



Natural Hazards Mitigation Plan

2022

This page left blank



FEMA

September 28, 2022

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:

Thank you for submitting adoption documentation for the 2022 Grand Traverse County Natural Hazard Mitigation Plan. The 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 plan met the required criteria for a multi-jurisdictional hazard mitigation plan and the plan is now approved for Grand Traverse County. Please submit adoption resolutions for any remaining jurisdictions who participated in the planning process.

The approval of this plan ensures continued availability of the full complement of Hazard Mitigation Assistance (HMA) Grants. All requests for funding, however, will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted.

We encourage the county to follow the plan's schedule for monitoring and updating the plan and to continue their efforts to implement the mitigation measures. The expiration date of the 2022 Grand Traverse County Natural Hazard Mitigation Plan is five years from the date of this letter. The plan must be reviewed, revised as appropriate, resubmitted, and approved no later than the plan expiration date.

Please pass on our congratulations to Grand Traverse County for completing this significant action. If you or the community have any questions, please contact Lorena Reyes at (202) 805-6352 or Lorena.reyes@fema.dhs.gov.

Sincerely,

Steven M. Greene
Chief (acting), Risk Analysis Branch
Mitigation Division



Resolution 88-2022

Date: September 7, 2022

2022 Grand Traverse County Natural Hazard Mitigation Plan Resolution

Whereas; Grand Traverse County, Michigan has experienced risks that may damage commercial, residential and public properties, displacing citizens and businesses, close streets and impair infrastructure, present general public health and safety concerns; and

Whereas; Grand Traverse County has developed the Grand Traverse County Natural Hazard Mitigation Plan that outlines the county's options to reduce damages and impacts from natural and technological hazards; and

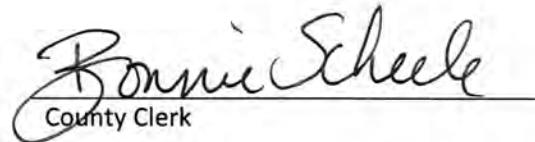
Whereas; the Natural Hazard Mitigation Plan has been reviewed by residents, business owners, and federal, state, and local agencies, and has been revised where appropriate to reflect their concerns;

Now, therefore, be it resolved that:

The Natural Hazard Mitigation Plan is hereby adopted as an official plan of Grand Traverse County, Michigan.



Chairman



Bonnie Scheele
County Clerk

ACKNOWLEDGEMENTS

The Grand Traverse County Hazard Mitigation Plan is prepared for Grand Traverse County and the jurisdictions in Grand Traverse County. Each jurisdiction within Grand Traverse County is a continuing participant in the update of the Plan. The Plan is the culmination of the interdisciplinary and interagency planning effort that required the assistance and expertise of numerous agencies, organizations, and individuals. Without the technical assistance and contributions of time and ideas of these agencies, organizations, and individuals, this plan could not have been completed.

