Dams)				
Flood Mitigation Strategies				
2015 Action Strategies	**Responsible Parties**	**Timeframe**	**2023 Status/Comments from EM**	**Related 2023 Plan Strategies and Priority Level**
e. Enforcement of state, county and township ordinances	County Planning, Townships	Ongoing	Ongoing. The Manistee County Planning Department continues to provide administers individual zoning ordinances for the City of Manistee; the Townships of Arcadia, Onekama and Bear Lake; and the Villages of Bear Lake, Copemish, Eastlake and Onekama. All remaining Villages and Townships administer their own zoning ordinances and include the Village of Kaleva and the Townships of Filer, Stronach, Norman, Dickson, Brown, Manistee, Maple Grove, Marilla, Cleon and Pleasanton. Soil erosion and sedimentation control permits are administered by the County Planning Dept. The District Health Dept. #10 requires permits for new septic/well systems, and existing septic systems prior to sale/transfer of a property to a new owner.	#41-42
f. Enforcement of building and zoning codes	Townships	Ongoing	Ongoing. Building permits are issued by the State of Michigan Building Inspection Services for all communities except the City of Manistee, Manistee Township and Springfield Township, which issue their own permits. All building permits issued are based on current State of Michigan Building Codes. Manistee County, through service contracts, administers individual zoning ordinances for the City of Manistee; the Townships of Arcadia, Onekama and Bear Lake; and the Villages of Bear Lake, Copemish, Eastlake and Onekama. All remaining Villages and Townships administer their own zoning ordinances and include the Village of Kaleva and the Townships of Filer, Stronach, Norman, Dickson, Brown, Manistee, Maple Grove, Marilla, Cleon and Pleasanton. The Township of Springdale is not zoned outside of the Betsie River Corridor which falls under the Department of Natural Resources Natural River Zoning Program.	#40

g. Public education especially for fishing areas and campgrounds	Emergency Management Coordinator, County Planning, Conservation District, Business Owners, Non-Profit Organizations, Townships	1-3 years from adoption of the plan	There are several campgrounds in Dickson, Brown, Norman and Manistee Townships that are located along the Manistee River or Pine River (a tributary) that are downstream of the Hodenpyl or Tippy Dams. Manistee County now utilizes the CodeRED Emergency Notification system, which allows users who sign up for the free service to receive emergency notifications as well as weather alerts right on their phone. For dam failures/flooding downstream, the CodeRED Emergency Communications Network is activated. Additionally, the Federal Energy Regulatory Commission requires hydroelectric facilities to be able to quickly notify residents and visitors of any developing emergency at the plants. Consumers Energy maintains four (4) emergency warning sirens on the Manistee River to alert the public of impending danger from rapidly rising waters due to an emergency at the Hodenpyl or Tippy Dams. The sirens are activated, accompanied with instructions, during an actual dam emergency. The sirens are located near the Tippy Dam, the High Bridge U.S. Forest Service boat launch, the Hodenpyl Dam, and the Red Bridge U.S. Forest Service boat launch. In an emergency, the sirens would only be used if the threat of a dam failure is imminent at one of the facilities. At that time, anyone on or near the river is instructed to evacuate at once to high ground. The sirens can be controlled physically on-site or remotely from Manistee County Central Dispatch. The siren systems are tested each August and December. Information related to a dam breach would be also provided on local radio and television stations.	#3, #4, #10, #36, #37 (fishing areas were not specifically identified)

2015 Priority Area 2: Potential Wildfire Areas throughout the County				
Wildfire Mitigation Strategies				
2015 Action Strategies	**Responsible Parties**	**Timeframe**	**2023 Status/Comments from EM**	**Related 2023 Plan Strategies and Priority Level**
a. Incorporate FIREWISE strategies into building codes and community master plans	None provided	None provided	Norman Township's zoning ordinance has had "High Forest Fire Urban Interface Regulations" (General Regulations, Article 10, Section 1043) in place since 2006 and serves as an example zoning revision pertaining to wildfire mitigation for other communities. Other communities in the county with wildfire prone areas include Dickson, Stronach, Brown, and Manistee townships and Filer Charter Township. Dickson Township does not have a Master Plan and has not amended its zoning ordinance since 2007. Stronach Township has not updated their master plan since 2013 or their zoning ordinance since 2015. Brown Township does not have a master plan or zoning ordinance. Manistee Township and Filer Charter Township have updated their zoning ordinances and master plans since 2015, but they do not include Firewise strategies or building regulations for high forest fire urban interface areas. All building permits issued are based on current State of Michigan Building Codes.	#12, #39
b. Develop new building and zoning codes such as a cleared buffer space between houses/ structures; defensible space	County Road Commission County Planning Townships, City, Villages	1-3 years after adoption of the plan		
c. Fuel management, diversity and native vegetation	County Planning, Insurance Agencies, MSU Extension, Conservation District, Emergency Management Coordinator	Ongoing	Following an approximate 1,000 acre wildfire in the community of Dublin in 2021, Norman Township residents, the County EM, USFS and local fire departments have been collaborating on strategies to increase wildfire preparation and prevention measures in that area, such as maintaining vegetation clearance around structures.	#9, #11, #60, #61, #61c
d. Homeowner property maintenance	County Planning Insurance Agencies MSU Extension Personnel Emergency Management Coordinator	1-3 years from adoption of the plan	See previous (c)	#11, #13, #14, #15, #42
e. Public education, awareness, and alertness	County Planning Insurance Agencies MSU Extension Conservation District Emergency Management Coordinator	Ongoing	See previous (c). Also, the County now utilizes the CodeRED mass emergency notification system, which allows users who sign up for the free service to receive mobile emergency notification and weather alerts.	#3, #5, #9, #10, #11, #13, #14, #15

f. Building code enforcement on new construction	County Planning Townships, City, Villages	Ongoing	Ongoing. Building permits are issued by the State of Michigan Building Inspection Services for all communities except the City of Manistee, Manistee Township and Springfield Township, which issue their own permits. Permit applicants are required to provide a site plan and drawings, which are reviewed for code compliance. Deficiencies are identified for correction during process and construction cannot begin until plans meet the standards. Occupancy isn't approved until all inspections are successfully completed. All building permits issued are based on current State of Michigan Building Codes.	#40
2015 Priority Area 3: Severe Winter Weather (heavy snow, extreme temperatures) – Countywide				
Snow Load and Ice Build Up Mitigation Strategies				
2015 Action Strategies	**Responsible Parties**	**Timeframe**	**2023 Status/Comments from EM**	**Related 2023 Plan Strategies and Priority Level**
a. Public education – suggested elderly services for 2-3 day storms; utilize Manistee County Road Commission video regarding travel plans, kits, and stranded car issues	Emergency Management Coordinator, County Planning, Business Owners, Non-Profit Organizations, Townships, City, Villages	Ongoing	Manistee County Sheriff's Department maintains a Facebook social media page that posts information from the National Weather Service about upcoming weather advisories/warnings, as well as traffic closures. The Manistee Council on Aging maintains a Facebook social media page that posts information such as advice such as cold weather safety tips for older adults, informative presentations regarding topics such as fire safety, and references to the COA website for more information on services for seniors (such as snow removal, meal delivery, etc.)	#3, #4, #19, #22a, #42
b. Building code enforcement for new construction.	County Planning, Townships, City, Villages	Ongoing	Ongoing. Building permits are issued by the State of Michigan Building Inspection Services for all communities except the City of Manistee, Manistee Township and Springfield Township, which issue their own permits. Building permits Permit applicants are required to provide a site plan and drawings, which are reviewed for code compliance. Deficiencies are identified for correction during process and construction cannot begin until plans meet the standards. Occupancy isn't approved until all inspections are successfully completed.	#40

2015 Priority Area 4: Lake Michigan Coastal Erosion Areas				
Landslide and Debris Flow Mitigation Strategies				
2015 Action Strategies	**Responsible Parties**	**Timeframe**	**2023 Status/Comments from EM**	**Related 2023 Plan Strategies and Priority Level**
a. Complete soil erosion control ordinance and enforcement of permits	County Planning; Conservation District; Drain Commissioner; Researchers, Engineers, and Architects; Non-Profit Organizations	1-3 years after adoption of the plan	The Manistee County Planning Department issues soil erosion permits and provides soil erosion code enforcement.	#40
b. Enforcement of the grading levels no more than 10%	Road Commission, Townships, City, Villages	Ongoing	Ongoing. Manistee County's Soil Erosion and Sedimentation Control (SESC) Permit Program, administered by the County's Planning Department, requires SESC permits to include documentation of erosion control practices on steep slopes (greater than 10% grade). Such practices include maintaining existing vegetation; placement of additional sediment fences; diversions; and re-vegetation by sodding or by seeding with use of erosion control mats.	#40
c. Placement of vegetation and utilizing native vegetation	Conservation District, Drain Commissioner, Developers, Non-Profit Organizations	Ongoing	Ongoing. Manistee Conservation District and the Northwest Michigan Invasive Species Network continue to provide information and/or educational workshops to the public on native plants.	#60, #60c, #61, #64, #65
d. Sand dune protection	County Planning, Conservation District, Non-Profit Conservation Organizations, MI Department of Environmental Quality, MI Department of Natural Resources, Townships, City, Villages	1-3 years from adoption of the plan	Ongoing. Permits related to State-designated High Risk Erosion Areas (HREAs) and Critical Dune Areas (CDAs) are issued by the Michigan Department of Environment, Great Lakes, & Energy (EGLE). Additionally, part of the application for an EGLE permit related to CDA includes completion of Vegetation Removal Assurance (VRA) documentation required by the Manistee Conservation District.	#39, #39a, #39b, #40, #65

e. Green belt buffer zones (Filer Township's Ordinance)	County Planning, Conservation District, Non-Profit Conservation Organizations, Townships, City, Villages	1-4 years from adoption of the plan	Complete. Filer Township's zoning ordinance, updated in September 2022, provides the following language in Section 31.10.1031 A: *The high risk erosion setback and greenbelt setback line shall be 100 feet landward of and parallel to the Lake Michigan bluff line throughout the entire length of the Lake Michigan shoreline in Filer Township. For the purpose of the high risk erosion overlay area, the minimum setback requirement shall be measured landward from the bluff line and shall be construed as running parallel to the bluff line. In the event the bluff line recedes (moves landward), the setback line of the high risk erosion area shall also be construed as to have moved landward a distance equal to the bluff line recession. No principal or accessory structure shall be located between the ordinary high water mark and the high risk erosion setback line.*	#61, #63, #64
f. Enforcement of building codes	-	Ongoing	Ongoing. Building permits are issued by the State of Michigan Building Inspection Services for all communities except the City of Manistee, Manistee Township and Springfield Township, which issue their own permits. All building permits issued are based on current State of Michigan Building Codes.	#40
g. Public education	Emergency Management Coordinator, County Planning, Conservation District, Business Owners, Non-Profit Organizations, Townships	Ongoing	Ongoing. As published on the Manistee Conservation District's website as of 6/20/2023: *Given the shoreline erosion impacts facing a number of landowners in our county, we plan to work closely with county government to increase understanding about forecasted lake water levels and present information that may help mitigate the impacts of soil erosion both now and in the future. The Manistee Conservation District currently does not have the technical staff available to address the many questions and resources private landowners may need for shoreline erosion, but we are gathering information to place on our website so that landowners can become familiar with available educational programs or assistance.*	#65

Additional Mitigation Strategies				
a. Continue working with the Little River Band of Ottawa Indians, other governmental organizations, businesses and the public	-	-	The Manistee County Local Emergency Planning Committee maintains representatives from organizations such as the LRBOI, major industrial companies in the county, Munson Healthcare, District Health Department #10, and local and county government agencies. Also, the Manistee County 2017 Strategic Plan indicates the following as one of the responsibilities of the County Board of Commissioners: *PARTNER AND COLLABORATE WITH LOCAL, INTERSTATE, TRIBAL AND REGIONAL GOVERNMENTS: Assist local units of government, through intergovernmental contracts, in areas of public works, human services, law enforcement, etc., sometimes granting the full faith and credit of the county to secure borrowing for local projects. Develop partnerships with governments at all levels to attain the goals of the County.*	Collaboration amongst governmental, private, non-profit and/or public organizations/ agencies is required to implement all 2023 strategies
b. Incorporate the Plan's natural hazards mitigation concepts, strategies and policies into existing elements of Manistee County's Master Land Use Plan	-	-	No Progress. The 2008 Manistee County Master Plan has not been updated.	#1

APPENDIX D: CONSIDERATION OF ALTERNATIVE MITIGATION STRATEGIES

Hazard Mitigation Alternatives Considered for Manistee County – 2023 HM Plan

A check mark indicates it was included in the list of mitigation strategies.

Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

Hazard Mitigation Alternatives for General Thunderstorm Hazards, Hail, Dense Fog, and/or Lightning	
✓	Increased coverage and use of NOAA Weather Radio, and public early warning systems and networks.
✓	Buried/protected power and utility lines. (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.)
✓	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.)
	Using structural bracing, window shutters, laminated glass in window panes, and impact-resistant roof shingles to minimize damage to public and private structures.
	Moving vehicles into garages or other covered areas.
	Installing lightning protection devices on the community's communications infrastructure and critical structures. More widespread use of lightning protection devices might also occur.
	Purchase of insurance that includes coverage for hail damage.
	Using surge protectors on critical electronic equipment.

Hazard Mitigation Alternatives for Tornadoes and Severe Winds	
✓	Increased coverage and use of NOAA Weather Radio, or comparable device-based notifications.
✓	Public early warning systems and networks.
✓	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.)
✓	Buried/protected power and utility lines. (NOTE: Where appropriate. Burial may cause additional problems and costs when breakage or malfunction occurs, due to the increased difficulty in locating and repairing the problem.)
	Using appropriate wind engineering measures and construction techniques (e.g. structural bracing, straps and clips, anchor bolts, laminated or impact-resistant glass, reinforced entry and garage doors, window shutters, waterproof adhesive sealing strips, and interlocking roof shingles) to strengthen public and private structures against severe wind damage.
	Proper anchoring of manufactured homes and exterior structures such as carports and porches.
	Securing loose materials, yard, and patio items indoors, or where winds cannot blow them about.
✓	Construction of concrete safe rooms in homes and shelter areas in mobile home parks, fairgrounds, shopping malls, or other vulnerable public areas or event locations.

Hazard Mitigation Alternatives for the Extreme Temperatures Hazard	
✓	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.
✓	Increased coverage and use of NOAA Weather Radio.
✓	Provide and publicize designated heating and cooling centers within the community, where persons in need may go to obtain relief from outdoor temperatures.

Hazard Mitigation Alternatives Considered for Manistee County – 2023 HM Plan

A check mark indicates it was included in the list of mitigation strategies.

Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

Hazard Mitigation Alternatives for Winter Weather Hazards (Includes snowstorms, ice & sleet storms)	
✓	Increased coverage and use of NOAA Weather Radio.
✓	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.)
✓	Buried/protected power and utility lines. (NOTE: Where appropriate. Burial may cause additional problems and costs in case of breakage, due to the increased difficulty in locating and repairing the problem.)
✓	Establishing heating centers/shelters for vulnerable populations.
	Home and public building design and maintenance to prevent roof and wall damage from "ice dams."
✓	Proper building/site design and code enforcement relating to snow loads, roof slope, snow removal and storage, etc.
	Agricultural activities to reduce impacts on crops and livestock.
	Pre-arranging for shelters for stranded motorists/travelers, and others.
	Using snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments.

Hazard Mitigation Alternatives for Fluvial (Riverine) Flooding	
✓	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.
	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.
✓	Dry floodproofing of structures within known flood areas (strengthening walls, sealing openings, use of waterproof compounds or plastic sheeting on walls).
	Wet floodproofing of structures (controlled flooding of structures to balance water forces and discourage structural collapse during floods).
✓	Elevation of flood-prone structures above the 100-year flood level.
✓	Purchase or transfer of development rights - to discourage development in floodplain areas.
	"Floating" architectural designs for structures in flood-prone areas.
	Construction of elevated or alternative roads that are unaffected by flooding, or making roads more flood-resistant through better drainage and/or stabilization/armoring of vulnerable shoulders and embankments.
✓	Government acquisition, relocation, or condemnation of structures within floodplain or floodway areas.
✓	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.).
✓	Protection (or restoration) of wetlands and natural water retention areas.
✓	Higher engineering standards for drain and sewer capacity, or the expansion of infrastructure to higher capacity.
✓	Joining the National Flood Insurance Program (NFIP).
	Obtaining flood insurance. (Requires community participation in the NFIP.)
	Participation in the Community Rating System (CRS).

Hazard Mitigation Alternatives Considered for Manistee County – 2023 HM Plan

A check mark indicates it was included in the list of mitigation strategies.

Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

	Hazard Mitigation Alternatives for Urban Flooding
✓	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.
	Homeowner's and rental insurance that includes coverage of damages and cleanup of sewer backflow impacts.
✓	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, flood gates and pumps, wetlands protection and restoration).
✓	Higher engineering standards for drain and sewer capacity, or the expansion of infrastructure to higher capacity.
	Drainage easements (allowing the planned and regulated public use of privately owned land for temporary water retention and drainage).
✓	Installing (or re-routing or increasing the capacity of) storm drainage systems, including the separation of storm and sanitary sewage systems.
✓	Farmland and open space preservation.
	Elevating mechanical and utility devices above expected flood levels.
	Flood warning systems and the monitoring of water levels with stream gauges and trained monitors.
✓	Increased coverage and use of NOAA Weather Radio.
	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.
	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.
✓	Back-up generators for pumping and lift stations in sanitary sewer systems, and other measures (alarms, meters, remote controls, switchgear upgrades) to ensure clear drainage infrastructure.
✓	Detection and prevention/discouragement of illegal discharges into storm-water sewer systems, from home footing drains, downspouts and sump pumps.
✓	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.
✓	Wetlands protection regulations and policies.
	Use of check valves, sump pumps and backflow preventers in homes and buildings.
	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.
✓	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.).
✓	Protection (or restoration) of wetlands and natural water retention areas.
✓	Landslide mitigation ideas: Do not build houses, buildings, parks, or playgrounds close to steep slopes

Hazard Mitigation Alternatives Considered for Manistee County – 2023 HM Plan

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Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

Hazard Mitigation Alternatives for Dam Failures	
	Regular inspection and maintenance of dams.
	Garnering community support for a funding mechanism to assist dam owners in the removal or repair of dams in disrepair.
	Regulate development in the dam's hydraulic shadow (where flooding would occur if a severe dam failure occurred).
	Ensuring that dams meet or exceed the design criteria required by law.
✓	Public warning systems.
	Obtaining insurance.
✓	Increased coverage and use of NOAA Weather Radio
	Increased funding for dam inspections and enforcement of the Dam Safety Program (Part 315 of the Natural Resources and Environmental Protection Act) requirements and goals.
	Constructing emergency access roads to dams, where needed.
	Pump and flood gate installation/automation.

Mitigation Alternatives for Drought Hazard	
	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).
✓	Legislative acts, local ordinances, and other measures to prioritize or control water use.
✓	Encouragement of water-saving measures by consumers (including landscaping, irrigation, farming, lower priority lawn maintenance, and non-essential auto washing).
✓	Anticipation of potential drought conditions, and the preparation of drought contingency plans.
	Designs, for recreational and other water-related structures and land uses, that take into account the full range of water levels (of lakes, streams, and groundwater).
✓	Designs and plans for water delivery systems that include a consideration of drought events.
	Obtaining agricultural insurance.

Hazard Mitigation Alternatives for Wildfire Hazard *(Note: Many of these actions are included in the Firewise USA public education program on wildfire preparedness)*	
✓	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 houses; thorough cleaning-up of spilled flammable fluids; and keeping garage areas protected from blowing embers).
✓	Safe disposal of yard and house waste rather than through open burning. *(Advice to be provided in public outreach efforts).*
	Use of fire spotters, towers, planes.
✓	Use of structural fire mitigation systems such as interior and exterior sprinklers, smoke detectors, and fire extinguishers.
✓	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).
✓	Public notification of fire weather and fire warnings.

Hazard Mitigation Alternatives Considered for Manistee County – 2023 HM Plan

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Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

✓	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.)
✓	Have adequate water supplies for emergency fire-fighting (in accordance with NFPA standards).
✓	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.
✓	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).
✓	Enclosing the foundations of homes and buildings rather than leaving them open with their underside exposed to blown embers or materials.
✓	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.
✓	Proper maintenance and storage of motorized equipment that could catch on fire (from blown embers, etc.)
✓	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.
✓	Avoid building structures on hilltop locations, where they will be at greater risk from wildfires (also, hillsides facing south or west are more vulnerable to increased dryness and heat from sun exposure).
✓	Use of proper setbacks from slopes (outside of the "convection cone" of intense heat which would be projected up the slope of the hill as a wildfire "climbs" it).
	Obtaining insurance.