Agency	Name	Title
Grand Traverse County Board of Commissioners	Robert Hentschel	Chair, District 7
	Brad Jewett	Vice Chair, District 3
Grand Traverse County	Nathan Alger	County Administrator
	Gregg Bird	Emergency Management Coordinator
	Thomas Bensley	Sheriff
	Michael Shea	Undersheriff
	Jason Torrey	911 / Central Dispatch Director
	Andy Smits	Drain Commissioner
	John Divozzo	Director of Public Works
	James D. Baker	Director of Equalization
	Josh Green	GIS Analyst, Equalization Department
	Wayne Schoonover	Manager of Engineering, Road Commission
Grand Traverse Band of Ottawa and Chippewa Indians	Jolanda Murphy	Public Safety Department 2 Manager and Emergency Manager
	Garrett Fairchild	Fire Chief
	Lori Savaso	Director of Risk Management and Safety
City of Traverse City	Art Krueger	Director of Municipal Utilities
	Frank Dituri	Director of Public Services
	Jeff O'Brien	Chief of Police
	Jim Tuller	Fire Chief
Acme Township	Pat Parker	Fire Chief
Blair Township	Bill Parker	Fire Chief
East Bay Township	Beth Friend	Township Supervisor
	Nick Lemcool	EMS Director
	Pat Parker	Fire Chief
Village of Fife Lake	Scott Tinker	Fire Chief
Fife Lake Township	Scott Tinker	Fire Chief
Garfield Township	John Sych	Planning Director
	Stephen Hannon	Deputy Planning Director
	Pat Parker	Fire Chief
Grant Township	Daryl Case	Emergency Services Chief
Green Lake Township	Daryl Case	Emergency Services Chief
Village of Kingsley	Dan Hawkins	Village Manager
	Deb Nickerson	Treasurer
	Terry Almquist	Supervisor, Department of Public Works
	Todd Weaver	Department of Public Works
	Norm Fenton	Department of Public Works
Long Lake Township	Andrew Down	Fire Chief
Mayfield Township	Bill Parker	Fire Chief
Paradise Township	Bill Parker	Fire Chief
Peninsula Township	Fred Gilstorff	Fire Chief
Union Township	Bill Parker	Fire Chief
Whitewater Township	Brandon Flynn	Fire Chief
The Salvation Army	Matthew Winters	Lieutenant
Mobile Medical Response	Amy Fairchild	Paramedic Field Supervisor
Area Agency on Aging of Northwest Michigan	Dee Wilkinson	Housing Coordinator
Munson Medical Center	John Bolde	Facilities & Emergency Management
Cherry Capitol Airport	Dan Sal	Operations Chief
Traverse Health Clinic	Krista Tharp	Compliance Officer

Prepared by Grand Traverse County Emergency Management
with assistance from:



Networks Northwest
PO Box 506
Traverse City MI 49685-0506
Telephone: 231.929.5000
www.networksnorthwest.org

TABLE OF CONTENTS

I.	Introduction	8
II.	Planning Process	10
III.	Community Profile.....	12
IV.	Hazard Identification and Assessments.....	22
V.	Goals and Objectives.....	54
VI.	Mitigation Strategies and Priorities	55
VII.	Implementation	60

Appendix A: County Infrastructure, Vulnerability, and Hazard Maps

Appendix B: Public Participation Survey

Appendix C: 2015 Plan Mitigation Strategies

Appendix D: Local Planning Team Meeting Documentation

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. When successful, hazard mitigation will lessen the need for a community to respond to subsequent hazard events, for some incidents may remain as mere incidents and not become disasters. Similarly, disaster events should involve lesser levels of impact than they otherwise would have. Hazard mitigation strives to reduce the impact of hazards on people, property, the environment and economy, and continuity of services, through the coordination of available resources, programs, initiatives, and authorities.

A hazard is an event or physical condition that has potential to cause fatalities, injuries, property damage, infrastructure damage, and agricultural loss, damage to the environment, interruption of business, or other types of harm or loss. The mission of the Grand Traverse County Natural Hazard Mitigation Plan is to permanently eliminate or reduce long-term risks to people and property from natural hazards so that county assets such as transportation, infrastructure, commerce, and tourism can be sustained and strengthened. This can be accomplished through collaborative efforts/activities amongst agencies within Grand Traverse County.

The Grand Traverse County Natural Hazards Mitigation Plan focuses on natural hazards such as drought, wildfires, flooding, shoreline erosion, thunderstorms and high winds, hail, and extreme winter weather, and was created to protect the health, safety, and economic interests of the residents and businesses by reducing the impacts of natural hazards through planning, awareness, and implementation. Through this Plan, a broad perspective was taken in examining multiple natural hazards mitigation activities and opportunities in Grand Traverse County. Each natural hazard was analyzed from a historical perspective, evaluated for potential risk, and considered for possible mitigation.