Hazard Mitigation Alternatives for Invasive Species	
	Restrictions on the import and transport of species carriers.
	Adjustments to hunting, fishing, and other policies and regulations related to wildlife populations.
✓	Use of barriers to prevent invasive species travel.
✓	Use of competing species or other population control techniques.

Hazard Mitigation Opportunities for Public Health Emergencies	
✓	Maintaining proper levels of PPE for healthcare workers and first responders, with additional supplies for long-term care facilities.
✓	Immunization programs to vaccinate against communicable diseases.
✓	Improving ventilation techniques in areas, facilities, or vehicles that are prone to crowding or that may involve exposure to contagion or noxious atmospheres.
✓	Maintaining community water and sewer infrastructure at acceptable operating standards.
✓	Providing back-up generators for water and wastewater treatment facilities to maintain acceptable operating levels during power failures.
✓	Demolition and clearance of vacant condemned structures.
✓	Adequate community clinics and school health services.
✓	Brownfield and urban blight clean-up activities.
✓	Proper location, installation, cleaning, monitoring, and maintenance of septic tanks.
✓	Separation of storm and sanitary sewer systems.
	Spraying programs to properly control mosquito populations.
✓	Updated Continuity of Operations (COOP) plans and alternative "work from home" schedules.

Hazard Mitigation Alternatives Considered for Manistee County – 2023 HM Plan

A check mark indicates it was included in the list of mitigation strategies.

Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

Hazard Mitigation Alternatives for Shoreline Flooding and Erosion	
✓	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).
✓	Dry floodproofing of structures within known flood areas (strengthening walls, sealing openings, use of waterproof compounds or plastic sheeting on walls).
	Wet floodproofing of structures (controlled flooding of structures to balance water forces and discourage structural collapse during floods).
✓	Elevation of flood-prone structures above the 100-year flood level.
	Construction of elevated or alternative roads that are unaffected by flooding, or making roads more flood-resistant through better drainage and/or stabilization/armoring of vulnerable shoulders and embankments.
✓	Government acquisition, relocation, or condemnation of structures within floodplain or floodway areas.
✓	Employing techniques of erosion control in the area (bank stabilization, planting of vegetation on slopes, creation of terraces on hillsides).
✓	Enforcement of basic building code requirements related to flood mitigation.
✓	Joining the National Flood Insurance Program, obtaining insurance, and participating in the Community Rating System (CRS).
✓	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).
✓	Elevating mechanical and utility devices above expected flood levels.
✓	Flood warning systems.
	Monitoring of water levels with stream gauges and trained monitors.
	Anchoring of manufactured homes to a permanent foundation in flood areas, but preferably these structures would be permanently relocated outside of flood-prone areas and erosion areas.
	Control and securing of debris, yard items, or stored objects in floodplains that may be swept away, damaged, or pose a hazard when flooding occurs.
✓	Increased coverage and use of NOAA Weather Radio.
✓	Locating structures and infrastructure landward of the established setbacks.

APPENDIX E: CITY OF MANISTEE PROPOSED SHORELINE HAZARD MITIGATION PROJECT INFORMATION

Networks Northwest
Talent / Business / Community

Jennifer Neal <jennifer.neal@networksnorthwest.org>

City of Manistee projects

Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org> Tue, Dec 20, 2022 at 11:09 AM

To: Jennifer Neal <jennifer.neal@networksnorthwest.org>

OK122022

---------- Forwarded message ---------
From: **Mike Machen** <mmachen@manistee911.org>
Date: Fri, Dec 16, 2022 at 12:10 PM
Subject: Fwd: Follow up on Cities Initiative coastal resilience program
To: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>, Jennifer Neal <jennifer.neal@networksnorthwest.org>

Get Outlook for iOS

From: Bill Gambill <bgambill@manisteemi.gov>
Sent: Friday, December 16, 2022 11:06:17 AM
To: Mike Machen <mmachen@manistee911.org>
Cc: Jeff Mikula <JMikula@manisteemi.gov>
Subject: Fw: Follow up on Cities Initiative coastal resilience program

[WARNING: External Message - Use extreme caution opening links or attachments]

Mike,

Here's some information about the City projects that should be included in the Manistee County Hazard Mitigation Plan. Please let us know what other information you need. Thank you.

Bill Gambill
City Manager
City of Manistee
Ph: 231.398.2801

From: Richardson, Lucas M. <lucas.richardson@spicergroup.com>
Sent: Thursday, December 15, 2022 11:50 PM
To: Bill Gambill <bgambill@manisteemi.gov>; Middleton, Shawn P. <shawnm@spicergroup.com>
Cc: Jeff Mikula <JMikula@manisteemi.gov>; Bentley, Anne M. <anne.bentley@spicergroup.com>
Subject: RE: Follow up on Cities Initiative coastal resilience program

Hi Bill,

Sorry for the late response. Please see attached for information that can be used as a starting point for discussion on a bioengineered “green” approach for the shoreline protection around the Clean Water Recovery Facility. Also,

attached is a conceptual design for 5th Avenue Flooding that we have went back and forth on in previous meetings with City Staff.

For the 5th Avenue project, our recommendation would be to start with the concrete wall with stop logs on the pier ramp to help prevent the high water/ waves from flooding the streets. The wall would also help reduce the amount of sand blown onto the streets which currently causes a lot of drainage issues. The catch basins get filled with sand frequently and I am sure DPW has to clean them all the time. A second route of protection would be to add a secondary gravity storm sewer that outlets in the Harbor Village channel. This outlet would be utilized if and when the streets are flooded and would help reduce the amount of time the residents in that area are inconvenienced with the flooded streets. A third option of protection could be to add a storm pump station with discharge out to the channel. This would again, help with reducing the time that the streets are flooded. However, the most important piece of the flood protection would be to construct the barrier to prevent the waves from flooding the streets. An additional drain or pump can only keep up with Lake Michigan for so long.

I will send follow up emails with additional photos that Rick Mohr sent me.

Please let us know if you have any questions.

Thank you,

Lucas Richardson, P.E. | Design Engineer III
SPICER GROUP, INC.
Office: 231-794-5620 | Cell: 231-668-1107
www.spicergroup.com
Stronger. Safer. Smarter. *Spicer*

From: Bill Gambill <bgambill@manisteemi.gov>
Sent: Tuesday, December 13, 2022 1:59 PM
To: Middleton, Shawn P. <shawnm@spicergroup.com>
Cc: Jeff Mikula <JMikula@manisteemi.gov>; Richardson, Lucas M. <lucas.richardson@spicergroup.com>
Subject: RE: Follow up on Cities Initiative coastal resilience program

> **Caution:** This email originated from a source outside Spicer Group. Do not click on links or open attachments unless you recognize the sender and you know the content is safe.

Hi Shawn,

Do we have any more information we can share on this with the call on Friday? Rough costs, recommended pump size for 5th ave.?

Bill Gambill
City Manager
City of Manistee
Ph: 231.398.2801

From: Middleton, Shawn P. <shawnm@spicergroup.com>
Sent: Tuesday, November 29, 2022 7:01 AM
To: Bill Gambill <bgambill@manisteemi.gov>
Cc: Jeff Mikula <JMikula@manisteemi.gov>; lucas.richardson@spicergroup.com
Subject: RE: Follow up on Cities Initiative coastal resilience program

Bill,

I misunderstood, I thought you were pursuing FEMA PDM or HMGP money. That is why I was asking about the Cost Benefit Ratio information. I am not familiar with this program.

Here is what we have for these two sites. We can prepare the supplemental information pretty quickly.

1. **CWRF shoreline erosion**. We have some preliminary plans for the WWTP that Brian and Shane had quickly put together. I think we would design it a little different than what is shown, especially if this grant has any required green or soft engineering components.. I need to confirm the cost. Brian had $1.4M. It should be significantly less than this. I don't know what we have for pictures of flooding and erosion, but we can check. Rick may have some as well.
2. **5th Avenue flooding**. – I think I have some photos of highwater. I am guessing Jeff and Brandon have some as well. Our last direction was a gravity storm sewer outlet to minimize costs. If we can get funding a wall and pump station would provide greater protection. We do not have any concept drawings or cost estimates for a PS and wall, but could prepare some pretty quickly. The pump station size cost will depend on the how fast we want to dewater and what recurrence interval we design for. Lucas and I can work through some scenarios and provide the City with some options.

Thanks,

Shawn
Shawn P. Middleton, PE CFM | Sr Project Manager
SPICER GROUP, INC.
Cell/Text: 989-928-8027

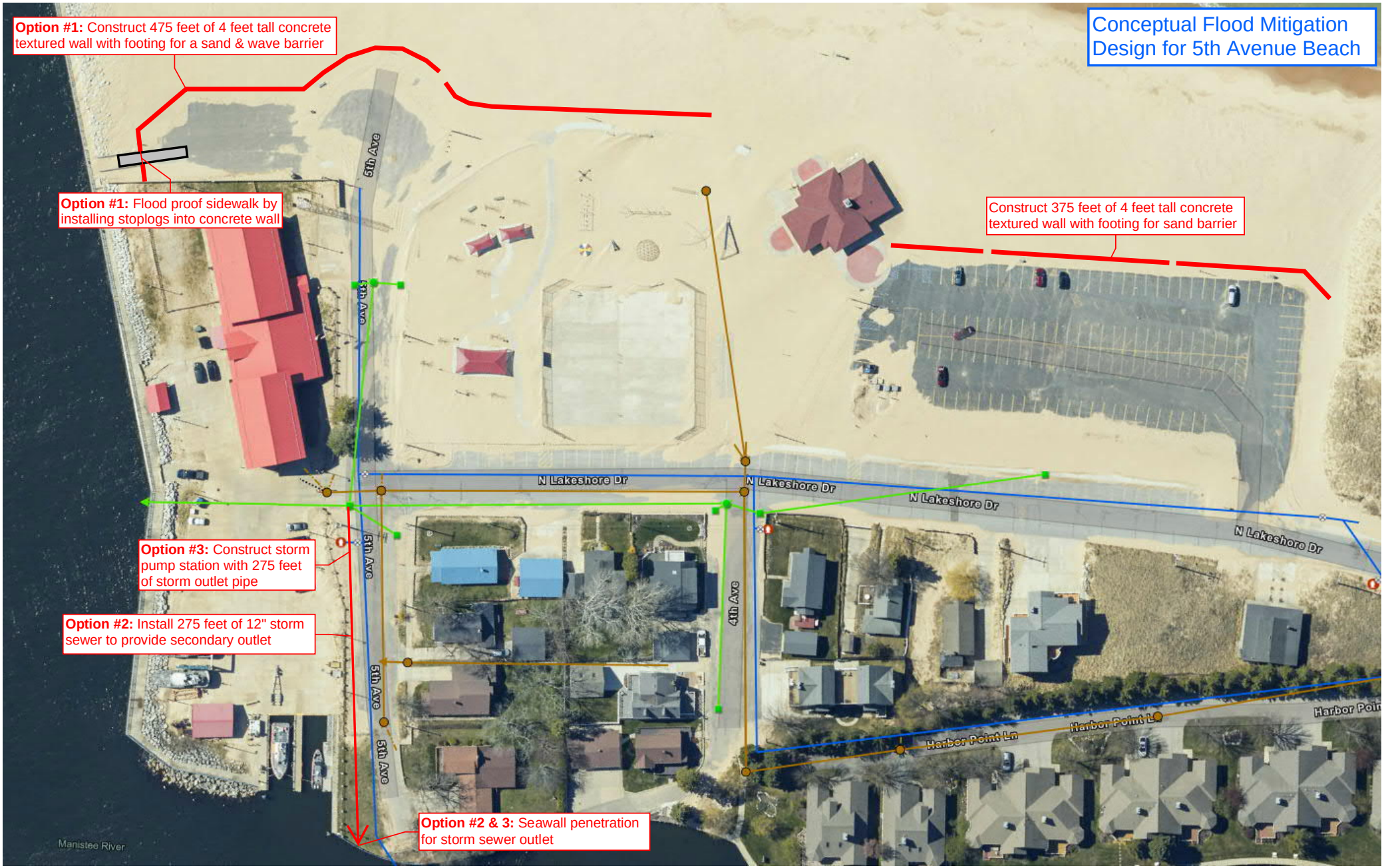
3 attachments

20221215_5th Ave Flood Mitigation.pdf
662K

5th Ave_Combined Flooding Photos.pdf
8948K

CWRF_Conceptual Design_.pdf
155K


Existing 5th Avenue Beach
5th Ave
5th Ave
5th Ave
5th Ave
5th Ave
N Lakeshore Dr
N Lakeshore Dr
N Lakeshore Dr
N Lakeshore Dr
Harbor Point Ln
Harbor Point Ln
Manistee River


Conceptual Flood Mitigation Design for 5th Avenue Beach
Option #1: Construct 475 feet of 4 feet tall concrete textured wall with footing for a sand & wave barrier
Option #1: Flood proof sidewalk by installing stoplogs into concrete wall
Construct 375 feet of 4 feet tall concrete textured wall with footing for sand barrier
Option #3: Construct storm pump station with 275 feet of storm outlet pipe
Option #2: Install 275 feet of 12" storm sewer to provide secondary outlet
Option #2 & 3: Seawall penetration for storm sewer outlet
5th Ave
N Lakeshore Dr
4th Ave
Harbor Point Ln
Manistee River

ENGINEER'S ESTIMATE OF COST
5TH AVENUE FLOOD MITIGATION
CITY OF MANISTEE
MANISTEE COUNTY

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
Option #1 (Only wall)					
1.	1	Lsum	Mobilization, Option #1	$8,000.00	$8,000.00
2.	850	Ft	2-foot wide, 6-inch thick, concrete footing	$20.00	$17,000.00
3.	850	Ft	4-foot tall, 6-inch thick, textured concrete wall	$80.00	$68,000.00
4.	200	Cyd	Excavation and handling for wall	$15.00	$3,000.00
5.	450	Sft	Sidewalk, Conc, 6-inch & Floodproofing wall with stop logs	$12.00	$5,400.00
6.	50	Syd	Sidewalk Removal	$12.00	$600.00
				Sub-Total Construction Cost:	$102,000.00
				Contingency (10%+/-):	$10,600.00
				Sub-Total Engineering:	$20,400.00
				Option #1 Total Project Cost:	**$133,000.00**
Option #2 (Wall & Secondary Outlet)					
7.	1	Lsum	Mobilization, Option #2	$1,800.00	$1,800.00
8.	275	Ft	12-inch Storm Sewer	$60.00	$16,500.00
9.	50	Syd	HMA surface, removal	$10.00	$500.00
10.	10	Ton	HMA	$180.00	$1,800.00
11.	1	Ea	Dr Structure Tap	$750.00	$750.00
12.	1	Ea	12-inch water-tight seawall penetration	$750.00	$750.00
				Sub-Total Construction Cost:	$22,100.00
				Contingency (10%+/-):	$2,500.00
				Sub-Total Engineering:	$4,400.00
				Option #2 Sub-Total Cost:	$29,000.00
				Option #2 Total Project Cost:	**$162,000.00**
Option #3 (Wall & Storm pump station)					
13.	1	Lsum	Mobilization, Option #3	$9,000.00	$9,000.00
14.	250	Ft	Storm Sewer Pressure Main Discharge Pipe	$80.00	$20,000.00
15.	25	Ft	12-inch Storm Sewer	$60.00	$1,500.00
16.	50	Syd	HMA surface, removal	$10.00	$500.00
17.	10	Ton	HMA	$180.00	$1,800.00
18.	1	Lsum	Electrical	$7,500.00	$7,500.00
19.	1	Ea	Storm Pump Station, Floats, Pump	$50,000.00	$50,000.00
20.	1	Ea	Dr Structure Tap	$750.00	$750.00
21.	1	Ea	12-inch water-tight seawall penetration	$750.00	$750.00
				Sub-Total Construction Cost:	$91,800.00
				Contingency (10%+/-):	$9,800.00
				Sub-Total Engineering:	$18,400.00
				Option #3 Sub-Total Cost:	$120,000.00
				Option #3 Total Project Cost:	**$253,000.00**

December 15, 2022

(*PRICES REFLECT CURRENT PRICING IN DEC 2022)


UNITED STATES
COAST GUARD


ST GUARD

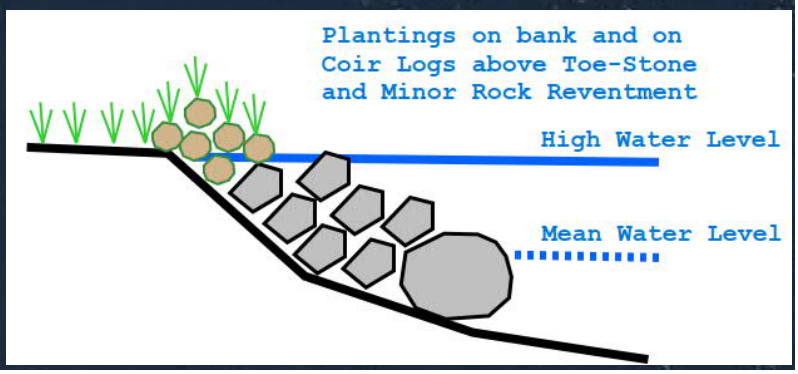
Clean Water Recovery Facility
(Roughly 1,023 feet of shoreline)

9th St

1,023.01 ft

9th St

Conceptual Green Engineering Design
(Typical Cross-Section)



ENGINEER'S ESTIMATE OF COST

CLEAN WATER RECOVERY FACILITY SHORELINE PROTECTION

CITY OF MANISTEE

MANISTEE COUNTY

Item No.	Estimated Quantity	Unit	Description	Unit Price	Amount
1.	1	Lsum	Mobilization	$35,000.00	$35,000.00
2.	1023	Lft	Toe Stone (2-3 Ton)	$150.00	$153,450.00
3.	1023	Lft	Heavy RipRap (18-36 Inch Diameter Stone)	$100.00	$102,300.00
4.	1023	Lft	Bioengineering/ Coir Logs	$50.00	$51,150.00
5.	0.3	Acres	Native vegetation plantings	$50,000.00	$15,000.00
6.	100	Cyd	Sand Backfill	$20.00	$2,000.00
				Sub-Total Construction Cost:	$358,900.00
				Contingency (10%+/-):	$36,000.00
				Sub-Total Engineering:	$65,100.00
				Total Project Cost:	**$460,000.00**

December 15, 2022

(*PRICES REFLECT CURRENT PRICING IN DEC 2022)

APPENDIX F: LOCAL COMMUNITY PLANS - ALIGNMENT WITH HM STRATEGIES

Local Community Plans in Manistee County: Alignment with 2023 Hazard Mitigation Plan Strategies

Arcadia Township

Bear Lake Township

Village of Bear Lake

Brown Township

Cleon Township

Village of Copemish

Village of Eastlake

Filer Charter Township

Manistee Township

City of Manistee

Maple Grove Township and Village of Kaleva

Marilla Township

Norman Township

Onekama Township

Onekama Village

Pleasanton Township

Stronach Township

Hazard Mitigation Plan Strategy Themes:

AP: Awareness & Preparation

S: Shelters

BD: Buildings and Development

UT: Utilities and Technology

ENR: Environment & Natural Resources

Arcadia Township

Master Plan (2021)
http://www.townshipofarcadia.org/uploads/8/6/4/2/86425640/arcadia_approved_adapted_1-21.pdf

BD UT ENR

p. 136 Goal: Continue to provide support for Arcadia Township's four-season harbor with sufficient amenities to service multiple users and types of uses.
p. 138 Strategy #7: Work closely with the appropriate entities to address water quality issues, fisheries, invasive species removal, access management, and general watershed management best practices.

p. 140 Goal: Provide an atmosphere that promotes and supports economic development opportunities.
p. 141 Strategy #10: Using the feasibility study data developed through SAW grant, explore data further to determine the potential of installing a sanitary sewer system for the purposes of water protection and infrastructure development for some portion of the township.

p. 142 Goal: Support efforts that are aimed at protecting, managing, enhancing, and providing appropriate access to the natural resources within the township.
Strategies:
1. Support the Arcadia Marsh, Grebe Park, Arcadia Beach, and Arcadia Dunes projects as well as others as they become available.
2. Support partnerships with entities that help enhance the Natural Resource Protection and Management goals.
3. Consider developing a Scenic Rural Preservation Plan.
4. Assess and consider Arbor Day Foundation standards to become a "Tree City USA."
6. Develop and improve road access and stormwater management standards.
8. Review and adhere to the Arcadia Watershed Plan.

p. 143 Goal: Expand opportunities that promote cohesion, stability, and well-maintained neighborhoods.
Strategies:
1. Seek funding sources to assist neighborhoods with the maintenance and rehabilitation of existing homes.
6. Conduct a comprehensive assessment of the infrastructure (roads, electricity, above and below ground utilities, etc.) to answer questions such as, "What infrastructure exists in the Township?", "What are the deficiencies?" and "What opportunities exist to make improvements?"