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

During the previous plan's adoption period, the county and municipalities achieved the following mitigation activities:

- Removal of the Boardman Dam (2017) and Sabin Dam (2018) and restoration of the upper Boardman River to its historical natural channel. The dam removal projects were a collaboration between local, county, state, federal, and tribal partnerships.
- Construction of two (2) severe storm/tornado shelters and integrated public alerting sirens at Traverse City State Park Campground and Interlochen State Park Campground (2019 & 2020)
- Finally, during the revision period of this plan document, the City of Traverse City is developing a comprehensive series of project applications for the newly developed FEMA Building Resilient Infrastructure and Communities grant program to repair and improve damage storm and sewer water, road, and drainage infrastructure and riverbank restoration and stabilization in the Traverse City area bordering the Grand Traverse Bay and Boardman River areas. Applications will be submitted once the County plan is approved and adopted.

Section VI provides a list of hazard mitigation strategies for each natural hazard identified in this plan. Strategies were developed based on discussions with local officials and a review of FEMA best practices for hazard mitigation. Appendix C provides a review of mitigation strategies included in the 2015 plan and their current status. Mitigation strategies are intended to be action items completed during the 5-year timeframe the plan is active.

Recognizing the importance of reducing community vulnerability to natural hazards, Grand Traverse County is actively addressing the issue through the development and implementation of this plan. This process will help ensure that Grand Traverse 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 Grand Traverse 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:

Figure 1: Planning Goals

Natural Hazards Mitigation Planning Goals for Grand Traverse County
Goal 1: Increase local awareness and participation in natural hazards mitigation
Goal 2: Integrate natural hazards mitigation considerations into the community's comprehensive planning and operational processes
Goal 3: Utilize available resources and apply for additional funding for natural hazards mitigation projects
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 receiving grant money related to natural hazard remediation. Grand Traverse County has a history of mitigation planning and adopted past Natural Hazard Mitigation Plans in 2007 and 2015. The adoption of the 2022 plan will reaffirm the county's eligibility for federal funding. Additionally, those local municipalities who participate in the planning process and adopt the County's Plan will also become eligible.

The update of the County's plan was led by the Natural Hazards Task Force comprised of the County's Local (Emergency) Planning Team (LPT). 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 assisted with the plan updated and provided support to facilitate meetings and plan writing. The Task Force met monthly at the Grand Traverse County Governmental Center, and meetings were open to the public. The following is an outline of events for the development of the 2022 Natural Hazard Mitigation Plan:

- The Task Force initiated the plan update in 2020 with a review of the County's 2015 Plan
- In December 2021, an online survey was administered to all local units of government to identify hazard threats, community vulnerabilities, and potential mitigation strategies
- The Task Force reviewed and commented on the Community Profile at the December 16, 2021 LPT meeting
- The Task Force had a discussion regarding hazard identification and assessment at a special meeting on January 11, 2022
- The Task Force reviewed and commented on the results of the community survey at the February 17, 2022 LPT meeting
- Local officials, municipal staff, and members of the Grand Traverse Band of Ottawa & Chippewa Indians participated in a community input session on March 23 and 24, 2022
- The Task Force reviewed and commented on the Goals and Objectives and Hazard Mitigation Strategies at the April 21, 2022 LPT meeting
- Local units of government received a draft copy of the plan for review in April 2022
- Public Notices were published in the newspaper on the county website, and via social media releases on April 28, 2022
- The Task Force held a public comment session for the draft plan on May 26, 2022; comments were received by staff.

Additionally, county and regional agencies that share borders with Grand Traverse County were invited to participate in the planning meetings and sent a copy of the plan in its draft form and again the approved plan. Those agency staff members are:

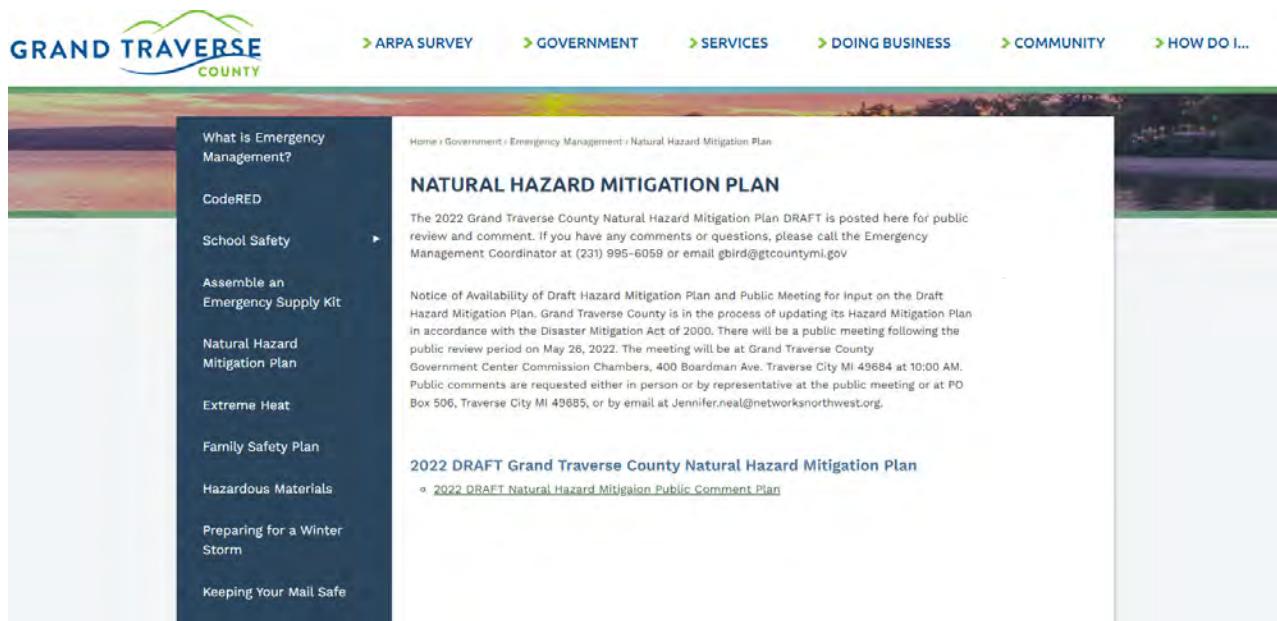
- Leslie Meyers, Emergency Services Coordinator, Antrim County
- Rebecca Hubers, Emergency Management Coordinator, Benzie County
- Mike Thompson, Emergency Management Coordinator, Kalkaska County
- Matt Ansorge, Emergency Management Director, Leelanau County
- Travis Baker, Deputy 911 Director/Emergency Management Coordinator, Wexford County
- Jolanda Murphy, Public Safety Department 2 Manager and Emergency Manager, Grand Traverse Band of Ottawa and Chippewa Indians
- Robert Carson, Regional Director of Community Development, Networks Northwest

The Grand Traverse Band of Ottawa and Chippewa Indians were invited to participate in the County's planning process and provided input related to tribal lands located in Grand Traverse County, but is not relying exclusively on the Grand Traverse County plan to seek full FEMA approval. The Grand Traverse Band of Ottawa and Chippewa Indians is undergoing a separate, but complementary planning process.

During development of the plan, all Grand Traverse County municipalities were provided the opportunity to formally comment on plan drafts and other related materials. The plan was published openly on the Grand Traverse County Emergency Management website and the public was encouraged to view, review and invited to submit suggestions and ideas for updates, changes to be considered during updates. All meetings where the plan was discussed were openly

published for public and other jurisdiction/municipality participation as well. While no formal written comments were received, county staff (particularly the county Emergency Manager) received feedback via other informal means. This feedback took the form of phone calls, emails and conversations that occurred at various non-mitigation related meetings throughout the county. Specifically, Wayne Schoonover, Manager of Engineering, of the Grand Traverse County Road Commission met with staff and provided a review of potential hazards impacting local road infrastructure. They also identified locations that frequently flood areas and may align with upcoming Road Commission projects. This information was provided and used in development of the plan, including the risk assessment and community profile sections.