Bear Lake Township

Master Plan (2014)
http://www.lakestoland.bria2.net/wp-content/uploads/2014/11/BearLakeTwp_ADOPTED_11262014_web.pdf

BD ENR

p. 135 Goal: Create a revitalized and vibrant downtown in the Village of Bear Lake.
Strategies:
4. Encourage appropriate development and conformance with current building and fire codes.
5. Redevelop underutilized and brownfield properties in the downtown area.

p. 136 Goal: Establish a park system with a combination of outdoor and indoor recreation facilities and enhanced access to the Bear Lake and Chief Lake.
Strategies:
7. Set up a boat cleaning station at one of the two public access sites to Bear Lake.

p. 137 Goal: Improve the quality of our surface water and groundwater.
Strategies:
3. Develop a shoreline inventory of Bear Lake to identify priority locations for restoration projects.
4. Set up a boat cleaning station at one of the two public access sites to Bear Lake.
5. Support enforcement of wellhead protection ordinances.
6. Support development of a locally generated and state approved contingency plan and training for first respondents for road accidents involving fuel or other hazardous materials to minimize runoff to surface waters of Bear Lake and Bear Creek.

p. 138 Goal: Eliminate blight.
Strategies:
1. Adopt and enforce a blight ordinance.
2. Adopt a local property maintenance ordinance.
3. If a parcel has contaminated property, work with the Manistee County Brownfield Authority on remediation efforts and strategy.
4. Encourage coordinated local township and village adoption and enforcement of clean-up requirements for blighted properties to preserve property values and quality of life.
5. Investigate collaboration with the Village of Bear Lake on combined code and zoning enforcement services.

Manistee County-Wide Park & Recreation Plan 2022-2026, Bear Lake Township Goals & Objectives, Page F-7
https://www.manisteecountymi.gov/DocumentCenter/View/1341/2022-County-Wide-Park--Recreation-Plan-Appendix-A-H-PDF

ENR

Goal 7: Maintain good stewardship of the natural resources within the township while also developing recreational opportunities.

•Set up a boat power washing cleaning station at a public access site to Bear Lake and Chief Lake in order to combat Aquatic Invasive Species.

Village of Bear Lake

Master Plan (2014)
http://www.lakestoland.bria2.net/wp-content/uploads/2014/07/BearLakeVil_ADOPTED_07282014_web.pdf

AP BD UT ENR

Page 136 Goal: Create a revitalized and vibrant downtown in the Village of Bear Lake.
Strategies:
4. Encourage appropriate development and conformance with current building, fire, and blight codes.
5. Redevelop underutilized and brownfield properties in the downtown area.

Page 137 Goal: Improve the visual appearance and character of the Village to foster a healthy and desirable community in which to live, shop, work, and play.
Strategies:
4. Develop and enforce a zoning ordinance.
5. Develop landscape standards as part of the site plan review process in the zoning ordinance.
8. Seek opportunities to apply for grants to assist home and business owners with repairs and restoration.

Page 138 Goal: Eliminate blight.
Strategies:
1. Adopt and enforce a blight ordinance.
2. Adopt a local property maintenance ordinance.
3. If a parcel has contaminated property, work with the Manistee County Brownfield Authority on remediation efforts and strategy.
4. Encourage coordination among the Village and adjoining townships with regard to adoption and enforcement of clean-up requirements for blighted properties to preserve property values and quality of life.
5. Investigate collaboration with Bear Lake Township on combined code and zoning enforcement services.

Page 139 Goal: Ensure that the community has adequate and responsive public safety personnel, facilities, and equipment.
Strategies:
1. Continue to support Bear Lake Township's efforts to maintain a high-quality Fire and Rescue Department.
3. Actively seek grants to replace aging equipment such as plow trucks, mowers, pickup trucks, loaders, and the like.

Page 140 Goal: Develop and enhance recreational and historical opportunities and facilities.
Strategies:
7. Support a Senior Center to service the needs of the area's aging population.

Page 141 Goal: Improve Hopkins Park for enhanced recreational opportunities.
Strategies:
2. Research a docking, launching, and boat cleaning station for public access site.

Page 142 Goal: Improve the quality of our surface water and groundwater.
Strategies:
1. Continue to support the efforts of the Bear Lake Watershed Alliance, Bear Lake Property Owners Association, and the Lake Management Board to keep the lake clean and free from invasive species.
2. Develop a shoreline inventory of Bear Lake to identify priority locations for restoration projects.
3. Support enforcement of wellhead protection ordinances.
4. Support a sewer system if price is financially feasible for Village residents and businesses.
5. Assure that all septic tanks are functioning properly
6. Support development of a locally generated and state approved contingency plan and training for first respondents for road accidents involving fuel or other hazardous materials to minimize runoff to surface waters of Bear Lake and Bear Creek.

Brown Township

Manistee County-Wide Park & Recreation Plan 2022-2026, Brown Township Goals & Objectives, page F-7-10
ENR

Goal 3: Continue to assess opportunities to add recreation assets and opportunities in the community.
•Acquire land adjacent to the Township Hall on the west side (≈ 3 Acres) that abuts Chief Creek.
•Identify land abutting the Manistee River that could be acquired for recreational use.

Cleon Township

Master Plan (2006)
https://www.cleontownship.com/_files/ugd/111d5a_d1f44c4ccb2347c49f358ee1343d3836.pdf

BD UT ENR

GOAL 1: Designate land use areas that compliment and do not conflict with the Township's vast natural resources.
Objective: To preserve and protect the Township's natural resources.
Strategies:
-Identify and map natural resource areas.
-Include the mapped natural resource areas in the Master Plan.
-Determine which land uses are compatible and appropriate within or near areas of natural resources.
-Review the Zoning Ordinance to make sure the uses allowed are consistent with the Master Plan.

GOAL 2: Create and maintain a Master Plan that directs future growth into appropriate areas.
Objective: To ensure that growth occurs in areas that can be served adequately by roads and streets, public safety vehicles, potable water, and sewage disposal systems.
Strategies:
-Ensure that all residential structures have adequate lot area for well and septic isolation requirements and replacement.

GOAL 3: Preserve recreational, cultural, and historic areas, as well as areas of commercial significance.
Objective: Encourage the preservation of buildings and lands that are culturally, historically, recreationally, and commercially important.
Strategies:
-Identify and map all historic, cultural, and recreational buildings and lands.
-Work with land owners to preserve the resources when they are located on private property.
-Identify sources of funds to acquire important lands.

GOAL 6: Eliminate dangerous buildings throughout the Township.
Objective: Systematically remove or have removed buildings that are dangerous.
Strategies:
-Follow proper procedure for eliminating dangerous buildings.
-Prevent dangerous buildings from occurring by rigorously enforcing the building codes.

GOAL 7: Protect the groundwater resources of the Township.
Objective: Adopt regulations protecting groundwater.
Strategies:
-Contact the DEQ with concerns and questions.
-Possible inspection of septic systems at the time of a real estate sale.

Village of Copemish

Master Plan (2018)
https://www.manisteecountymi.gov/DocumentCenter/View/506/Copemish-Village-Master-Plan-Poster-2018-PDF

BD UT ENR

Objective 7.1: Develop, Institute and Regulate Land Use Policy
Action 7.1.6: Enforce Zoning Ordinance Regulations including blight enforcement

Objective 7.2: Plan for Vehicular Transportation & Infrastructure
Action 7.2.1: Continue Village Street Maintenance, through regular Capital Improvement Planning for road improvements

Objective 7.5: Conserve Water Resources & Unique Terrain
Action 7.5.1: Protect surface waters from sediment and pollutants by maintaining existing buffer vegetation
Action 7.5.2: Plan and encourage for structure placement in areas outside of steep slopes

Objective 7.6: Promote and Grow the Community
Action 7.6.1: Plan for utility infrastructure improvements as they are made available to the area

Village of Eastlake

Master Plan (2012)
https://www.manisteecountymi.gov/DocumentCenter/View/1274/Eastlake-Village-Master-Plan-2012-PDF

ENR

Pages 46 - 47

Goal: Protect and promote Eastlake's natural features
Objective: Preserve and enhance natural areas such as wetlands, floodplains, and woodland areas
Action Strategies:
- Support and participate in the development of a Manistee Lake plan that addresses water quality and other environmental issues within the lake and along the shoreline

- Work with DNR and other stakeholders to pursue habitat restoration in bayou area of Manistee Lake

- Work with Little River Band on shoreline redevelopment

- Continue to work with Manistee Lake stakeholders toward water quality improvement measures.

Filer Charter Township

Master Plan (2020)
https://filertwpmi.gov/boards-committees/planning-commission/

AP BD UT ENR

Goals, Policies and Action Plan (pages 119-121)

Natural Resources Goal: Protect and enhance natural resources throughout the Township for future generations. Policies:
• Consider adopting natural feature protection setbacks for all inland waterways and wetlands.
• Explore policy and design solutions to address erosion and increasing water levels along Lake Michigan.
• Working with Northwest Michigan Invasive Species Network, explore adoption of an invasive species ordinance. • Develop a guide to preferred low impact design techniques to use as a reference during Planning Commission site plan reviews.

Housing Goal: Develop and maintain high-quality housing options that meet the needs of all residents and attracts and retains talented workers.
Policies: Explore opportunities for senior housing to meet the needs of aging residents and allow for aging in place.

Economic Development Goal:
Foster a strong and resilient economic climate through public infrastructure investment and public-private partnerships.
Policies:
• Focus on the redevelopment and repurposing of large, vacant industrial buildings within the Township, seeking brownfield funding to offset costs.
• Seek grants and low interest loans to develop Phases 2 of the Township's sanitary sewer system.

Governance Goal: Maintain a climate of community trust and transparency that inspires strong civic engagement.
Policies:
• Seek to improve regional collaboration, working with City of Manistee and surrounding Townships on land use and service provision.
• Explore a millage increase to maintain a high level of fire service.

Manistee Township

Master Plan (2020)
https://www.manisteecountymi.gov/DocumentCenter/View/1305/Manistee-Township-Master-Plan-2020-PDF

BD UT ENR

Pages 36-

Section 5: Future Land Use Analysis (Cause and Actions)

5.1: Natural Resources Actions: The Natural resources contained in this section are regulated by State and Federal Agencies. Manistee Township works cooperatively with these agencies to ensure that their development standards are achieved.

5.1.1: Shoreline Erosion Cause: Fluctuating water levels have played havoc along the Lake Michigan shoreline. Due to increasing water levels, property owners have had to take immediate and costly action to protect structures which are threatened by excessive shoreline erosion.

Action: Support bluff setbacks enacted and regulated by the Department of Environment, Great Lakes and Energy (EGLE) with the State of Michigan.

5.1.2: Wetlands Cause: Wetlands connected to the Great Lakes, Great Lakes waterways, and those that are 5 acres or greater are regulated by the State of Michigan. The State requires a wetland permit in order to perform dredging, filling or construction within wetland areas.

Action: Article 25 of the current Manistee Township Zoning Ordinance regulates wetlands through the provisions of a wetland district. The current district does not align with the wetland boundary provided by the State of Michigan (*The State of Michigan Wetland Boundary is created by overlaying the "National Wetland Inventory Boundary" with the "Hydric Soils Boundary" from the Soil Survey Geographic database and displaying where the two datasets intersect.) The Township should amend Article 25 to become a wetland overlay district that applies to all wetlands of 5 acres or more within the Township.

5.1.3: Steep Slopes Cause: Development on excessively steep slopes can enhance erosive forces of water, destabilize soils and lead to increased erosion.

Action: Limit development in areas of steep slopes by protecting slopes of 25% or greater.

5.1.4: Waterway Buffers Cause: Lack of vegetation along surface waters may negatively affect water quality, promote erosion and limit wildlife habitat.

Action: Implement a vegetative buffer around all surface waters. A determination for the preservation of trees of a certain size (measured by diameter at breast height, DBH) should not be allowed to be removed unless dying, diseased or invasive. Provide provisions for removal of brush and trees for riparian access and preservation of viewsheds.

5.1.5: Floodplains Cause: Manistee Township is a participant in the National Flood Insurance Program. FEMA is preparing to adopt new floodplain maps for the Lake Michigan coastline and connected waters. Adjustment in flood zone boundaries may include additional property owners who may be required to obtain flood insurance. Development within the 100 year floodplain requires structures to be built to a flood standard, and for structures currently in the floodplain to meet standards if they were to be expanded or reconstructed.

Action: Enforce FEMA standards regarding floodplain development as required.

5.4: Infrastructure Actions

5.4.1: County Drains & Drainage Districts Cause: Communication and transparency issues have surrounded some drainage district expansion and maintenance efforts.

Action: Only support petitions for the creation, expansion, and/or maintenance of drainage districts that are brought about by free land holders of property within the Township.

Action: Support closure of all non-essential drains as identified by the Manistee County Drain Commissioner.

5.4.2: Stormwater Management Cause: Stormwater runoff from impervious surfaces carries pollutants such as heavy metals, nitrogen, phosphorus, fecal matter and other pathogens that can be carried to surface waters resulting in nonpoint source pollution.

Action: Continue support of the Drain Commissioner's Office “Stormwater Guidelines” which require on-site infiltration of stormwater for commercial, industrial and residential sub-division site plans that are under authority of the drain commissioner's office.

5.4.3: Water and Sewer Agreements Cause: Water and Sewer infrastructure through joint agreements with local units of government, promote development within areas of Manistee Township. Increased density should follow infrastructure.

Action: Continue cooperative agreements with the City of Manistee and the Little River Band of Ottawa Indians. Locate and promote zoning districts that increase density where infrastructure is present.

5.5: Energy and Extraction Actions

5.5.2: Solar Thermal Energy Cause: The Township has been approached for placement of solar farms for the harnessing and distribution of energy.

Action: Manistee Township should continue to allow solar farms in areas of low density residential development and agricultural production. Solar energy should compliment agricultural production by working with landowners to sustain a mode of agriculture that may coexist with solar panels and ancillary equipment.

City of Manistee

Master Plan (2016)
https://www.manisteecountymi.gov/DocumentCenter/View/483/City-of-Manistee-Master-Plan-2016-PDF

AP BD UT ENR

Section 3.1 Goals and Tasks, pages 65-71

Theme: Transportation
Goal 2: Continual review of streets and parking adequacy.
Task: Support road improvements under direction and leadership of the public works department.

Theme: Land Use and Zoning
Goal 4: Explore application of Low Impact Development requirements for environmental sustainability.
Task: Utilization of stormwater requirements to allow retention and infiltration of stormwater runoff for protection of property and surface waters.

Theme: Housing
Goal 2: Consideration for senior housing within the City
Task: Maintain existing senior housing and support expansion of assisted living options through marketing of potential sites.
Task: Set aside senior housing space that is utilized solely by seniors as the needs of seniors differ from other age cohorts.

Theme: Aesthetics and Environment
Goal 4: Work towards eradication of blight.
Task: Continue blight enforcement program and zoning ordinance enforcement.
Goal 5: Promote environmental quality of air, land and water.
Task: Ensure soil erosion protection practices are utilized and enforced for development and soil disturbance activities.
Task: Support and work through watershed and other environmental land use planning processes which impact local water and land resources.

Theme: Governmental Efficiency and Communication
Goal 1: Continue to utilize and expand communication with residents.
Task: Continue to keep the City's Web Site up to date, and emphasize the importance of the website as a tool for communication with the City's residents.
Task: Continued use of the community newsletter which is provided with the tax bill.
Task: Utilize Social Media as a method to communicate information to the residents and visitors.

Maple Grove Township and Village of Kaleva

Joint Planning Commission Master Plan (2023)
https://www.villageofkaleva.com/_files/ugd/39838c_d92e0d5a6c0f42cb90b084118c3a1ac4.pdf

AP S BD UT ENR

Goal 1: The community's neighborhoods and businesses will be maintained such that they are attractive, free of blight and reflect the high quality of the community.

- Ensure that the Village and Township are staffed to effectively administer and enforce the municipalities' police power and zoning ordinances.
- The enforcement of municipal ordinance violations will be uniform across the community.
- Establish clear remediation procedures for ordinance violations in the municipal code of ordinances. These should be clear in procedure for both the municipal staff as well as the property owner.
- Increase awareness and capacity regarding the community's dump days in the spring and fall to assist property owners with blight and junk removal.
- Review the Village and Township's ordinances and fix any ordinances that are in conflict with one another or create uncertainties in terms of administration.
- Ensure that ordinances passed by the Village and Township are enforceable.
- Update the rental ordinance to make certain that rental properties are maintained to a high standard and are in compliance with all relevant codes and statutes.

Goal 2: Kaleva and Maple Grove's arts, culture and business environment will attract and retain a populace with varying interests, lifestyles, ages and occupations.

- Maintain quality green spaces and natural habitats on public land to preserve the community's rural character.

Goal 3: The community's infrastructure and services will be of a high quality, acting as a benefit to the people and businesses in Kaleva and Maple Grove, as well as for visitors.

- Support initiatives to improve broadband connectivity in the community, recognizing its increased importance in attracting people and businesses.
- Continue to manage road quality data through the PASER rating system to ensure the data accurately describes the community's road infrastructure.
- As the community's population grows, ensure that police, EMS and fire services are budgeted and staffed appropriately to ensure quality service to the public.

Goal 4: The former Kaleva Elementary School will become a hub for the community, serving a range of purposes for a variety of people.

- The Center now houses the Maple Grove Township offices, Village of Kaleva offices, elections, a food pantry, senior meals, the Michigan State Police Kaleva detachment, pickleball, the Village of Kaleva Water Department, Great Start Kids Program, an exercise room, music lessons and several meeting rooms for organizations. It has become one of the centerpieces of the community, with scores of individuals volunteering.
- The leadership in Kaleva and Maple Grove plan to apply for grants to allow the Community Center to be outfitted with features to serve the public during a disaster or weather emergency. This would include, but is not limited to, a generator and showers.

Marilla Township

Master Plan (2018)
https://www.manisteecountymi.gov/DocumentCenter/View/1277/Marilla-Township-Master-Plan-2018-PDF

AP BD UT ENR

Chapter 6 Goals and Objectives

6-1.1 General Community Goals

1. Preserve the history and rural atmosphere of the township.

-Protect farm and forestland through the use of PDR and open space preservation

1. Encourage preservation tools to be used in the Township to help preserve valuable natural features and maintain rural character

-Encourage denser development where infrastructure is available

1. Research and determine the locations of service areas and infrastructure that can provide for higher densities
2. Research areas where soils will allow septic/well in higher densities

2. Preserve and protect the quality of life within the Township.

-Encourage opportunities for community fellowship

1. Continued support for groups and programs such as the Senior Meals (meals on wheels), Food Bank, Friends of Marilla and Historical Society as well as promoting the availability of the Township Hall for rental

-Promote opportunities for community service

1. Compile list of ways people can help such as with spring cleanup of Twp. properties, Funeral dinners, etc.

3. Preserve and maintain the natural beauty of the Township.

-Promote clean landscape and roadways

1. Encourage active citizen participation in programs such as “Adopt a Highway” through the County Road Commission.
2. Enforce the Township Junk Ordinance
3. Provide at least one Township wide cleanup opportunity for residents per year

-Protect the natural resources within the Township

1. Continued enforcement of Environmental Ordinances.
2. Work with Federal, State and local agencies as well as private groups such as land trusts and conservancies to purchase and protect valuable environmental locations

6-2.2 Residential Goals

1. Promote and maintain a quality housing stock.

-Encourage proper building codes so new structures meet State guidelines

1. Work with building code officials to ensure all construction projects obtain proper permits

-Encourage enforcement of zoning regulations to reduce blight; i.e. structures, cars, trash, junk, etc.

1. Educate residents on how to notify the Township of potential zoning violations
2. Keep sound accurate public records of zoning violations and the correspondence with property owners of said violations

-Maintain an inventory of blighted structures throughout the Township; i.e. damaged, dilapidated, unhabitable structures

1. Develop and enforce appropriate guidelines regarding removal of such structures
2. The Township Zoning Administrator and Assessors should work in collaboration to maintain a list of blighted structures.

6-2.5 Community Services and Infrastructure Goals

1. Determine ways to improve community services and infrastructure within the Township.

-Develop a list of roads in need of improvement

1. Work with the County Road Commission on maintaining and improving county roads

-Encourage options for improved telecommunications services (internet, cell phone)

1. Examine current height restrictions and district uses for towers
2. Increase cell coverage in the community.

6-2.6 Forestry Goals

1. Promote sustainable forest management practices on both public and private lands.

-Support open space and forest preservation programs

1. Encourage timber management programs

-Encourage proper forestry management through the use of forestry management plans.

1. Obtain pamphlets that outline methods for development of a forestry management plan.
2. Identify opportunities for hosting or attendance by Township residents of forestry management workshops/lectures through the Manistee Conservation District and/or Natural Resource Conservation Service

Manistee County-Wide Park & Recreation Plan 2022-2026, Marilla Township Goals & Objectives, page F-31

ENR

Goal 4: Improve existing recreation facilities and expand recreation opportunities in the community

•Acquire land for new recreation opportunities or to expand existing recreation sites including playgrounds, walking paths, picnic areas, restrooms and covered pavilions.

Norman Township

Master Plan (2015)
https://www.normantownship.org/_files/ugd/4fb008_7281f442cc2e429cb44970301590d07a.pdf

AP BD UT ENR

Chapter 8: FUTURE LAND USE PLAN, POLICIES, GOALS, and ACTIONS

1) Forest and Farm

To promote the maintenance and enhancement of productive farms and forests within Norman Township, the Township shall:

b) Support and promote voluntary efforts to preserve active farm and forestlands, such as conservation easements, the State of Michigan's purchase and leasing of development rights program (P.A. 116), etc.

c) Maintain the Township's rural character by utilizing planning tools and techniques, including but not limited to the following:

- Working with landowners to voluntarily protect, enhance, and conserve farm, forest, wetlands, shorelines, and other recreation lands.
- Explore the use of the purchase of development rights, transfer of development rights, and explore the provision of providing density

h) Partner with local, regional, and state governmental and nonprofit agencies and landowners to protect farm and forestlands.

i) Recognize the importance of healthy, intact forests in providing wildlife habitat, erosion control, groundwater recharge, recreational uses such as hunting, recreational vehicle travel and other enjoyment.

j) Encourage forestland owners to enter into sustainable forest management and conservation plans.

k) Encourage reforestation on steep, sandy, wet, and other fragile soils. Bonuses for development that voluntarily preserves natural and/or cultural resources.

3) Environment

To maintain and enhance environmental quality within Norman Township, the Township shall:

a) Promote the protection of sensitive environmental resources including but not limited to steep slopes, wetlands, wildlife habitat, springs/seeps, waterways and shorelines.

b) Encourage mineral rights owners and developers, i.e. oil and gas exploration and production firms, to comply with state regulation and relevant local ordinances in the production and abandonment of oil and gas wells, production facility maintenance and testing, and site restoration.

c) Encourage the restoration, re-contouring, replanting and require the establishment of safe conditions at inactive or abandoned sand and gravel extraction sites.

d) Utilize best management practices, including but not limited to promoting the use of native plants, on-site treatment and disposal of storm water, soil conservation, sustainable forest yields, and the restoration of damaged lands.

e) Identify and preserve important wildlife habitat, migration corridors and natural buffer areas within the Township.

f) Utilize an inventory of the Township's natural resource base for on-going development and land conservation decisions

g) Protect groundwater, representing 100% of the Township's drinking water source, and surface waters from contamination, depletion and/or degradation.

h) Recognize the importance of and promote the protection of wetlands in maintaining and improving water quality and sustaining diverse wildlife populations, and thereby recreation/tourism, within the Township.

i) Promote the protection of wetlands, springs, and ground water recharge areas by requiring efficient water use and septic treatment/disposal, and promote water resource protection in any plans.

j) Recognize and protect quiet and air quality as essential components of the protection of public health, safety and general welfare, and to minimize the potential for public or private nuisance.

4) Economy

The Township recognizes that its rural/forested character and natural environment are among its most important economic assets. These assets provide economic opportunities, recreational enjoyment, wildlife habitat, and together create a desirable place to live, work and play.

To promote and sustain appropriate economic development within Norman Township, the Township shall:

a) Balance residential, commercial and industrial development, and promote the voluntary protection of natural resources, including productive forest and active farmland.

b) Assist willing landowners in the voluntary conservation of active farms, forest lands and farmland.

g) Protect and enhance existing natural and cultural resources within the township.

5) Public Facilities, Infrastructure & Utilities

To promote and maintain the rural character within Norman Township, the Township shall:

a) Consider the establishment of appropriate public infrastructure and municipal services that keep pace with the Township's needs.

b) Continue to pursue and support the construction of a new fire barn.

c) Maintain and promote existing EMS and fire protection services within the Township.

d) Encourage the location of future electric power, communication, oil and gas development, and utility infrastructure in a manner that will not negatively impact rural character or fragment farmland or natural ecosystems.

e) Encourage the underground installation of all utilities at future housing developments, and strongly encourage underground utility placement at single parcel residential developments.

f) Encourage appropriate sewage/manure treatment, fertilizer use management, and water protection techniques for planned unit developments, animal feed lots, golf courses, etc.

g) Encourage the clustering of utilities such as electrical substations, transmitter towers, cell phone or other towers, etc.

h) Co-location on existing and future communication towers will be required. Co-location of emergency service communications on existing structures shall also be strongly encouraged.

i) Require private road development in conformance with Township and County regulations.

6) Residential Development

To promote the maintenance and enhancement of the rural character of Norman Township, while balancing the need for new residential development, the Township shall:

a) Consider the housing needs of all income levels and ages, including first time home buyers, elder housing and/or assisted care facilities.

c) Encourage and provide incentives for the use of conservation design and low impact development standards for all new housing developments. Promote new housing developments having a minimum of 50% open space after excluding non-buildable areas. Non-buildable areas include but are not limited to slopes over 25%, wetlands, roadways, streams, and seeps/springs. Explore density bonuses for conservation developments that exceed these requirements and permanently protect natural and/or cultural resources.

e) Require the appropriate construction and maintenance of private roads and support the efficient layout of public facilities within housing developments.

f) Support programs to encourage home renovation and rehabilitation through obtaining grants for old water well abandonment, alternative energy, water conservation, home exterior upgrades, the demolition and removal of abandoned structures, blight control, and home insulation, etc.

g) Seek to protect existing natural resources, especially productive forest and active farmland.

7) Waterfront Areas

To promote the maintenance and enhancement of water quality and property values within Norman Township, the Township shall promote the following actions:

a) Protect the water quality and near shore environment of lakes, ponds, streams, creeks, wetlands, etc. from degradation, siltation, pollution, and other human impacts.

b) Protect existing native vegetation, water resources, fisheries, wildlife habitat, and unbroken forest canopy on shorelines and banks.

c) Support the enforcement of existing federal, state, and local laws that protect waterfront resources and the environment.

d) Support the distribution of existing brochures and other materials to educate property owners on waterfront properties. Distribute these materials through MSU Extension, county and township agencies and departments, real estate offices, code enforcement officials, lake and property owners associations, etc. Explore and apply for grants from state, federal agencies and other sources to implement this effort.

8) Commercial Town Center/Commercial Development

To guide the future commercial development of Norman Township, the Township shall:

g) Study the feasibility of sewer and water services for these areas (the communities of Wellston and Dublin).

j) Incorporate best management practices and low impact development techniques to reduce amounts of impermeable surfaces, storm water runoff, and require on-site natural treatment of storm water.

9) Recreation

To promote recreational resource development, the Township shall:

b) Support and promote the State or local acquisition/development of unique natural and/or cultural resources as public recreation lands (i.e., lake accesses, unique natural features, wildlife and fish habitat, etc.)

c) Manage land within the Township for the conservation of natural resources as balanced with recreational uses, including Township-owned lands.

10) Transportation

To promote the maintenance and enhancement of transportation infrastructure within Norman Township, the Township shall:

f) Establish and maintain good communication with the Michigan Department of Transportation and Manistee County Road Commission to ensure efficient transportation policy, and future transportation improvement projects in accordance with the vision of this Master Plan.

11) Regional Planning

To support regional planning, the Township shall:

a) Recognize that Norman Township's natural resources and community are connected to and an important part of much larger systems, and that both often cross other boundaries and can impact other natural and human communities.

b) Be aware that decisions in one community may affect other nearby communities, encourage and promote cooperation among local governments on development decisions that affect more than one community.

c) Enhance communication and cooperate with adjacent Townships and Counties on planning and other shared issues.

e) Support regional strategies to better protect and preserve forestlands, waterways, active farmland, and other natural features along Township boundaries.

Onekama Township

Master Plan (2023)
https://www.onekamatwp.org/sites/g/files/vyhlif7481/f/news/report_10.03.2023_0.pdf

AP BD UT ENR

Page 53 Goal: Provide a variety of housing types that are attractive to all age groups.
Objectives:
6. Evaluate the sewer system capacity to ensure that has sufficient capacity to support future housing and population growth.

Page 54 Goal: Ensure that our agricultural and rural character is preserved.
Objectives:
4. Evaluate the Onekama Township Permanent Zoning Ordinance, Section 3703; Special Uses under the AG-1 zoning district which allows for a variety of light industrial land uses that could be detrimental to adjacent agricultural uses and the underlying groundwater recharge area.

Page 55 Goal: Support local government efforts to implement quality of life initiatives
Objectives:
2. Adopt a police power ordinance focused on blight elimination utilizing the Lakes to Land Regional Imitative model blight ordinance as a guide.
5. Establish an internal and external training program for Planning Commission and Trustees on topics, such as, innovative zoning, redevelopment strategies and, blight control and code enforcement.
6. Continue water quality advocacy through the Portage Lake Watershed Forever initiative.
7. Investigate the formation of a locally based land conservancy.
8. Develop a community strategy to “age in place” to accommodate an aging population.

Manistee County-Wide Park & Recreation Plan 2022-2026, Onekama Township Goals & Objectives, page F-36-37

Goal 2: Collaborate with other local units of government, Manistee County, businesses, and civic organizations to improve existing park facilities and to identify new parks and recreation opportunities.
•Support the Portage Lake Management Plan for the control of lnvasive Species both in and around Portage Lake.

Goal 3: Enhance and expand upon the parks and recreation sites in Onekama Township.
•Continue to support the ongoing stewardship of the Portage Lake Watershed.
•Continue to identify and acquire land that contributes to environmental preservation, education, viewsheds and recreation experiences.
•Support public education efforts regarding invasive species and septic system monitoring.

Onekama Village

Master Plan (2010)
https://www.manisteecountymi.gov/DocumentCenter/View/504/Onekama-Township-and-Onekama-Village-Community-Master-Plan-2010-PDF
Pages 75-77

AP BD UT ENR

Portage Lake Watershed Goal: To further the recommendations of the Portage Lake Watershed Forever Plan and enhance the water quality and fisheries habitat of Portage Lake.
Strategies:

- Incorporate into the zoning ordinance stormwater best management practices (BMP's) regulating the collection, treatment, and discharge of stormwater runoff.
- Establish a riparian area overlay district which contains site design criteria addressing the development within this management zone. Criteria would include setbacks, vegetation clearance, controlling impervious surface runoff and abating the use of inappropriate fertilizers and pesticides.
- Inventory regulated and unregulated wetlands within the riparian area overlay district, and develop review standards for local (MDEQ unregulated) wetlands.

Economic Development Goal: Provide conditions which create opportunities for family-wage jobs and business development.
Strategies:

- Procure high-speed broadband Internet service throughout the Township.

Land Use Goal: Consolidate development within public service boundaries and balance development with unique environments in the Onekama Community.

- Prepare a sanitary sewer master plan identifying service areas, costs, phasing, and funding sources.
- Limit development in or adjacent to wetlands and flood-prone areas.
- Incorporate into the zoning ordinance special provisions to protect groundwater recharge areas; especially on properties with natural gas and oil exploration.
- Allow only low-density, low-scale, and low-impact development within the Riparian Area.

Water Quality Management Goal: Ensure that the Portage Lake Watershed has higher water quality than today. Strategies:

- Ensure that the Portage Lake Watershed has higher water quality than today.
- Treat all stormwater prior to discharge in Portage Lake.
- Define high quality water recharge area and protect these areas with appropriate zoning and site development regulations.
- Manage soil erosion and sedimentation.
- Revise ordinance and codes to require low-impact storm water runoff techniques for existing and new development.
- As an initial phase install public sanitary sewers around Portage Lake.

Biodiversity and Natural Ecosystems Goal: Preserve the wetlands along Portage Lake and the wooded hills within the watershed.
Strategies:

- Conduct a Natural Features Inventory for the Township.
- Develop zoning ordinance provisions to control development on or adjacent to wetland areas.
- Encourage through public education forest stewardship practices

Human Infrastructure Goal: Consolidate separate community initiatives into a common vision which results in sound community building, promotes leadership, engages volunteers, and involves students.
Strategies:

- Ensure that as the population ages they have access to medical care and emergency services.

Manistee County-Wide Park & Recreation Plan 2022-2026, Village of Onekama Goals & Objectives, pages F-37-38

UT ENR

Goal 1: Highlight, preserve and enhance the community's natural resources to glean their contributions to the environmental, social and economic well-being of Onekama.

•Continue to support Portage Lake's water quality and pollution monitoring by the Portage Lake Watershed Forever organization, Onekama Township and Onekama Consolidated Schools.

•Support the enforcement of the county-wide septic system monitoring program.

•Support the extension of the sewer system into areas where septic systems are endangering the ecological quality of Portage Lake and other bodies of water in the community.

•Support educational initiatives that foster environmental stewardship, such as describing the risks that invasive species pose and best practices for their prevention, management and eradication.

•Involve community organizations in efforts to protect and enhance environmental quality, such as by identifying and controlling invasive species in and around Portage Lake.

•Support the Portage Lake Management Plan and its goals for public health, aquatic ecosystems, water-based recreation, natural resource and cultural assets, and the control of invasives both in and around Portage Lake.

•Continue to support the Portage Lake Overlay Zone in the Village Zoning Ordinance.

Pleasanton Township

Master Plan (2015)
https://www.pleasantontownship.org/uploads/1/1/3/9/113947797/tab4_pleasanton__1_.pdf

BD UT ENR

Page 6 Goal: Ensure that a wide range of recreational opportunities exists for all types of users.
Strategies:
BEAR LAKE ACCESS POINTS: Continue to maintain and improve access to Bear Lake by developing a road end maintenance program and allocating funds that seek to keep all public access points to Bear Lake viable through weed control, trash removal, installation of picnic tables and trash receptacles, and widening the access point for more users where possible.
GTRLC LAND: Work closely with the Grand Traverse Regional Land Conservancy to develop the "Borwell Property" and other property under their ownership in order to ensure that the township's recreation goals are considered.

Page 7 Goal: Ensure that transportation and technological infrastructure meets the needs of the community.
Strategies:
ROAD IMPROVEMENT ANALYSIS: Conduct a Road Improvement Analysis to understand which roads need improving and the level of improvement necessary to maintain public health, welfare, and safety.
ROAD IMPROVEMENT SCHEDULING: Promote road improvements that are determined necessary.
BROADBAND INTERNET: Encourage and support broadband internet access throughout the community.

Page 8 Goal: Maintain the scenic rural character of the community.
Strategies:
WATERSHED PROTECTION: Encourage the state, particularly the Michigan Department of Environmental Quality, on their work overseeing our watershed.
AGRICULTURAL LAND CONVERSION: Existing agriculture or forest land uses shall have priority over new residential uses and will be encouraged to continue as the principal permitted use.
ENVIRONMENTAL SITE DESIGN STANDARDS: Review the existing zoning ordinance to ensure the inclusion of standards that state: 1. New development shall not pollute or degrade the quality of surface water or groundwater, current quiet countryside noise levels, scenic views, or night time dark sky; 2. New development shall be designed and constructed to avoid sensitive natural features in order to keep them pristine and shall be protected and restored where damaged; 3. New lakefront public access sites shall be carefully sited to minimize environmental degradation and managed to prevent overcrowding of the lake surface and nuisance impacts on abutting properties.
ZONING ORDINANCE REVISIONS: Adopt or Amend ordinances to provide protection for sensitive features including wetlands, floodplains, land bordering lakes and streams, current quiet countryside noise levels, scenic viewsheds, and nighttime skies.
COMMUNICATION WITH GRAND TRAVERSE REGIONAL LAND CONSERVANCY: Maintain regular communication with the Grand Traverse Regional Land Conservancy to ensure that their land use practices are in keeping with this Plan.
GREENWAY PLANS: Consider development of a Greenway Plan. This is a document that describes how to develop a corridor of open space located along a specific natural feature (i.e. waterway, trail route, forest blocks, and unused right-of-way) that may simultaneously protect natural resources, wildlife movement, scenic landscapes, and historical resources while providing recreational opportunities and connecting existing protected and environmentally sensitive areas.
WILDLIFE CORRIDOR PLAN: Commission a professional study and develop a Wildlife Corridor Plan for the purpose of improving game management and habitat protection.
JUNK/BLIGHT: Review, update and enforce a Junk/Blight Ordinance to ensure that issues such as unstable structures, accumulation of debris in yards, and perpetually unsightly human-made attributes of the township are removed in a timely fashion to protect the health, safety, and welfare of the community.

Manistee County-Wide Park & Recreation Plan 2022-2026, Pleasanton Township Goals & Objectives, page F-40
ENR

Goal 3: Create and improve access opportunities to Bear Lake.
•Continue to identify potential property acquisitions that would promote public access to Bear Lake.
•Support efforts to monitor and steward the ecological quality of Bear Lake.

Stronach Township

Master Plan (2013)
https://www.stronachtownship.net/s/Stronach-Master-Plan-3-14-2013-compressed-compressed.pdf

AP

Page 30: "Forested areas of the Township are important to the wildlife and character of the land, and the recreational opportunities that draw people to the area. Wildfire is a real threat to the forest and homes and residents should familiarize themselves with community wildfire plans and the Fire Wise Program."

APPENDIX G: PARTICIPATION TABLE

Manistee County Hazard Mitigation Plan Participation Table																				
			Participation Method/Event																	
Participating Agency or Jurisdiction	Representative	Title	Completed Survey	HM Kick-off Meeting 7/1/2021 (In person and via Zoom)	LPT/LEPC Meeting 9/29/2021 (Via Zoom)	LPT/LEPC Meeting 12/20/2021 (via Zoom)	LPT/LEPC Meeting 03/17/22 (via Zoom)	LPT-LEPC Meeting/ Public Input 05/19/22 Hazards ID	LPT-LEPC Meeting 08/22/22 (in person)	County PC Meeting 12/8/22 (in person and via Zoom)	LPT/LEPC Meeting 12/16/22 (in person and via Zoom)	LPT/LEPC Meeting 02/21/23 (in person and via Zoom)	Manistee MTA meeting 3/22/2023 (in person)	Stronach Twp. Board Meeting 4/12/2023 (in person)	Email - draft plan receipt acknowledgement 6/13/2023	County BOC / Public Hearing 6/20/2023 (in person & via Zoom)	Email - draft plan comments 6/26/2023	Email - NFIP enforcement info. 6/28/2023	LEPC/LPT meeting 6/28/2023 (in person)
Manistee County Board of Commissioners	Janice McCraner	District 1 Commissioner (All of Arcadia, Bear Lake, and Pleasanton Townships, and that portion of Onekama Township North of Eight Mile Road and Portage Lake, except the Village of Onekama)																		
	Richard Schmidt	District 2 Commissioner (All of Townships of Cleon, Maple Grove, Marilla and Springdale)														X				
	Nicole Koons	District 3 Commissioner (All of Norman, Dickson, and Brown Townships)														X				
	Eric Gustad	District 4 Commissioner (All of Stronach Township, the Village of Eastlake, and all of Filer Township lying South of Merkey Road and 21st Street)														X				
	Jeff Dontz	Chair, District 5 Commissioner (Part of Onekama Township, being the Village of Onekama and all of Onekama Township lying South of Eight Mile Road and Portage Lake, and all of Manistee Township, except the Village of Eastlake.)				X		X	X							X				X
	Karen Goodman	Vice Chair, District 6 Commissioner (That portion of the City of Manistee lying West of Maple Street and all of the City North of the Manistee River, and a portion of Filer Township lying North of Merkey Road and 21st Street in Filer Township)														X				
	Margret Batzer	District 7 Commissioner (That portion of the City of Manistee lying East of Maple Street and South of the Manistee River.)														X				
Manistee County Planning Commission	Eleanor DeYoung	Planning Commissioner; Village of East Lake resident								X										
	Glenn Zaring	Planning Commissioner; City of Manistee resident								X										
	Ted Batzer	Planning Commissioner; Stronach Twp. resident								X										
	Phil Landis	Planning Commissioner; Stronach Twp. resident								X										
	Margret Batzer	Planning Commissioner; Commissioner; City of Manistee resident								X										
	Mary Becker-Witt	Planning Commissioner; Norman Twp. resident								X										
Manistee County	Mike Machen	E.M./Deputy 911 Coordinator (former)	X	X	X	X	X	X	X	X	X	X								X
	Alvin Rischel	E.M./Deputy 911 Coordinator (current)								X	X	X	X	X		X				X
	Jim Espvik	911 Director (former)	X				X													
	Lisa Sagala	Administrator/Controller		X												X				
	Mike Szokola	Planning Director (former)	X	X						X						X				
	Katie Mehl	Planning & Zoning Administrator								X										
	Jodie Lynch	Planner 1														X				