The public was notified through a published notice in the *Traverse City Record Eagle* on Thursday, April 28, 2022 of the County's draft Hazard Mitigation Plan and the opportunity to provide feedback at the public hearing held on May 26, 2002. The draft plan was made available on the County's website as well as Networks Northwest's website. Below are images of the websites for the available draft plan and a copy of the published notice to the public.



The screenshot shows the Grand Traverse County website. The top navigation bar includes links for ARPA SURVEY, GOVERNMENT, SERVICES, DOING BUSINESS, COMMUNITY, and HOW DO I... The main content area is titled "NATURAL HAZARD MITIGATION PLAN". It features a sub-navigation menu on the left with links to "What is Emergency Management?", "CodeRED", "School Safety", "Assemble an Emergency Supply Kit", "Natural Hazard Mitigation Plan", "Extreme Heat", "Family Safety Plan", "Hazardous Materials", "Preparing for a Winter Storm", and "Keeping Your Mail Safe". The main content area contains text about the draft plan, a notice of availability, and a link to the "2022 DRAFT Grand Traverse County Natural Hazard Mitigation Plan".

Source: Grand Traverse County Emergency Management website April 27, 2022



The screenshot shows the Networks Northwest website. The top navigation bar includes links for TALENT, BUSINESS, COMMUNITY (which is highlighted in yellow), DATA, ABOUT US, and NEWS & EVENTS. The main content area is titled "GRAND TRAVERSE COUNTY". The left sidebar contains a "Notice of Availability of Draft Hazard Mitigation Plan and Public Meeting for Input on the Draft Hazard Mitigation Plan". The right sidebar lists various county links: ABOUT US, GOVERNMENTS, FRAMEWORK FOR OUR FUTURE, PROJECTS, GROWTH & INVESTMENT, TRANSPORTATION, RECREATION, NATURAL HAZARD MITIGATION, Antrim County, Benzie County, Grand Traverse County, Kalkaska County, Leelanau County, and a link to the "Grand Traverse County Natural Hazard Mitigation Plan".

Notice of Availability of Draft Hazard Mitigation Plan and Public Meeting for Input on the Draft Hazard Mitigation Plan

Grand Traverse County is in the process of updating its Hazard Mitigation Plan in accordance with the Disaster Mitigation Act of 2000. There will be a public meeting following the public review period on May 26, 2022. The meeting will be at Grand Traverse County Government Center Commission Chambers, 400 Boardman Ave. Traverse City MI 49684 at 10:00 AM. Public comments are requested either in person or by representative at the public meeting or at PO Box 506, Traverse City MI 49685, or by email at jennifer.neal@networksnorthwest.org.

DRAFT 2022 Grand Traverse County Hazard Mitigation Plan

2021 Hazard Mitigation Plan

Networks Northwest will assist the [Grand Traverse County Office of Emergency Management](#) Coordinator to update their plan. The following meetings included discussion related to the update of the County's Natural Hazard Mitigation Plan.

- December 16, 2021 at 8:30 am
- January 11, 2022 at 10:00 am
- February 17, 2022 at 8:30 am
- March 23, 2022 (Village of Kingsley) at 10:00 am
- March 24, 2022 at 10:00 am
- April 21, 2022 at 8:30 am
- May 26, 2022 at 10:00 am

All meetings are held in conjunction with the Grand Traverse County Local Emergency Planning Committee/ Local Planning Team. Meetings are held in person at the Grand Traverse Governmental Center, 400 Boardman Ave., Traverse City, MI 49684 and are open to the public.

Source: Networks Northwest website April 27, 2022

III. COMMUNITY PROFILE

Land Use

Grand Traverse County is located in northwest lower Michigan, and is bordered by Leelanau County, the Grand Traverse Bay and Antrim County to the north, Kalkaska County to the east, Wexford County to the south, and Benzie County to the west. The county is approximately 384,640 acres or 601 square miles in area. A portion of the county area includes 137 square miles of area in the water. County residents take advantage of diverse environments ranging from dense, urban areas to rural communities and unspoiled natural areas. Its landscape features rolling and hilly forest uplands, extensive wetlands and low areas, numerous inland lakes and streams, and the shorelines of East and West Grand Traverse Bay. The influence of glacial activity is clearly evident in the outwash plains and steep gravel and clay slopes that make up the majority of the southern two-thirds of the County. With 1,214 feet in elevation and 620 feet in depth in Grand Traverse Bay, these geographies lend special character to the County – lofty vistas of the bay, lakes, farmlands, and deep wooded valleys.