Manistee County Hazard Mitigation Plan Participation Table																			
			Participation Method/Event																
Participating Agency or Jurisdiction	Representative	Title	Completed Survey	HM Kick-off Meeting 7/1/2021 (In person and via Zoom)	LPT/LEPC Meeting 9/29/2021 (Via Zoom)	LPT/LEPC Meeting 12/20/2021 (via Zoom)	LPT/LEPC Meeting 03/17/22 (via Zoom)	LPT-LEPC Meeting/ Public Input 05/19/22 Hazards ID	LPT-LEPC Meeting 08/22/22 (in person)	County PC Meeting 12/8/22 (in person and via Zoom)	LPT/LEPC Meeting 12/16/22 (in person and via Zoom)	LPT/LEPC Meeting 02/21/23 (in person and via Zoom)	Manistee MTA meeting 3/22/2023 (in person)	Stronach Twp. Board Meeting 4/12/2023 (in person)	Email - draft plan receipt acknowledgement 6/13/2023	County BOC / Public Hearing 6/20/2023 (in person & via Zoom)	Email - draft plan comments 6/26/2023	Email - NFIP enforcement info. 6/28/2023	LEPC/LPT meeting 6/28/2023 (in person)
Manistee County	Nancy Baker	Planning Secretary/Assistant to Planner								X									
	Brian Gutowski	County Sheriff											X			X			
	Jason Torrey	Undersheriff			X	X	X		X			X				X			
	Gary Schwaiger	Drain Commissioner	X																
	Lindsey Marquardt	County Clerk														X			
	Melissa Bjorkquist	Chief County Deputy Clerk														X			
	Susan Zielinski	Finance Officer														X			
	Karla Smith Kasten	Recycling Coordinator											X						
	Heather Vasquez	County Equalization														X			
	Loren Van Alstine	Register of Deeds														X			
	Kristyn Malkowski	Administrative Secretary														X			
	Julie Griffis	HR Generalist														X			
	Joe Coleman	Administrator, County Medical Care Facility	X		X	X	X	X			X	X							X
	Joe Jones	County Medical Care Facility			X	X	X												
Manistee County Road Commission	Brad Lasko	Maintenance Supervisor						X											
	Greg Hejl	Superintendent									X	X							
Manistee Blacker Airport	Barry Lind	Airport Director	X																
Manistee Conservation District	Renee Mallison	Executive Director	X																
Manistee Intermediate School District	Mary Becker-Witt	Board President								X									
City of Manistee	Josh Glass	Police Chief			X	X					X								
	Jeff Mikula	Public Works Director	X																
	Bill Gambill	City Manager	X								X								
Village of Bear Lake	Tracy Gary	Clerk	X																
Village of Copemish																			
Village of Eastlake	Sherry Stamp	Clerk																X	
		Village Employee; resident	X																
Village of Kaleva	Karen Dufresne	Clerk	X																
Village of Onekama	Roger Burger	President																X	
Arcadia Twp.	Janice McCraner	Supervisor	X																
Bear Lake Twp.	Deanna Pattison	Clerk	X																
		Trustee	X																
Brown Twp.	Lani Millsap	Treasurer	X																
	Paul Wondolowski	Trustee											X						
Cleon Twp.	Linda Cudney	Treasurer	X										X						
	Amy Herrst	Clerk	X										X						
Dickson Twp.																			
Filer Charter Twp.	Andy Bradford	Resident; TES Filer City Station Supervisor	X									X							
	Terry Walker	Supervisor											X						
Manistee Twp.	D. R. Bjorkquist	Supervisor	X																
Maple Grove Twp.	H. Wayne Beldo	Supervisor	X										X						
	Frances Beldo	Clerk											X						
	Karen Roy	Treasurer											X						
Marilla Twp.	Douglas Glick	Supervisor	X																
		Planning Commissioner	X																

Manistee County Hazard Mitigation Plan Participation Table																			
			Participation Method/Event																
Participating Agency or Jurisdiction	Representative	Title	Completed Survey	HM Kick-off Meeting 7/1/2021 (In person and via Zoom)	LPT/LEPC Meeting 9/29/2021 (Via Zoom)	LPT/LEPC Meeting 12/20/2021 (via Zoom)	LPT/LEPC Meeting 03/17/22 (via Zoom)	LPT-LEPC Meeting/ Public Input 05/19/22 Hazards ID	LPT-LEPC Meeting 08/22/22 (in person)	County PC Meeting 12/8/22 (in person and via Zoom)	LPT/LEPC Meeting 12/16/22 (in person and via Zoom)	LPT/LEPC Meeting 02/21/23 (in person and via Zoom)	Manistee MTA meeting 3/22/2023 (in person)	Stronach Twp. Board Meeting 4/12/2023 (in person)	Email - draft plan receipt acknowledgement 6/13/2023	County BOC / Public Hearing 6/20/2023 (in person & via Zoom)	Email - draft plan comments 6/26/2023	Email - NFIP enforcement info. 6/28/2023	LEPC/LPT meeting 6/28/2023 (in person)
Norman Twp.	Jack VanderBie	Fire Chief	X																
	Karin Patnode	Clerk											X						
Onekama Twp.	Edward Bradford	Treasurer	X																
Pleasanton Twp.																			
Springdale Twp.	Penny Nelson	Clerk	X										X						
Stronach Twp.	Phil Vadeboncouer	President												X					
	Barbara Rishel	Clerk												X					
	Robert Sell	Treasurer												X					
	Philip Landis	Trustee												X					
	Terry Lindeman	Trustee												X					
Little River Band of Ottawa Indians	Brandy Martin	Tribal Emergency Response Team Coordinator		X	X	X	X	X	X	X	X	X							
	Steve Parsons	Planning Coordinator						X											
	Gary Lewis	Utility Director						X											
	Gary DiPiazza	Tribal Council						X											
	Robert Robles	Sgt., Director of Public Safety						X											
	Robert Medacco	Tribal Public Safety Director					X												
Benzie County	Rebecca Hubers	E.M. Coordinator		X															
Wexford County	Travis Baker	E.M. Coordinator		X															
District Health Dept. #10	Bret Haner	Emergency Preparedness Coordinator	X		X	X													
	Jessica Savage	Director																	
American Red Cross	Megan Powers	Disaster Program Manager	X					X			X								
National Weather Service Forecast Office - Gaylord	Pat Bak	Warning Coordination Meteorologist						X				X							
Michigan State Police - Manistee County	David Skorka	Trooper									X								
Michigan State Police EMHSD	Mike Sobocinski	Hazard Mitigation Planning Analyst		X															
	Travis House	MSP Cadillac Post Commander										X							X
	Lt. Michael deCastro	Region 7 District Coordinator	X				X	X											
Northwest Michigan Invasive Species Network	Audrey Menninga	ISN Coordinator															X		
USFS Manistee National Forest	Benjamin Wagner	Deputy Fire Staff Officer													X				
Manistee Area Chamber of Commerce	Mark Miller	Director of Economic Development								X									
Manistee County Medical Control Authority	Joel Robinson, D.O.	Medical Director	X																
Munson Healthcare Manistee Hospital and Paul Oliver Memorial Hospital	Fred Craigin	Manager - Safety, Security and Emergency Mgmt.	X				X		X										
Mobile Medical Response	Jason Sopha						X												
CMS Energy (TES Filer City Station)	Andy Bradford	Maintenance Supervisor	X			X		X											
	Todd Guenthardt	Maintenance Superintendent																	
Interstate Asphalt Corp.	Samantha VanAelst	Compliance Specialist & Assistant Operations Manager						X											

APPENDIX H: MEETING AND PUBLIC INPUT DOCUMENTATION

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE

June 30th, 2021 Meeting Minutes

I. Call to order

Deputy Director Mike Machen/EMC called the meeting to order at 1100 hours on 6-30-2021 via zoom.

II. Roll Call

The following persons were present: MCEM Mike Machen, Manistee 911 Director Jim Espvik, Undersheriff Jason Torrey, District #10 Health Department Representatives Bret Haner and Jenifer Savage, Manistee Medical Care Representatives Joe Coleman and Joe Jones, PCA Representative Angela Wong, Manistee County Commissioner Chair Jeff Dontz, Manistee City Police Chief Josh Glass, LRBOI Director of Public Safety Robert Medacco and Filer TES Representative Todd Guenthardt.

III. Approval of Agenda

Motion by Bret Haner for approval of the agenda. Supported by Joe Coleman. All in favor – no nays.

IV. Approval of Last meeting minutes

No minutes to approve.

V. **Treasures Report**- $982.56 balance.

VI. Old Business

M-55 Bridge construction is still ongoing. Construction is still expected to be completed in November of 2021.

VII. New Business

Maritime Security Training- Mike Machen requests information on when that training needs to take place, and what organizations are involved with that. Todd Guenthardt of Filer TES are involved. Angela Wang of PCA unsure if they still use the dock.

VIII. Adjournment

Motion by Undersheriff Jason Torrey to adjourn, Joe Coleman supported. All in favor- no nays. Meeting adjourned at 11:08.

Minutes submitted by: Deputy Director/EMC Mike Machen

Hazard Mitigation Plan Update Kick Off Meeting

July 1, 2021, 9:30 a.m.

Networks Northwest
600 East Front Street, Suite 205
Traverse City, MI 49686
Conference Room #2

Agenda

I. Welcome

II. Introductions

III. Roles and Responsibilities
   a. Federal Emergency Management Agency
   b. Michigan State Police
   c. Networks Northwest
   d. County and Tribal Staff
   e. Local Government Staff
   f. Local Stakeholders
   g. General Public

IV. Communication

V. The Process
   a. Phase I – Obtain Public Input
   b. Phase II – Complete Hazard Analysis
   c. Phase III – Create Action Plan
   d. Phases IV – Update Plans and Maps
   e. Phase V – Facilitate Local Adoptions

VI. Project Timeline
   a. Period of Performance Expires: December 16, 2023

VII. Next Steps

Hazard Mitigation Plan Update Kick Off Meeting

July 1, 2021, 9:30 a.m.

Networks Northwest
600 East Front Street, Suite 205
Traverse City, MI 49686
Conference Room #2

I. In-person meeting location information

The Networks Northwest main office has an attached parking garage with entrances from Front Street and Railroad Avenue. Enter the building on the second floor and access Conference Room #2 through the door on the right. The conference room is down the hall on the left, past the bathrooms.

II. Remote meeting attendance

Community Planning is inviting you to a scheduled Zoom meeting.

Topic: Hazard Mitigation Kick Off
Time: Jul 1, 2021 09:30 AM Eastern Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/2319295012

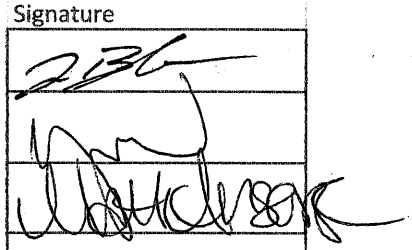
Meeting ID: 231 929 5012
One tap mobile
+16468769923,,2319295012# US (New York)
+13017158592,,2319295012# US (Washington DC)

Dial by your location
+1 646 876 9923 US (New York)
+1 301 715 8592 US (Washington DC)
+1 312 626 6799 US (Chicago)
+1 669 900 6833 US (San Jose)
+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
Meeting ID: 231 929 5012
Find your local number: https://us02web.zoom.us/u/kbKc4W10Ib

Date: Meeting Title:

	Name	Title/ Organization	Email	Phone #	Salary Fed Funded	Miles to Mtg	Miles from Mtg
1	Travis Baker	EM Director Wexford County	tbaker@wexfordcounty.org	231-306-2130	Yes	37 47	37 47
2	Brandy Martin	Incident Commander Little River Band	brandymartin@lrboi-nsn.gov	231-398-6818	no	60	60
3	Matt Anserge	EM/911 Leelanau	manserge@leelanau.gov	231 256-8715	Yes	25	25
4	Zach Vega	comm. planner NWNW	zach.vega@networknorthwest.org	231.			
5	Rob Carson	Networks Northwest	rob.carson@networknorthwest.org	2	Yes.	45	45
6	Frank Post		Frank.Post@live.com	231-383-0558		64	64
7							
8							
9							
10							
11							
12							
13							
14							
15							

Signature



09:34:30 From Mike Sobocinski to Community Planning(Direct Message) : Mike Sobocinski, MSP/EMHSD - Position is federally funded and therefore not eligible for matching federal planning grant.
09:34:51 From Rebecca Hubers to Everyone : Rebecca Hubers - Benzie County Emergency Management / rhubers@benzieco.net / 231-882-0567
09:36:01 From PLANNING EMD to Everyone : Linda Hartshorne-Shafer, Missaukee County Planning/Emergency Management Director, planningemd@missaukee.org, 231-839-7264 Ext 3
09:36:08 From Manistee County to Community Planning(Direct Message) : Michael Machen/Deputy 911 Director/Emergency Manager/ $59,000 mmachen@manistee911.org/231-723-9970/ Yes Federally Funded
09:37:43 From Mike Thompson to Everyone : Mike Thompson, Kalkaska County Emergency Management Coordinator, mthompson@kalso.org, 231.258.3319 ext. 2229
09:37:49 From Garrett Fairchild GTB Fire Dept to Everyone : Garrett Fairchild / GTB Fire Chief / garrett.fairchild@gtbindians.com / 231-534-7161
09:40:07 From Mike Sobocinski to Community Planning(Direct Message) : Is this introduction separate from my agenda item?
09:40:40 From JAMurphy to Everyone : Jolanda Murphy, Grand Traverse Band Emergency Manager, Jolanda.murphy@gtbindians.com, 231-534-7111
09:42:22 From Becky Oien to Everyone : Rebecca Oien, Grand Traverse Band, Tribal Manager, becky.oien@gtbindians.com 231-534-7136
09:44:12 From Rebecca Hubers to Everyone : my mic must not be working
10:01:22 From Manistee County to Community Planning(Direct Message) : Lisa Sagala, Manistee County Administrator $84,,200 231-398-3501, lsagala@manisteecountymi.gov
10:02:49 From Manistee County to Community Planning(Direct Message) : Mike Szokola, Manistee County Planner, $68,500 mszokola@manisteecountymi.gov, 231-398-3527
10:10:24 From Mike Sobocinski to Everyone : FEMA Map Service Center (access to NFIP flood map information): https://msc.fema.gov/portal/home
10:11:46 From Mike Sobocinski to Everyone : FEMA has an impressive new mapping resource called the National Risk Index, providing information by county or even census tract. Risks from natural hazards, social vulnerability, etc. https://www.fema.gov/flood-maps/products-tools/national-risk-index
10:14:31 From Mike Sobocinski to Everyone : The Michigan Hazard Analysis (2019) provides an overview of natural hazards throughout Michigan. You can search the document for your county's name to find local information more quickly (Ctrl F search function)
https://www.michigan.gov/documents/msp/MHA_2019__full_update_natural_hazards_653708_7.pdf
10:38:03 From Rebecca Hubers to Everyone : I'm sorry I have to walk away now to attend another meeting - thank you

MANISTEE COUNTY LOCAL PLANNING TEAM

September 29th, 2021 Meeting Minutes

I. Call to order

Deputy Director Mike Machen/EMC called the meeting to order at 1130 hours on 9-29-2021 via zoom.

II. Roll Call

The following persons were present: MCEM Mike Machen, Undersheriff Jason Torrey, District #10 Health Department Representative Bret Haner, Manistee Medical Care Representatives Joe Coleman and Joe Jones, Manistee City Police Chief Josh Glass, and LRBOI Representative Brandy Martin.

III. Approval of Agenda

Motion by Mr. Coleman for approval of the agenda. Supported by Mr. Haner. All in favor – no nays.

IV. Approval of Last meeting minutes

Motion by Mr. Coleman for approval of the minutes. Supported by Ms. Martin. All in favor – no nays.

V. Old Business

COVID 19- C.

M-55 Bridge construction is still ongoing. Construction is still expected to be completed in November of 2021.

VI. New Business

Hazard Mitigation Introduction- All members present were present at the LEPC Meeting where Mr. Post discussed the Hazard Mitigation plan. Discussion was not duplicated.

VII. Adjournment

Motion by Joe Coleman to adjourn, Bret Haner supported. All in favor- no nays. Meeting adjourned at 11:46.

Minutes submitted by: Deputy Director/EMC Mike Machen

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE

DATE: 9/29/21

TIME: 1100 HRS.

LOCATION: Zoom meeting

CHAIRMAN: Deputy Director Mike Machen/EMC

MEETING AGENDA:

- MEETING CALLED TO ORDER _____AM/PM
- ATTENDEES SIGNED/CHECKED IN
- APPROVAL OF AGENDA _____/_____
- APPROVAL OF LAST MEETING MINUTES _____/_____
- TREASURER'S REPORT -- $982.56
- ROUND TABLE

OLD BUSINESS

- M-55 bridge construction

NEW BUSINESS

- Hazard Mitigation Plan
- Future meeting topics
- Questions/concerns

NEXT MEETING:

11/24/21 – 11:00 am, location TBD

MEETING ADJOURNED: _____/_____

TIME: _____

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE

September 29th, 2021 Meeting Minutes

I. Call to order

Deputy Director Mike Machen/EMC called the meeting to order at 1100 hours on 9-29-2021 via zoom.

II. Roll Call

The following persons were present: MCEM Mike Machen, Undersheriff Jason Torrey, District #10 Health Department Representative Bret Haner, Manistee Medical Care Representatives Joe Coleman and Joe Jones, Manistee City Police Chief Josh Glass, LRBOI Representative Brandy Martin, Filer TES Representative Andy Bradford, National Weather Service Representative Pat Bak, Red Cross Representative Meghan Powers, and Networks Northwest Representative Frank Post.

III. Approval of Agenda

Motion by Mr. Coleman for approval of the agenda. Supported by Mr. Haner. All in favor – no nays.

IV. Approval of Last meeting minutes

Motion by Mr. Coleman for approval of the minutes. Supported by Ms. Martin. All in favor – no nays.

V. **Treasures Report**- $982.56 balance.

VI. Old Business

M-55 Bridge construction is still ongoing. Construction is still expected to be completed in November of 2021.

VII. New Business

Mr. Post discussed with the group the Manistee County Hazard Mitigation Plan renewal and the process involved moving forward.

VIII. Adjournment

Motion by Mr. Coleman to adjourn, Undersheriff Jason supported. All in favor- no nays. Meeting adjourned at 11:20.

Minutes submitted by: Deputy Director/EMC Mike Machen

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE

& LOCAL PLANNING TEAM

December 20th, 2021 Meeting Minutes

I. Call to order

Deputy Director Mike Machen/EMC called the meeting to order at 1100 hours on 12-20-2021 via zoom.

II. Roll Call

The following persons were present: MCEM Mike Machen, Undersheriff Jason Torrey, District #10 Health Department Representative Bret Haner, Manistee Medical Care Representatives Joe Coleman and Joe Jones, Manistee City Police Chief Josh Glass, LRBOI Representative Brandy Martin, Manistee County Commissioner Chair Jeff Dontz, Filer TES Representative Andy Bradford, Reith Riley Representative Samantha Van Aelst, Michigan State Police Post Commander Lt. House, Region 7 Coordinator Lt. DeCastro, and Networks Northwest Representatives Stephanie Loria and Jennifer Neal.

III. New Buisness

Networks Northwest Presentation on Manistee County Hazard Mitigation Plan.

IV. Adjournment

Mr. Machen Adjourned the meeting at 12:00pm.

Minutes submitted by: Deputy Director/EMC Mike Machen

MANISTEE COUNTY LOCAL PLANNING TEAM

DATE: 12/20/21

TIME: 1100 HRS.

LOCATION: Zoom meeting

CHAIRMAN: Deputy Director Mike Machen/EMC

MEETING AGENDA:

- MEETING CALLED TO ORDER _____AM/PM
- ATTENDEES SIGNED IN
- APPROVAL OF AGENDA _____/_____

OLD BUSINESS

NEW BUSINESS

- Hazard Mitigation Plan

NEXT MEETING:

TBD

MEETING ADJOURNED: _____/_____

TIME: _____

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE

DATE: 12/20/21

TIME: 1100 HRS.

LOCATION: Zoom meeting

CHAIRMAN: Deputy Director Mike Machen/EMC

MEETING AGENDA:

- MEETING CALLED TO ORDER _____AM/PM
- ATTENDEES SIGNED/CHECKED IN

OLD BUSINESS

NEW BUSINESS

- Hazard Mitigation Plan

NEXT MEETING:

TBD

MEETING ADJOURNED: _____/_____

TIME: _____

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE/Local Planning Team Agenda

DATE: ~~**3/17/21**~~ 3/17/22

TIME: 1100 HRS.

LOCATION: Zoom meeting

CHAIRMAN: Deputy Director Mike Machen/EMC

MEETING AGENDA:

- MEETING CALLED TO ORDER _____AM/PM
- ATTENDEES SIGNED/CHECKED IN

OLD BUSINESS

NEW BUSINESS

- Hazard Mitigation Plan

NEXT MEETING:

TBD

MEETING ADJOURNED: _____/_____

TIME: _____

LEPC/LPT Meeting

External HazMitigation/Manistee

Mike Machen <mmachen@manistee911.org> May 3, 2022, 1:25 PM
to angelawang@packagingcorp.com, Breanna, Bret, Sheriff, cbrandt@packagingcorp.com, Frank, Fred, hdarling@manisteemi.gov

May
19
Thu

Manistee & LRB LEPC/LPT Meeting

View on Google Calendar

When Thu May 19, 2022 11am – 12pm (EDT)
Where https://us02web.zoom.us/j/86099490485
Who Michael Decastro, houset@michigan.gov, jadams@interstateasphalt.com, jcoleman, Jeff Dontz...

Yes Maybe No

More options

Agenda

Thu May 19, 2022

No earlier events

11am Manistee & LRB LEPC/LPT Meeting

No later events

This meeting will focus on our Hazard Mitigation Plan in the areas of Hazard Identification and Mapping.

Mike Machen is inviting you to a scheduled Zoom meeting.

Join Zoom Meeting
https://us02web.zoom.us/j/86099490485

Meeting ID: 860 9949 0485
One tap mobile
+13126266799,,86099490485# US (Chicago)
+19292056099,,86099490485# US (New York)

Dial by your location
- +1 312 626 6799 US (Chicago)
- +1 929 205 6099 US (New York)
- +1 301 715 8592 US (Washington DC)
- +1 346 248 7799 US (Houston)
- +1 669 900 6833 US (San Jose)
- +1 253 215 8782 US (Tacoma)

Meeting ID: 860 9949 0485
Find your local number: https://us02web.zoom.us/u/kcDWfnHB0Q

5/19/22 ZOOM Joint Meeting with Manistee County LEPC/LPT and LRBOI Tribe

Participants:

- Mike Machen, Manistee County EM /911-Director
- Jeff Dontz, Manistee County Board of Commissioners
- Joe Coleman, Administrator for Manistee County Medical Care Facility
- Pat Bak, National Weather Service – Gaylord, Warning Coordination Meteorologist
- Andy Bradford, TES Filer City Station Maintenance Supervisor
- Samantha VanAelst, Reith-Riley, Interstate Asphalt
- Megan Powers, American Red Cross
- Lt. Michael deCastro, Michigan State Police
- Brad Lasko, Manistee County Road Commission Maintenance Supervisor
- Brandy Martin, LRBOI Tribal Emergency Response Team
- Robert Robles, LRBOI Tribal Police
- Gary Lewis, LRBOI Utility Department
- Steve Parsons, LRBOI Planning Coordinator
- Gary Paul DiPiazza, LRBOI Tribal Councilor

Presenters:

- Jennifer Neal, AICP, Networks Northwest Community Planner
- Stephanie Loria, Networks Northwest Community Planner

Participants were asked to indicate their top natural hazard concerns in the chat box:

Top Natural Hazard Event	# of Responses
Winter Storms	4
Dam Failure	3
Excessive Rainfall/Flooding	2
Severe Thunderstorms	2
Coastal Erosion	1
Invasive Species/Wildlife Diseases	1

Severe Thunderstorm/Wind Storm Group Discussion

- Steve Parsons, LRBOI: Severe thunderstorms appear quickly and people are unaware of what is coming. They usually results in no severe damage or injury to people; mostly result in downed trees; damaged homes, yards and buildings. They need a better system to warn people other than relying on TV/Radio announcements. There is the potential for people to become severely injured and they need a better way to forewarn people of severe storms. Also, once the storm comes through, their tribal community needs a better mechanism to access resources for recovery and cleanup. They have the sense that there is no “fallback” mechanism to rely on for this.
- Brandy Martin, LRBOI: the LRBOI sends severe weather notifications out only to their employees, but not to tribal members because they are so geographically spread out. So tribal members have to rely on news sources for weather alerts.
- Gary Lewis, LRBOI: his concern from the utility management side is power outages from thunderstorms. They have some backup generators at certain utility locations. But they have had to deal with lightning strikes on some of their utility system’s electrical components; have had repair and put surge protectors on certain ones.

Severe Winter Weather Group Discussion

- Joe Coleman, Manistee Medical Care Facility: anything like a once-in-a-decade major winter storm would affect the ability of staff to drive to their jobs at the facility. Results in staffing issues if roads are not cleared.
- Brandy Martin, LRBOI: They have a heat/cooling center available for residents downhill from the Aqi housing complex, but they would need protocols/facilities/equipment to also deal with power outages for residents.
- Jeff Dontz – power outages often occur in areas where the lines are aging and/or tree trimming along the lines has been neglected. There are several areas in Manistee Twp. like this.
- The definition of winter storm events seems to have changed over the years. For example, the blizzards of the late 1970's/early 1980's seem to be a rarity nowadays. It appears that the media, particularly social media, report most weather events as severe even if they are not. Social media has diluted the definitions provided by the NWS. But, perhaps this is a result of the news media wanting to make sure people are well prepared for any scenario.
- Megan Powers – the American Red Cross (ARC) receives residential calls for assistance in severe weather events. They do provide assistance for anyone who needs power to run medical devices in their home. She has noticed that many people are buying perishable goods instead of canned goods in grocery stores, and when the power goes out, they lose most of their food supply. The ARC does provide informational brochures, etc. on how to prepare emergency kits with the appropriate supplies. However, during an ice storm, they cannot respond/travel to help people until the roads are cleared.
- Pat Bak – The NWS has specific criteria for defining each type of severe weather event. For example, a blizzard is defined by winds over 35 mph, and blowing and drifting snow lasting for at least 3 hours. A blizzard is not the same as a heavy snowstorm. The NWS emails out to county/local agencies, EMS/1st responders, etc. alerts for severe weather. Also, even though it is considered a low tech option, the NOAA Weather Radios can be quite effective as a warning system. They are loud and can wake people up at night with a warning.

Extreme Heat and Drought – no discussion

Vulnerable Populations Group Discussion

- Some local residential renters have to move out of rental homes in the summer, due to the demand for short-term rental properties in the summer. Those year-round renters are often living out of campers, on campsites, etc. during that time and therefore are more exposed to severe weather events.
- Those living, vacationing or recreating in the wilderness areas often have no nearby emergency services in a severe weather event.

Invasive Species Group Discussion

- Gary Paul DiPiazza, LRBOI – he serves on the tribe's Natural Resource Commission. They have concerns about diseases with the deer population, zebra/quagga mussels, round gobi, Asian carp (when they arrive) and the Autumn olive shrub (they have tried pulling some of it). Their tribe values hunting & gathering activities and many invasive species would negatively impact this.

Pandemic Group Discussion

- The County's 911 Center received fewer calls during the pandemic and their workload actually went down because of this. People did not want to go to the hospital due to fears of COVID exposure. The calls they did get were often of true emergency situations where someone was very sick or injured and needed immediate medical care.
- The 911 Dispatch crew had to change the questions they asked when taking a call in order to obtain and relay information about COVID symptoms/exposure before lending in the first responder team.
- The EMS staff was down due to COVID exposures, quarantine timing guidelines and less interest in the workforce for this sector.
- It was difficult/frustrating to relay the constantly changing COVID procedures and guidelines provided by the State of Michigan. The guidelines seemed to be more politically driven than science-based. Also, the procedures did not account for the different types of impact on rural areas vs. urban areas.
- Some of the rules/guidelines seemed to be extreme and not based on scientific evidence. For example, having to fire health care workers who did not get vaccinated. Then they found out that workers who did get vaccinated still got COVID and could spread it. The effects on fewer staff available in the health industry and just about every other industry have not lessened and we are still not at recovered employment levels.
- The overall message of what to do to be safe (quarantine guidelines) could have been changed based on new scientific evidence.
- Vaccination clinics provided by the local Health Department were very efficient and went well. They efficiently completed vaccinations for the County Medical Care Facility after their original arrangement for vaccinations with commercial pharmacies fell through.

Mapping Exercise/Discussion: Coastal Hazards, Inland Flooding, and Wildfire

Coastal Hazards

- In 2019, before the pandemic, coastal erosion/flooding issues was the primary concern in Manistee County. On a positive note, EGLE has streamlined the process for shoreline permits in high risk erosion areas.
- FEMA Flood Zone Map changes – an issue to get the flood zone designation changed or removed on a property title when transferring ownership.
- The entire Lake MI coastline has erosion/flooding issues, particularly around Portage Lake/Portage Point/Manistee Lake.
- Sheriff's Dept. took photos of the entire coastline during high lake levels.
- When heavy rainfall events occur, there is often a sewage overflow in the City of Manistee. There is a corrective action being completed now.
- The Manistee River channel experiences a lot of damage to boat docks, launches, and the Riverwalk during high lake levels combined with a seiche event (2018 or 2019?)
- Some people with flood insurance were not covered during coastal erosion events because the event was categorized as erosion, not flooding.

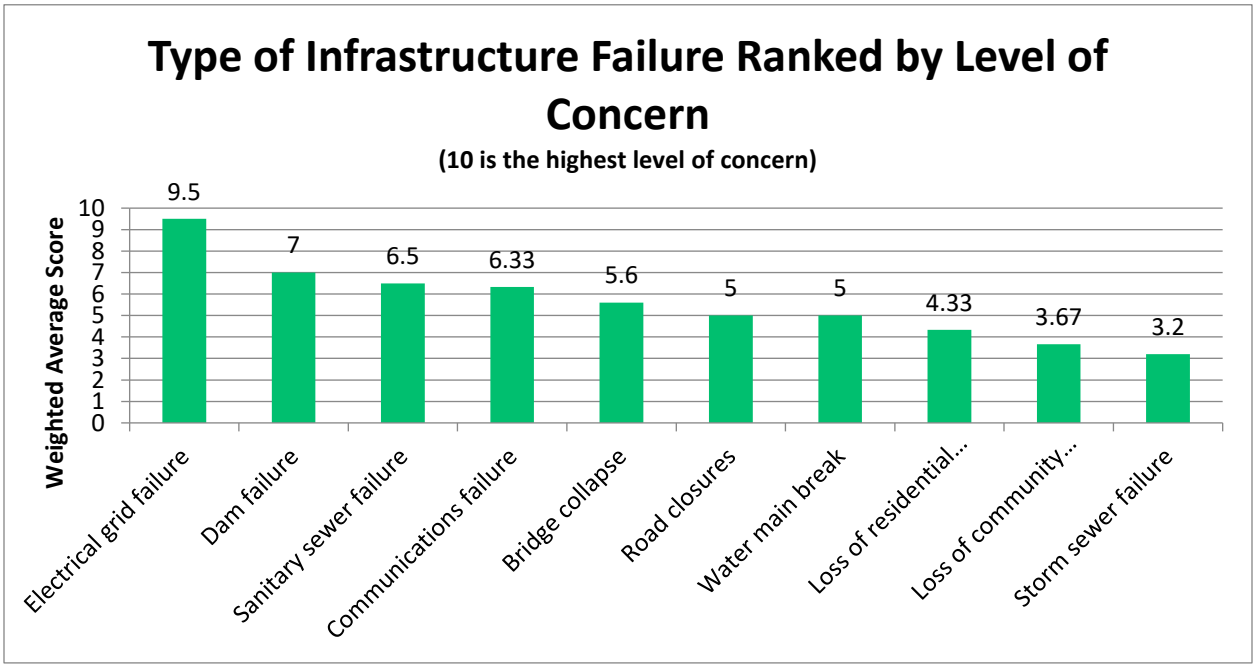
Inland Flooding – no discussion.

Wildfire

- The area in the community of Dublin (100-150 people) in the southeast area of the county (Norman Twp.) experienced a wildfire in 2021 that burned about 1,000 acres. There is a concern with one neighborhood in particular where James Street is the only access in and out. The area is surrounded by forest which tends to be very dry. The Norman Fire Chief held a community meeting in Dublin

sometime in March or April of 2022 to provide information on fire prevention in the neighborhood. They distributed information on CODE RED; will start to do neighborhood cleanups to get rid of brush… The Fire Chief said it was a good turnout.

- This year the USFS has been active in working on fire mitigation plans in the county; Mike Machen has heard from Ben Wagner, Manistee Zone Fire Officer.



Survey respondents (5 out of 6) respondents:

- Manistee County Emergency Mgmt.
- Manistee and Onekama Twp.
- Manistee County
- Manistee Township
- LRBOI

Zoom Meeting Chat Box 05/19/22

11:06:31 From Andy Bradford to Everyone:
Andy Bradford
11:06:39 From Brandy Martin to Everyone: Brandy Martin LRBOI

11:07:02 From Lt. deCadtro to Everyone:
Lt. Michael deCastro. Yes I'm federally funded.
11:07:09 From Gary Lewis to Everyone:
Gary Leiws, LBOI, Utility Dept. not Federally funded
11:07:10 From Andy Bradford to Everyone:
Andy Bradford TES Filer City Station Maintenance Supervisor, not Federally funded
11:07:12 From Manistee County Road Commission - Brad Lakso to Everyone:
brad
11:07:13 From Gary Paul DiPiazza to Everyone:
Gary Paul DiPiazza LRBOI Tribal Councilor
11:07:15 From Joe Coleman to Everyone:
Joe Coleman, Administrator, Manistee County Medical Care Facility My position is not federally funded.
11:07:16 From Robert Robles to Everyone:
Sgt Robert Robles LRBOI Public Safety
11:07:18 From Jeffrey Dontz to Everyone:
Jeffrey Dontz
Not Federally funded
Manistee County Board of Commissioner's
11:07:29 From Pat Bak - NWS Gaylord to Everyone:
Pat Bak, Warning Coordination Meteorologist, National Weather Service, Gaylord. Federal employee
11:07:40 From Steve Parsons to Everyone:
Steve Parsons, Planning Coordinator, Little River Band of Ottawa Indians. My position is funded by tribal revenues and is not federally funded.
11:08:22 From Andy Bradford to Everyone:
Excessive Rainfall / flooding
11:08:25 From Brandy Martin to Everyone:
winter weather
11:08:27 From Mike Machen to Everyone:
Dam Failure
11:08:35 From Joe Coleman to Everyone:
Winter storm (staffing)
11:08:40 From Jeffrey Dontz to Everyone:
Coastal Erosion
11:08:50 From Manistee County Road Commission - Brad Lakso to Everyone:
Brad Lakso, Manistee County Road Commission
11:08:55 From Steve Parsons to Everyone:
Steve Parsons:: Severe Thunderstorms and Winter storms.
11:08:59 From Robert Robles to Everyone:
Dam failure
11:09:18 From Gary Lewis to Everyone:
Storm Damages, Dam Failure, Energy Resiliency
11:10:56 From Manistee County Road Commission - Brad Lakso to Everyone:
Winter weather, flooding affecting structures - roads and bridges
11:11:03 From Gary Paul DiPiazza to Everyone:
Invasive Species, Wildlife Diseases
11:36:33 From Samantha VanAelst to Everyone:
Samantha VanAelst Rieth-Riley, Interstate Asphalt
11:39:49 From Joe Coleman to Everyone:
It seems every storm has a name now.
11:42:04 From Pat Bak - NWS Gaylord to Everyone:
pat.bak@noaa.gov
11:43:57 From Pat Bak - NWS Gaylord to Everyone:
The National Weather Service does not name winter storms. That is the Weather Channel doing that and others have picked up on it. Tropical Storms/Hurricanes are named when a tropical weather system reaches a specified strength.
12:29:34 From Meghan Powers to Everyone: Meghan powers Red Cross
12:30:29 From Stephanie Loria_Networks NW to Everyone: https://www.surveymonkey.com/r/MVKQ38M

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE/LOCAL PLANNING TEAM AGENDA

DATE: 8/22/22

TIME: 1000 HRS.

LOCATION: Manistee County Sheriff's Office EOC

CHAIRMAN: Deputy Director Mike Machen/EMC

MEETING AGENDA:

- MEETING CALLED TO ORDER 10:00 (AM)/PM
- ATTENDEES SIGNED/CHECKED IN

OLD BUSINESS

Hazard Mitigation Plan

NEW BUSINESS

NEXT MEETING:

TBD

MEETING ADJOURNED: Mike Machen

TIME: 11:40

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE

& LOCAL PLANNING TEAM

August 22nd, 2022 Meeting Minutes

I. **Call to order**

Deputy Director Mike Machen/EMC called the meeting to order at 1000 hours on 8/22/2022 in the Manistee County EOC.

II. **Roll Call**

The following persons were present: MCEM Mike Machen, Undersheriff Jason Torrey, LRBOI Representative Brandy Martin, Manistee County Commissioner Chair Jeff Dontz, Munson Hospital Representative Fred Craigin and Networks Northwest Representatives Stephanie Loria and Jennifer Neal.

III. **New Buisness**

Networks Northwest Presentation on Manistee County Hazard Mitigation Plan. The Presentation reviewed the draft plan and all the information that had been gathered.

IV. **Adjournment**

Mr. Machen Adjourned the meeting at 11:40pm.

Minutes submitted by: Deputy Director/EMC Mike Machen

Manistee County LEPC/LPT

Date: 8/22/2022

Sign-in Sheet

	NAME (Please Print)	Organization
1.	Jennifer Neal	Networks Northwest
2.	Stephanie Loria	Networks NW
3.	FRED CRAIGIN	MUNSON HEALTH Care
4.	mike Mackey	Manistee 911/Em
5.	Brandy Martin	ICBOZ
6.	Jason Torry	Manistee County Undersheriff
7.	Jeff Dontz	Manistee County
8.		
9.		
10.		
11.		
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15.		
16.		
17.		
18.		
19.		
20.		

PLEASE PRINT CLEARLY

MEMO

To: Manistee County Planning Commission

From: Jennifer Neal, AICP, Community Planner
Stephanie Marchbanks, Community Planner

Date: December 8, 2022

Re: Manistee County Natural Hazard Mitigation Plan

Background

Manistee County with assistance from Networks Northwest is updating their 2015 Hazard Mitigation Plan. The County's Hazard Mitigation Plan must be approved by Federal Emergency Management Agency (FEMA) and adopted by the County and local jurisdictions every five years in order to be eligible for pre-disaster mitigation project grants awarded by FEMA. Mike Machen, 911 Director/Emergency Management Coordinator is leading this process with the coordination of the Local Emergency Planning Committee and the Local Planning Team (LEPC/LPT). Meetings with the LEPC/LPT have occurred regularly over the last year, and local officials, stakeholders, and residents were encouraged to participate. Steps in the planning process have included:

- Community survey distributed in December 2021
- Community profile and demographic analysis
- Historic hazards analysis and identification
- Joint meeting with Little River Band of Ottawa Indians and Manistee County
- Initial strategies discussion

Meeting Purpose

As we near the end of the planning process, we look to a broader audience to review the draft plan (included) and make comments on the strategies listed in the table (also included). We will give a brief overview of the plan and provide an opportunity for comment, but primarily, we look to have a discussion regarding the strategies table. Mitigation strategies must be:

- The measure must be technically feasible.
- The measure must be financially feasible.
- The measure must be environmentally sound and not cause any permanent, significant environmental concerns.
- The measure must be acceptable to those participating in the strategy and/or primarily impacted by the strategy.

In response to hazards that impact "countywide," many strategies also impact all Manistee County jurisdictions and thus can be carried out by Manistee County officials or departments or partner organizations such as District Health Department #10. However, some hazards may impact local communities more than others. For example, coastal hazards impact communities located along the Lake Michigan coastline. Therefore, it is essential under the fourth bullet point, that local communities provide input and ultimately support the strategies that impact their community. During FEMA's review, prior to approval, they will consider what local input as has been received and what are the identified strategies. We look to the Planning Commission to provide comment both from the perspective of Manistee County as a whole in regards to ongoing planning and coordination efforts, as well as your perspective as members of local communities.

Manistee County
Planning Department

PLANNING DEPARTMENT
(231) 723-6041
Fax (231) 398-3526
planning@manisteecountymi.gov

Manistee County Planning Building • 395 Third Street • Manistee, Michigan 49660

DRAFT
Thursday, December 8, 2022
Immediately following the
Brownfield Redevelopment Authority Meeting

Manistee County Board Room
415 Third Street
Manistee, Michigan

MINUTES

A. Call to Order, Pledge of Allegiance and Roll Call.
The meeting was called to order by Chair Becker-Witt at 6:30 pm.

Members Present: Eleanor DeYoung, Glenn Zaring, Ted Batzer, Phil Landis, Margaret Batzer, and Mary Becker-Witt

Members Absent: Duane Jones

Ex-OFFICIO MEMBERS PRESENT: Mike Szokola Planning Director, Katie Mehl City Zoning /Planner 1, Jodie Lynch Planner 1, and Nancy Baker Planning Secretary/Assistant to Planner

OTHERS PRESENT: Jennifer Neal and Stephanie Marchbanks NWNW Planners, Brandy Martin Tribal Government, Mike Machen 911 Director, Alvin Rishel new Emergency Management Coordinator, and Marc Miller Manistee Chamber

B. Approval of the Agenda
Mr. Szokola wished to amend the agenda adding under F. Unfinished Business, 4. Other Business, a. Manistee Township Map Amendment.
Mr. Zaring moved, seconded by Mr. Landis to approve the December 8, 2022, agenda as amended. Motion passed with a voice vote.

C. Public Comment.
None

D. House Keeping Business
Act to approve the September 22, 2022 Minutes.
Mr. Zaring moved, seconded by Mr. Batzer to approve the September 22, 2022, minutes as printed. Motion passed with a voice vote.

E. New Business & Communications
1. Networks Northwest
Jennifer Neal and Stephanie Marchbanks, Community Planners:
County Natural Hazard Mitigation Plan
- Requires update every 5 years per Federal Emergency Agency

- Becoming eligible for FEMA grants
- Potential Projects
  - Planning & Enforcement
  - Flood Protection
  - Retrofitting
  - Construction
- Future strategies and timeline
  - Planning grant application, project initiation, hazard identification, hazard mitigation strategies, draft plan review, plan adoption, BRIC project application
  - Community nature of events; types of events, impact on community, infrastructure withstanding events, identifying potential strategies for the near future
- County-wide risks and hazard mapping for site-specific risks
- County Hazard Mitigation Goals
  - Local planning & regulations
  - Building & infrastructure projects
  - Natural systems protection
  - Education & awareness efforts
  - Improve utility & technology capability
    - Solar power
    - Add projects; city flooding areas and treatment plant, riverwalk, review and educate on coastal management practices
- Each township needs to join the plan to assist their community
- Help from FEMA only comes if included in the plan

2. 2023 PC Meeting Schedule

Change the following dates for the 2023 PC meeting schedule: remove November 23rd and December 28th dates and add December 14th date.

The Planning Commission agreed to the 2023 Meeting Schedule with the changes.

F. Unfinished Business and Reports

1. Planning Department Update

Mr. Szokola:

- Department is under budget
- Increase of Soil Erosion fees
- Amending contract with Manistee Conservation District for AIS; extra money available to them, closing out past grants 2013-2022, USFS supports grant under Conservation District
- Staff completed Citizen Planner training
- Mike & Katie attending Zoning Administrator Certificate Training in Feb 2023
- Soil Erosion and Code Enforcement contract to go before County Board Dec 20th
- Reaching out to Community Foundation regarding student government position
- Looking to fill Rec Commission position
- Possible contract with Brown Township
- Contract with Copemish Village dropped

- Cleon Township attempting to get community to agree to dissolving Copemish Village; hoping to contract with department as a township
- RR relocation grant work
- Engineering grant for county
- Thompsonville to Kaleva trail; thanked NWNW for providing engineering data
- 10.5-mile stretch, $5 million to accomplish, applied for match grant up to $1 million
- DNR with SMARTrails Friends Group responsible for trail maintenance
- Addressing blight in Onekama Village
- Leadership Team- installing lifeguard vest stations
- ORV map updating-not taking on GIS project without reimbursement

2. Ms. Lynch:
   - Arcadia Township-Enforcing on short-term rentals and attended meeting on the subject
   - Reviewing land use permits in Bear Lake and Arcadia Townships
   - Close out reviews
   - Completed Filer Township map update for their review
   - 3 Onekama Township ZBA hearings
   - Completed Citizen Planner training
   - Created new RR design map for 3 different proposals
   - Addressing blight complaints in townships and villages

   Ms. Mehl:
   - City dumpster and sign enforcements
   - Several city zoning amendments
   - Attended October MAP conference with Mike
   - Onekama Village map and fence amendments
   - Conducted map training with Mike
   - 3 costs for Master Plan came in between $50-80,000; NWNW cost is much lower

3. Meetings and Trainings Attended by Planning Commission Members

   Mr. Batzer: prison meeting with no additional information.
   Ms. Batzer: County Board-voted for a letter in opposition of removal of Hodenpyl Dam, discussed Rec Planner position.
   Mr. Landis: Green Team meeting with no additional information.
   Mr. Zaring: Technology meeting --complimented Gordon McLellan on a great job of handling county technology.
   Ms. DeYoung: Rec Comm meeting. Concerns regarding bat population at Tippy Dam. The area is a bat sanctuary and therefore protected.
   Ms. DeYoung, Ms. Becker-Witt, Mr. Zaring attended Regional Summit: housing issues, mental health bed nonavailability-none are close to our area.

4. Other business from Planning Commission members or its staff
   a. Manistee Township Map Amendment
   Mr. Szokola: township requested map amendment, attempting to redevelop Kennedy School.

Ms. Lynch: reviewed memo points- request for zoning change, relations to public plans, planning analysis.

Mr. Szokola: supported by Master Plan, centrally located within township, supported by future land use map.

Mr. Landis moved, seconded by Mr. Zaring to recommend the Manistee County Planning Commission support for Manistee Township to approve the rezone proposal as presented in the memo. Motion passed with a voice vote.

G. Adjourn

Meeting was adjourned by call of the Chair at 7:49 pm.

Respectfully submitted,

Nancy Baker

Nancy Baker, Recording Secretary, for
Eleanor DeYoung, Secretary, Manistee County Planning Commission
Date: December 8, 2022

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE/LOCAL PLANNING TEAM AGENDA

DATE: 12/16/22

TIME: 1100 HRS.

LOCATION: Manistee County Sheriff's Office EOC

CHAIRMAN: Director Mike Machen/EMC

MEETING AGENDA:

- MEETING CALLED TO ORDER 11am AM/PM
- ATTENDEES SIGNED/CHECKED IN
- New Emergency Management Coordinator

OLD BUSINESS

Hazard Mitigation Plan

Stephanie Seasonal Pop Study NW Lower Michigan

NEW BUSINESS Manistee Hazard Mitigation Goals

NEXT MEETING:

TBD Feb 2/15 10am

MEETING ADJOURNED: Joe, Greg

TIME: 1131

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE

September 29th, 2021 Meeting Minutes

I. Call to order

Deputy Director Mike Machen/EMC called the meeting to order at 1100 hours on 9-29-2021 via zoom.

II. Roll Call

The following persons were present: MCEM Mike Machen, Undersheriff Jason Torrey, District #10 Health Department Representative Bret Haner, Manistee Medical Care Representatives Joe Coleman and Joe Jones, Manistee City Police Chief Josh Glass, LRBOI Representative Brandy Martin, Filer TES Representative Andy Bradford, National Weather Service Representative Pat Bak, Red Cross Representative Meghan Powers, and Networks Northwest Representative Frank Post.

III. Approval of Agenda

Motion by Mr. Coleman for approval of the agenda. Supported by Mr. Haner. All in favor – no nays.

IV. Approval of Last meeting minutes

Motion by Mr. Coleman for approval of the minutes. Supported by Ms. Martin. All in favor – no nays.

V. **Treasures Report**- $982.56 balance.

VI. Old Business

M-55 Bridge construction is still ongoing. Construction is still expected to be completed in November of 2021.

VII. New Business

Mr. Post discussed with the group the Manistee County Hazard Mitigation Plan renewal and the process involved moving forward.

VIII. Adjournment

Motion by Mr. Coleman to adjourn, Undersheriff Jason supported. All in favor- no nays. Meeting adjourned at 11:20.

Minutes submitted by: Deputy Director/EMC Mike Machen

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE/LOCAL PLANNING TEAM AGENDA

DATE: 2/21/23

TIME: 1000 HRS.

LOCATION: Manistee County Sheriff's Office EOC

CHAIRMAN: Deputy Director Alvin Rischel/EMC

MEETING AGENDA:

- MEETING CALLED TO ORDER _____AM/PM
- ATTENDEES SIGNED/CHECKED IN
- New Emergency Management Coordinator

OLD BUSINESS

Hazard Mitigation Plan

NEW BUSINESS

NEXT MEETING:

TBD

MEETING ADJOURNED: _____/_____

TIME: _____

Michigan Townships Association
Manistee County Chapter
Agenda for
March 22, 2023
Maple Grove Township 7:00 PM

Welcome
Pledge to the Flag
Roll Call

Arcadia	**Bear Lake**	**Brown**
Cleon	**Dickson**	**Filer**
Manistee	**Maple Grove**	**Marilla**
Norman	**Onekama**	**Pleasanton**
Springdale	**Stronach**	

Election of Officers for 2023
Approval of minutes from October 26, 2022
Treasurers Report
Guests:

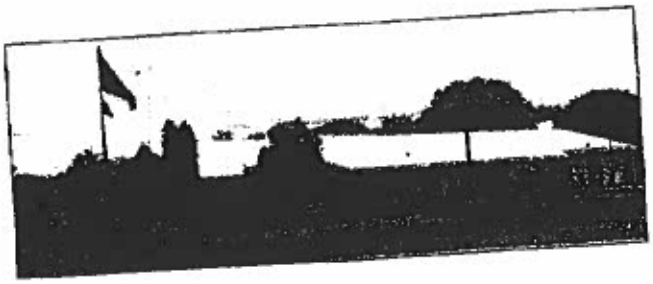
- **County Representative**
- **Brian Gutowski, Manistee County Sheriff**
- **Mike Machen, Manistee County 911 Director**
- **Representative from Manistee Soil Conservation District**
- **Mark Sohlden, Manistee County Road Commission Manager**

Additional Topics:
Unfinished Business
New Business

Bits and Pieces – questions and/or comments from each township present

Next meeting will be at Marilla Township, April 26, 2023.

Public Comment:
Adjournment



TOWNSHIP OF STRONACH
(Manistee County)
2471 Main St RR3
Manistee Michigan,49660

Meeting agenda

Board Meeting April 12, 2023

A) **Meeting Called to Order:** by Mr. Vadeboncoeur. Pledge of Allegiance recited.
(Please Quiet Cell Phones)

B) **Roll Call:** __ Mr. Vadeboncoeur __ Mr. Sell__ Mr. Lindeman __ Mr. Landis__ Ms. Rishel

C) **Motion to approve the agenda**

D) **Review of consent agenda**
1) minutes- March 6th special meeting and March 8th board meeting.2023
2) Treasurers report
3) bills for the month

E) **Correspondences:**
1) Manistee County Road agreement
2) Cornerstone 2023 lawn care service contract
3) MTA local Manistee County 2023 Dues

F) **GUEST SPEAKER:** Mr. Alvin Rischel, Manistee Co. Emergency Coordinator/ 911Deputy Directo

G) **Fire Department Report:**

H) **Public Comment:**

I) **Unfinished Business:**
1) 10 minute review of employee manual pages 5-15

J) **Committee Reports:**

K) **New Business:**
1) **2023** spring projects

L) **Agenda for next meeting:**

M) **Meeting adjourned:**

Respectfully Submitted;
Barbara Rishel, Clerk
Barbara Rishel

TOWNSHIP OF STRONACH
(Manistee County)
2471 Main St RR3
Manistee Michigan,49660

Board Meeting April 12, 2023 DRAFT

Meeting Called to Order: 7pm by Mr. Vadeboncoeur. Pledge of Allegiance recited.

Roll Call; present: Mr. Vadeboncoeur, Mr. Sell, Mr. Lindeman, Mr. Landis, Ms. Rishel. Absent: None

Motion to approve the agenda **Lindeman 2nd Landis** with All in Favor **MC**

Review of consent agenda items: Minutes- special mtg 3-6-23 and 3-8 regular ,2023, Treasurers report, Bills for the month. **Motion** to approve the consent agenda **Lindeman 2nd Landis** with All in Favor **MC**

Correspondences:
1) MCRC agreement for North Kettle hole rd. **Motion** to approve the agreement for N. Kettle Hole rd project with the township match of 21,650.00 with the advance being 5,412.50 and a contingency of 2,165.00 **Sell 2nd Lindeman** with **RC vote:** Sell-yes, Lindeman-yes, Landis-yes, Rishel-yes, Vadeboncoeur-yes. **MC**
2) Lawn care services for 2023 season. Cornerstone contract submitted with no changes from 2022 season. **Motion** to accept the contract from Cornerstone for the 2023 season **Rishel 2nd Lindeman** with **RC vote:** Rishel-yes, Lindeman-yes, Landis-yes, Sell-yes, Vadeboncoeur-yes. **MC**
3) MTA local Manistee County chapter 2023 Dues. **Motion** to approve the 30.00 for the dues. **Lindeman 2nd Landis** with **RC vote:** Lindeman-yes, Landis-yes, Sell-yes, Rishel-yes, Vadeboncoeur-yes. **MC**

Guest Speaker: Mr. Alvin Rischel Manistee County Emergency Coordinator/ 911 Deputy Director. Presented information regarding the Manistee County Natural Hazard Mitigation Plan with discussion on Stronach townships potential interest in the future involvement with the plan. **Action** to put on the agenda for next month.

Fire Department: Report given by Chief Lindeman on possible sites for helicopter landings if needed. discussion on insurance coverage for portable equipment. **Action** Supervisor will check with the agent. B&M to return to complete service.

Public Comment: None.

Unfinished Business:
1) Employee Police manual review of pages 5-15/or10 min limit. Pages covered 5-8
Page 6: **Action: board consensus** #3 4th line to change the word company to **township.**
7: **Action: board consensus** to add the words **in writing** to first paragraph end of last sentence .
Action: board consensus to correct typo #10 the word you to **your**
Action : board consensus fourth paragraph second line last word to correct typo Cleark to **Clerk.**
8: **Action: board consensus** second paragraph first line (35)hours to say (35) hours **or more**
Action board consensus sixth paragraph end of last sentence to add **or Clerk**

Committee Reports: report given by Landis: met 4-5-23. Continuing with the master plan review

New Business:

1) Spring projects. Topic Claybank Park with discussions on pavilion roofs, roof over the hand pump, grills, door on the bathroom. **Motion** to replace the roofs on the pavilions **Vadeboncoeur 2nd Lindeman** with All in Favor **MC**
2) porta john for the river access site. Discussion on having it in use for the end of May.
3) Organizational meeting: Discussion and review of dates with Action and consensus of the Board to hold the meeting on the 24th of May at 7pm. With budgets to be collected at the meeting.

Agenda for next meeting:

1) Manistee County Natural hazard mitigation plan
2)10 minute- review of employee manual pages 9-15
3) set date for the proposed budget hearing for the fiscal year 7-1-23 to 6-30-24

Meeting adjourned with no further business before the board by Mr. Vadeboncoeur at 8:15pm.

Respectfully submitted by
Barbara Rishel
Barbara Rishel, Clerk

COUNTY OF
manistee
MICHIGAN
Manistee County Courthouse
415 Third Street · Manistee, Michigan 49660

CLERK
Lindsey Marquardt
(231) 723-3331
CONTROLLER/ADMINISTRATOR
Lisa Sagala
(231) 398-3504

AGENDA

THE MANISTEE COUNTY BOARD OF COMMISSIONERS WILL HOLD THEIR REGULAR MEETING ON TUESDAY, JUNE 20, 2023, AT 9:00 A.M. IN THE BOARD OF COMMISSIONERS' MEETING ROOM LOCATED IN THE MANISTEE COUNTY COURTHOUSE AND GOVERNMENT CENTER, 415 THIRD STREET, MANISTEE, MICHIGAN.

CALL TO ORDER BY THE CHAIRPERSON

PLEDGE OF ALLEGIANCE

INVOCATION

ROLL CALL

APPROVAL OF MEETING AGENDA

CONSENT AGENDA

A) The minutes of the May 16, 2023, Board meeting.
B) June 2023 monthly appropriations and fund transfers which are attached under APPENDIX A.

PUBLIC COMMENT

RECOGNITION & ANNOUNCEMENTS

COMMITTEE REPORTS - (Reports may be given at any time during the meeting as time allows).

*A) Policy Committee Report
*B) Ways & Means/Finance/Equalization/Physical Resources/Investment Committee
C) Housing Review Committee Report
*D) Personnel Committee Report
E) Public Safety Committee Report & Sheriff Report
F) Technology/Information Committee Report
G) Human Services Committee Report
H) Executive Committee Report (Joint Court Committee)
I) Public Defender Committee Report
*J) Green Team/Recycling Committee Report
K) Regional Summit Committee Report
*L) Reports from individual Commissioners on various special assignments.
M) Road Commission Update (Nikki Koons)
N) Airport Authority Update

(*= Committee meetings held this month)

9:10 A.M. GARY SCHWAIGER, MANISTEE COUNTY DRAINER COMMISSIONER, will appear before the board to discuss the closing of the Mud Lake Drain.

9:15 A.M. PUBLIC HEARING ON THE MANISTEE COUNTY HAZARD MITIGATION PLAN
Manistee County has updated its Natural Hazard Mitigation Plan in accordance with the Disaster Mitigation Act of 2000.

Immediately following the public hearing, the Board will consider approval of the Hazard Mitigation Plan for Manistee County.

9:30 A.M. – BOARD/COMMISSION APPOINTMENTS

A) MANISTEE COUNTY PLANNING COMMISSION

Two (2) vacancies each to serve for three (3) year terms which will begin on June 10, 2023 and expire on June 09, 2026. One (1) vacancy will be filled by a person representing Economic and Commercial interests in the County and one (1) vacancy will be filled by a person representing School Board interests in the County.

There were two applicants.

Phillip Landis (Incumbent)
2020 Stronach Road
Manistee, MI 49660

Mary Becker-Witt (Incumbent)
1620 Spruce Street
Wellston, MI 49689

9:35 A.M. – JOE VERLIN, GABRIDGE & COMPANY, will appear before the board to provide an overview of the year ending September 30, 2022.

MISCELLANEOUS CONTROLLER AND BOARD ITEMS. (These items may be considered at any time during the meeting as time allows).

1. Resolution 2023-11 Opposing SB 299, SB300 and HB 4479, HB 4480.
2. Contract for Grant Administrator.
3. Resolution 2023-14 approving the FY 2024 Plan for the Area Agency on Aging of Northwest Michigan.
4. Request from United Veterans Council.

COORESPONDENCE

5. Planning updates.
6. Various resolutions.

PUBLIC COMMENT

ADJOURNMENT

visit: www.manisteecountymi.gov to view the County Directory, Calendar of Events, Meeting Reports (under Board of Commissioners), etc.

MANISTEE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE/LOCAL PLANNING TEAM

MEETING MINUTES OF: June 28, 2023

Meeting Called to order at 10:03 by Chairman, Alvin Rischel.

Members Present: Alvin Rischel, Manistee County Emergency Management Coordinator; Mike Machen, Manistee County 911 Director; Lt. Travis House, Michigan State Police; Mr. Jeff Dontz, Manistee County Board Chairman; Joe Coleman, Manistee County Medical Care Representative.

Minutes from the previous meeting were reviewed. Motion to accept minutes by Joe Coleman, seconded by Lt. House. Motion carried.

Discussion regarding the Natural Hazards Mitigation Plan. The Plan was adopted by the Manistee County Board of Commissioners at their last County Meeting. Once the Plan is approved by FEMA, E.M. Rischel will be going to participating Manistee County Townships to seek adoption by the individual townships.

Discussion regarding future LEPC/LPT Meetings. Due to the completion of the Natural Hazards Mitigation Plan, all future meetings will be separated. LEPC meetings will be conducted first, with LPT meetings to immediately follow. Independent Zoom links will be provided with future agendas.

Discussion held regarding whether LEPC/LPT requires an Executive Board. Tabled for future discussion.

Motion to adjourn by Commissioner Dontz, seconded by Lt. House. Meeting adjourned at 10:23.

Respectfully submitted,

Alvin D. Rischel
Manistee County
Emergency Management Coordinator

Networks Northwest
Talent / Business / Community

Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Manistee County Hazard Mitigation Plan Available for Review and Comment until June 20

Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org> Tue, Jun 13, 2023 at 12:25 PM
Cc: Andrew Bradford <Andrew.bradford@cmsenergy.com>, Angela Wang <angelawang@packagingcorp.com>, Audrey Menninga <amenninga@gtcd.org>, Ben Wagner <benjamin.wagner1@usda.gov>, Bill Zimmerman <zimmermanB2@michigan.gov>, Blacker Airport <manisteeairport@gmail.com>, Brandy Martin <brandymartin@lrboi-nsn.gov>, Bret Haner <bhaner@dhd10.org>, Brian Gutowski <gutowskib@manisteesheriff.org>, "C. Brandt" <cbrandt@packagingcorp.com>, "Chambers, Dean - FS, MT" <Dean.Chambers@usda.gov>, David Cox <dcox@wmisd.org>, Elizabeth Reimink <emergencymanagement@masoncounty.net>, Frank Keck <keckf@michigan.gov>, Fred Craigin <fcraigin@mhc.net>, "gbird@gtcountymi.gov" <gbird@gtcountymi.gov>, Gordon McLellan <gordon.mclellan@mnstco.net>, Hilary McKie <mccoa.hm@gmail.com>, "J. Carpenter" <jkcarpenter@packagingcorp.com>, Jack VanderBie <vanderbiejack@gmail.com>, Jason Sopha <jsopha@mobilemedical.org>, Jason Torrey <torreyj@manisteesheriff.org>, Jeanne Barber <mccoa.jb@gmail.com>, Jeannine Taylor <jtaylor@dhd10.org>, Jennifer Berkey <berkeyj@msu.edu>, Jennifer Savage <savagej1@michigan.gov>, Jim Espvik <jespvik@manisteecountymi.gov>, Joe Coleman <jcoleman@mcmcf.org>, Joe Jones <JJones@mcmcf.org>, Katie Mehl <kmehl@manisteecountymi.gov>, Kevin Hughes <khughes@dhd10.org>, Lawrence Hrachovina <fire@onekamatwp.org>, "Lt. Michael DeCastro" <decastrom@michigan.gov>, "M. Novak" <mnovak@interstateasphalt.com>, Manistee Twp Fire Dept <info@manisteetownship.com>, Mark Sohlden <manager@manisteecrc.org>, Mary Reilly <reilleym8@anr.msu.edu>, Meghan Powers <meghan.powers3@redcross.org>, Mike Machen <mmachen@manistee911.org>, Mike Szokola <mszokola@manisteecountymi.gov>, "Moore, Todd - FS, ID" <todd.moore@usda.gov>, "Murphy, Jolanda, A" <Jolanda.Murphy@gtb-nsn.gov>, Nancy Fortin <mccoanan767@gmail.com>, Pat Bak <pat.bak@noaa.gov>, Patrick Maddox <emergencymanagement@co.lake.mi.us>, "Peedle, Scott - FS, MI" <scott.peedle@usda.gov>, Randy Boike <EMD@wexfordcounty.org>, Rebecca Hubers <rhubers@benzieco.net>, Renee Mallison <renee.mallison@macd.org>, Richard Strevey <richard@manisteebus.com>, Robert Medacco <robertmedacco@lrboi-nsn.gov>, Samantha VanAelst <svanaelst@interstateasphalt.com>, Sarah Howard <mccoa.sh@gmail.com>, Tamara Buswinka <l44planners@gmail.com>, Tim Tritten <tim.tritten@martinmarietta.com>, Todd Guenthardt <taguenthardt@cmsenergy.com>, Travis House <houset@michigan.gov>, arischel@manistee911.org

Dear Manistee County Stakeholder,

The Manistee County Department of 911/Central Dispatch, with assistance from Networks Northwest, has prepared a draft of the County's 2023 Natural Hazard Mitigation Plan. This is a multi-jurisdictional plan which provides mitigation strategies for many hazards, such as wildfire, flooding, invasive species, and public health emergencies. The strategies consider how to mitigate the impacts of hazard events on vulnerable populations (such as the elderly, disabled, isolated, or low-income individuals), as well as personal property, the economy and infrastructure, and environmental features.

As a valued community stakeholder, your input is very important! The draft plan, mitigation strategies and maps can be viewed on the project webpage. Suggested edits and questions are welcome (please email or call me). A public hearing will be held for the plan on Tuesday, June 20, 2023 at 9:15 AM. The meeting location is in the Manistee County Board of Commissioners' Meeting Room in the Manistee County Courthouse and Government Center, at 415 Third Street, Manistee, Michigan. An option to attend virtually via Zoom is also available: https://us06web.zoom.us/j/83580115646
Password: 4153

Upon review of the plan, the Board of Commissioners shall recommend it be sent to Michigan State Police Homeland Security Division for review and then on to FEMA for their review and approval. Once FEMA has approved the plan, it will be brought before the County and all local government boards for adoption later this year.

Stephanie Marchbanks
Community Planner
Networks Northwest

Desk: 231.439.5247
Mobile: 231.590.0930
stephanie.marchbanks@networksnorthwest.org

Networks Northwest
Talent / Business / Community
2240 Mitchell Park Dr., Suite B
Petoskey MI 49770

Networks Northwest
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Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Manistee County Hazard Mitigation Plan Available for Review and Comment until June 20

Wagner, Ben - FS, MI <Benjamin.Wagner1@usda.gov> Tue, Jun 13, 2023 at 12:36 PM
To: "Moore, Todd - FS, MI" <todd.moore@usda.gov>, "Chambers, Dean - FS, MI" <Dean.Chambers@usda.gov>, "Raspotnik, Joseph - FS, MI" <joseph.raspotnik@usda.gov>
Cc: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>, "Peedle, Scott - FS, MI" <scott.peedle@usda.gov>

Todd & Co.,

Please see the message below regarding the Manistee county Hazard Mitigation plan. I recommend speaking with Scott Peedle to ensure our bases are covered for any agency related feedback to the development of this project. I believe this is relevant to FACTs reporting in lieu of a CWPP. Thanks!

Ben Wagner
Deputy Fire Staff Officer

Forest Service

Huron-Manistee National Forests

c: 231-342-8004
Benjamin.wagner1@usda.gov

1755 S. Mitchell St.
Cadillac, MI 49601
www.fs.fed.us

Caring for the land and serving people

From: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>
Sent: Tuesday, June 13, 2023 12:25 PM
Cc: Andrew Bradford <Andrew.bradford@cmsenergy.com>; Angela Wang <angelawang@packagingcorp.com>; Audrey Menninga <amenninga@gtcd.org>; Wagner, Ben - FS, MI <Benjamin.Wagner1@usda.gov>; Bill Zimmerman <zimmermanB2@michigan.gov>; Blacker Airport <manisteeairport@gmail.com>; Brandy Martin <brandymartin@lrboi-nsn.gov>; Bret Haner <bhaner@dhd10.org>; Brian Gutowski <gutowskib@manisteesheriff.org>; C. Brandt <cbrandt@packagingcorp.com>; Chambers, Dean - FS, MI <Dean.Chambers@usda.gov>; David Cox <dcox@wmisd.org>; Elizabeth Reimink <emergencymanagement@masoncounty.net>; Frank Keck <keckf@michigan.gov>; Fred Craigin <fcraigin@mhc.net>; gbird@gtcountymi.gov; Gordon McLellan <gordon.mclellan@mnstco.net>; Hilary McKie <mccoa.hm@gmail.com>; J. Carpenter <jkcarpenter@packagingcorp.com>; Jack VanderBie <vanderbiejack@gmail.com>; Jason Sopha <jsopha@mobilemedical.org>; Jason Torrey <torreyj@manisteesheriff.org>; Jeanne Barber <mccoa.jb@gmail.com>; Jeannine Taylor <jtaylor@dhd10.org>; Jennifer Berkey <berkeyj@msu.edu>; Jennifer Savage <savagej1@michigan.gov>; Jim Espvik <jespvik@manisteecountymi.gov>; Joe Coleman <jcoleman@mcmcf.org>; Joe Jones <JJones@mcmcf.org>; Katie Mehl <kmehl@manisteecountymi.gov>; Kevin Hughes <khughes@dhd10.org>; Lawrence Hrachovina <fire@onekamatwp.org>; Lt. Michael DeCastro <decastrom@michigan.gov>; M. Novak <mnovak@interstateasphalt.com>; Manistee Twp Fire Dept <info@manisteetownship.com>; Mark Sohlden <manager@manisteecrc.org>; Mary Reilly <reilleym8@anr.msu.edu>; Meghan Powers <meghan.powers3@redcross.org>; Mike Machen <mmachen@manistee911.org>; Mike Szokola <mszokola@manisteecountymi.gov>; Moore, Todd - FS, MI <todd.moore@usda.gov>; Murphy, Jolanda, A <Jolanda.Murphy@gtb-nsn.gov>; Nancy Fortin <mccoanan767@gmail.com>; Pat Bak <pat.bak@noaa.gov>; Patrick Maddox <emergencymanagement@co.lake.mi.us>; Peedle, Scott - FS, MI <scott.peedle@usda.gov>; Randy Boike <EMD@wexfordcounty.org>; Rebecca Hubers <rhubers@benzieco.net>; Renee Mallison <renee.mallison@macd.org>; Richard Strevey <richard@manisteebus.com>; Robert Medacco <robertmedacco@lrboi-nsn.gov>; Samantha VanAelst <svanaelst@interstateasphalt.com>; Sarah Howard <mccoa.sh@gmail.com>; Tamara Buswinka <l44planners@gmail.com>; Tim Tritten <tim.tritten@martinmarietta.com>; Todd Guenthardt <taguenthardt@cmsenergy.com>; Travis House <houset@michigan.gov>; arischel@manistee911.org
Subject: [External Email]Manistee County Hazard Mitigation Plan Available for Review and Comment until June 20

[Quoted text hidden]

Networks Northwest
Talent / Business / Community

Board Chair: **Nicole Sulak**

Chief Executive Officer: **Terry Vandercook**

May 18, 2023

Dear Manistee County Local Government Representative,

The Manistee County Department of 911/Central Dispatch, with assistance from Networks Northwest, has prepared a draft of the County's 2023 Natural Hazard Mitigation Plan. The plan provides data and documentation on natural hazard events, the impact of such events on local communities, and strategies to mitigate the impact of future events. This is a multi-jurisdictional plan which addresses hazard events and strategies for all cities, villages, and townships in the county.

Your input on this draft plan is an essential requirement of the planning process. The draft plan and associated strategies, resources, and maps are available for public review and comment. These can be viewed online at the project webpage:
https://www.networksnorthwest.org/community/natural-hazard-mitigation/manistee-county.html

Your participation in the review of this plan is also a Federal Emergency Management Agency (FEMA) requirement to be eligible for federally-funded pre-disaster hazard mitigation grant opportunities for five years. Many of the hazard mitigation strategies have a county-wide application, but some are site-specific. Please review the plan and materials carefully to verify your community is in support of the material provided or request changes to the draft.

A public hearing for the plan will be held on Tuesday, June 20, 2023 at 9:15 AM. The meeting location is in the Board of Commissioners' Meeting Room in the Manistee County Courthouse and Government Center, at 415 Third Street, Manistee, Michigan. An option to attend virtually via Zoom is also available: https://us06web.zoom.us/j/83580115646 Password: 4153

Upon review of the plan, the Board of Commissioners shall recommend it be sent to Michigan State Police Homeland Security Division for review and then on to FEMA for their review and approval. Once FEMA has approved the plan, it will be brought before the County and all local government boards for adoption later this year.

A copy of this letter will also be shared with local officials through government officials through electronic mail. Comments are requested in person by representative at the public hearing; by mail at PO Box 506, Traverse City, MI 49685; or by email to stephanie.marchbanks@networksnorthwest.org.

Sincerely,

Stephanie Marchbanks
Community Planner, Networks Northwest

LEPC/LPT Meeting

External HazMitigation/Manistee

Mike Machen <mmachen@manistee911.org> May 3, 2022, 1:25 PM
to angelawang@packagingcorp.com, Breanna, Bret, Sheriff, cbrandt@packagingcorp.com, Frank, Fred, hdarling@manisteemi.gov

May
19
Thu

Manistee & LRB LEPC/LPT Meeting

View on Google Calendar

When Thu May 19, 2022 11am – 12pm (EDT)
Where https://us02web.zoom.us/j/86099490485
Who Michael Decastro, houset@michigan.gov, jadams@interstateasphalt.com, jcoleman, Jeff Dontz...

Yes Maybe No

More options

Agenda

Thu May 19, 2022

No earlier events

11am Manistee & LRB LEPC/LPT Meeting

No later events

This meeting will focus on our Hazard Mitigation Plan in the areas of Hazard Identification and Mapping.

Mike Machen is inviting you to a scheduled Zoom meeting.

Join Zoom Meeting
https://us02web.zoom.us/j/86099490485

Meeting ID: 860 9949 0485
One tap mobile
+13126266799,,86099490485# US (Chicago)
+19292056099,,86099490485# US (New York)

Dial by your location
- +1 312 626 6799 US (Chicago)
- +1 929 205 6099 US (New York)
- +1 301 715 8592 US (Washington DC)
- +1 346 248 7799 US (Houston)
- +1 669 900 6833 US (San Jose)
- +1 253 215 8782 US (Tacoma)

Meeting ID: 860 9949 0485
Find your local number: https://us02web.zoom.us/u/kcDWfnHB0Q

Networks Northwest
Talent / Business / Community

Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

National Flood Insurance Program (NFIP) implementation question

Village President <president@villageofonekama.org> Wed, Jun 28, 2023 at 11:06 AM
To: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Ms. Marchbanks:

We have an intergovernmental agreement with LARA to be the Village's floodplain program administrator.

Roger Burger
Village President
Village of Onekama
5283 Main Street
P. O. Box 477
Onekama, MI 49675
(231) 889-3171 telephone
(231) 889-3423 fax
president@villageof onekama.org

> On 06/27/2023 1:06 PM Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org> wrote:
>
> Good Afternoon,
>
> Networks Northwest Community Development staff have been assisting Manistee County with updating the county-wide Natural Hazards Mitigation Plan. One of the plan requirements of FEMA, the plan approval agency, is to provide details on how communities that participate with the NFIP implement local floodplain regulations (associated with the Flood Insurance Rate Maps issued for and adopted by your community).
>
> Can you please tell me who is the appointed designee (acting as floodplain administrator) for the Village of Onekema that is responsible for implementing the commitments and requirements of the NFIP?
>
> **Stephanie Marchbanks**
> **Community Planner**
> **Networks Northwest**
>
> Desk: 231.439.5247
> Mobile: 231.590.0930
> stephanie.marchbanks@networksnorthwest.org
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> Petoskey MI 49770

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Talent / Business / Community

Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Manistee County Hazard Mitigation Plan Available for Review and Comment until June 20

Audrey Menninga <amenninga@gtcd.org> Fri, Jun 30, 2023 at 8:12 AM
To: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Hi Stephanie,
I would maybe change the language for the HWA in Benzie County - at this time, due to how long we suspect this infestation at Crystal Downs has been there, it is likely that it has been spread elsewhere in the county, and it's just a matter of finding it now unfortunately. As to the priority species for each county, there's definitely some overlap, but here's what I would likely put it at:

- Manistee County: HWA, invasive knotweeds, invasive phragmites, Japanese barberry
- Benzie County: HWA, invasive knotweeds, invasive phragmites, baby's breath
- Leelanau County: HWA, invasive knotweeds, invasive phragmites, baby's breath, and coltsfoot

Manistee has some pretty dense populations of Japanese barberry, especially in Onekama where I've seen entire hillsides of it growing. Baby's breath is included for Benzie and Leelanau Counties because it grows on the dunes and beaches, which can limit recreational use of the beaches and also can threaten some federally threatened species including pitcher's thistles. Coltsfoot is a species that has been found in Leelanau County, and grows in the same areas as federally endangered Michigan monkey flower, which is a species that is endemic to Michigan. HWA is included for all three counties, due to its threat to our dense and important hemlock populations, invasive knotweeds are listed because of their potential for destruction to infrastructure, ability to spread easily, and dense growth patterns, and invasive phragmites are listed due to their habitat impacts and their ability to restrict beach use and lower property values.

If you have any questions, please let me know!

On Tue, Jun 27, 2023 at 10:17 AM Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org> wrote:
> Hello Audrey,
>
> Thanks so much for your reply! I will make the changes you mentioned accordingly in the invasive species section of the plan. And yes, if you can indicate what specific species NMISN thinks are of most concern, and maybe a short description of why and if there are specific geographic areas that are affected, that would be great.
>
> We are also wrapping up the Hazard Mitigation Plans for Benzie and Leelanau counties, so the same info. on invasive species could also be applied to those plans. We do mention that HWA has been detected in Benzie County (Crystal Downs Country Club and Sleeping Bear Dunes) but that the infestations have been contained and monitoring efforts remain in effect.
>
> No public comments or questions pertaining to invasive species were brought up in the public input sessions for any of these plans.
>
> **Stephanie Marchbanks**
> **Community Planner**
> **Networks Northwest**
>
> Desk: 231.439.5247
> Mobile: 231.590.0930
> stephanie.marchbanks@networksnorthwest.org
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> Networks Northwest
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> 2240 Mitchell Park Dr., Suite B
> Petoskey MI 49770

On Mon, Jun 26, 2023 at 4:10 PM Audrey Menninga <amenninga@gtcd.org> wrote:
> Hi Stephanie,
> I'm so sorry for how long it took me to get to this! A couple of things:
>
> - We actually usually abbreviate our name as NWISN, just to specify which region of Northern Lower Michigan.
> - In 2019, we actually redid our priority invasive species and we now have the "Top 12 Species" instead of 20 - it's a little more manageable! I've attached a graphic that includes that, in case you'd like to use it. If you'd like, I can also pick out specific species that ISN believes may be of concern.
> - For HWA, I don't know if it's worth noting that HWA is currently found to the south and north of Manistee County. It is highly suspected that there are HWA populations within Manistee County, and we just haven't found them yet.
>
> I think that was everything that I had - I'm happy to answer any follow up questions, or any other questions that were raised during the public session.
>
> On Tue, Jun 13, 2023 at 12:25 PM Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org> wrote:
> > Dear Manistee County Stakeholder,
> >
> > The Manistee County Department of 911/Central Dispatch, with assistance from Networks Northwest, has prepared a draft of the County's 2023 Natural Hazard Mitigation Plan. This is a multi-jurisdictional plan which provides mitigation strategies for many hazards, such as wildfire, flooding, invasive species, and public health emergencies. The strategies consider how to mitigate the impacts of hazard events on vulnerable populations (such as the elderly, disabled, isolated, or low-income individuals), as well as personal property, the economy and infrastructure, and environmental features.
> >
> > As a valued community stakeholder, your input is very important! The draft plan, mitigation strategies and maps can be viewed on the project webpage. Suggested edits and questions are welcome (please email or call me). A public hearing will be held for the plan on Tuesday, June 20, 2023 at 9:15 AM. The meeting location is in the Manistee County Board of Commissioners' Meeting Room in the Manistee County Courthouse and Government Center, at 415 Third Street, Manistee, Michigan. An option to attend virtually via Zoom is also available:
> > https://us06web.zoom.us/j/83580115646 Password: 4153
> >
> > Upon review of the plan, the Board of Commissioners shall recommend it be sent to Michigan State Police Homeland Security Division for review and then on to FEMA for their review and approval. Once FEMA has approved the plan, it will be brought before the County and all local government boards for adoption later this year.
> >
> > **Stephanie Marchbanks**
> > **Community Planner**
> > **Networks Northwest**
> >
> > Desk: 231.439.5247
> > Mobile: 231.590.0930
> > stephanie.marchbanks@networksnorthwest.org
> >
> > Networks Northwest
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> > 2240 Mitchell Park Dr., Suite B
> > Petoskey MI 49770
>
> --
> Audrey Menninga (she/her)
> Northwest Michigan Invasive Species Network
> ISN Coordinator
> Grand Traverse Conservation District
> 1450 Cass Rd. Traverse City, MI 49685

Networks Northwest
Talent / Business / Community

Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

National Flood Insurance Program (NFIP) questions

Sherry Stamp <sstamp@manisteecountymi.gov>
To: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Wed, Jun 28, 2023 at 12:22 PM

Hi Stephanie-

I will look into it. Thank you.

From: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>
Sent: Wednesday, June 28, 2023 12:16 PM
To: Sherry Stamp <sstamp@manisteecountymi.gov>
Subject: National Flood Insurance Program (NFIP) questions

[WARNING: External Message - Use extreme caution opening links or attachments]

Hi Sherry,

Networks Northwest Community Development staff have been assisting Manistee County with updating the county-wide Natural Hazards Mitigation Plan. One of the plan requirements of FEMA, the plan approval agency, is to provide details on how communities that participate with the NFIP implement local floodplain regulations (associated with the Flood Insurance Rate Maps issued for and adopted by your community).

The Village of Eastlake is listed as a sanctioned, non-participating community in the NFIP. FIRMs were issued by FEMA for the Village on June 2, 2021, but it appears that floodplain management provisions/FIRM maps were not formally adopted by your local government within a year after that. Do you know if the local adoption procedures were completed later and just not provided to FEMA? Or if there is another reason the Village of Eastlake is a non-participant with the NFIP even though maps have been issued for your community?

Thank you,

Stephanie Marchbanks

Community Planner

Networks Northwest

Desk: 231.439.5247

Mobile: 231.590.0930

stephanie.marchbanks@networksnorthwest.org

Networks Northwest
Talent / Business / Community

2240 Mitchell Park Dr., Suite B

Petoskey MI 49770

---------- Forwarded message ---------
From: **Katie Mehl** <kmehl@manisteecountymi.gov>
Date: Tue, Jun 27, 2023 at 4:50 PM
Subject: RE: Hazard Mitigation
To: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>
Cc: Sherry Stamp <sstamp@manisteecountymi.gov>

Hi Stephanie,

Sherry Stamp is the Clerk for the Village, and she is also with MSU Extension; they share an office with us, so she is usually our point person. She is copied to this email and her phone number is (231)510-5941. She should be able to get you in touch with whoever would be able to answer your questions. Also, attached is the County Directory for everyone in Eastlake. Let me know if I can assist with anything else! 😊

Regards,

Katie Mehl

Planning and Zoning Administrator

Manistee County

(231) 398-3525

kmehl@manisteecountymi.gov

Manistee County
Planning Department