In addition to the lakes and rivers, the county is blessed with 66.72 miles of shoreline on the Grand Traverse Bay. The Boardman River, is a Blue Ribbon trout stream, being one of the top 10 trout streams in Michigan, bisects the county as it outlets into the Bay. Approximately 60% of the county is located in the Grand Traverse Bay Watershed. According to the 2017 Census of Agriculture, the county had 50,886 acres of land in farms for a total of 497 farms. Fruits, tree nuts, and berries had the highest market value of agriculture products sold at \$ 19,175,000. Grand Traverse County ranks 8th in the State of Michigan for the sale of fruits, tree nuts, and berries overall. The predominant land cover type is "Forested" followed by the combined types of land cover classified as "Grassland, Pasture, Shrub/Scrub" (Table 1). Developed land cover is found predominantly in and around Traverse City including Garfield Township and East Bay Township, village areas of Kingsley, Interlochen and Fife Lake, and around the Long Lake and Spider Lake areas.

Agriculture land is concentrated on Old Mission Peninsula (Peninsula Township), in the northern halves of Acme and Whitewater Townships, on the fringe of the urban area of Traverse City, and throughout the southern portion of the county. More intense land uses such as commercial, industrial, institutional and transportation are primarily found in the Traverse City area and to a lesser extent in village areas and in small parcels on major corridors throughout the county.

Table 1: Land Cover by Type

Classification	Acres	Percent
Developed (High Intensity)	1,762.77	0.6%
Developed (Med. Intensity)	4,550.79	1.5%
Developed (Low Intensity)	12,948.59	4.2%
Developed (Open Space)	20,966.14	6.7%
Agriculture	45,691.89	14.7%
Forested	124,006.88	39.8%
Wetlands	28,579.29	9.2%
Grassland, Pasture, Shrub/Scrub	57,244.17	18.4%
Barren	1,387.70	0.4%
Open Water	14,410.38	4.6%
TOTAL	311,548.60	

Source: Networks Northwest

A comparison of the 2007 Grand Traverse County Hazard Mitigation Plan indicates there were 489 farms and 62,268 acres of farmland as of 2002. In the fifteen year timeframe, the number of farms in the county rose, but they are smaller, thus reducing the amount of acres of land in farms. Similarly, a comparison of forested land also indicates a reduction in forested areas. The 2007 Plan identified 175,800 acres or 59.1% of the county was forest lands. Current data shows 124,006.88 acres or 39.8% of Grand Traverse County is forested. While growth in the county has remained steady, it has been noted that the type of growth is changing. Office 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.

Population

Grand Traverse County is the most populated county in the ten county region of northwest lower Michigan (Table 2) and is the 22nd most populated county in the state. The 2019 American Community Survey estimated the county population to be 92,181 people. A comparison of the 2010 and 2019 indicates an upward county population growth trend with a 7.1% increase from 2010 where the population was an estimated 86,061 (Table 3). The 2010 population per square mile is 187.3 people.

Grand Traverse County is comprised of thirteen (13) townships, two (2) villages, and one (1) city. The City of Traverse City, which is also the county seat, makes up 17% of the population. However, nearby Garfield Township is the most populated jurisdiction in the county with 17,319 people (19% of the population). The combined populations of Traverse City, Garfield Township and portions of other surrounding jurisdictions including Blair Township, East Bay Township, and Long Lake Township are likely to create a new metropolitan statistical area with the result of the 2020 decennial Census. All communities, with the exception of Kingsley Village, Fife Lake Township, and Union Township, experienced growth during the subject years (shown in green, Table 3). Grant Township, located in the southwest part of the county, saw the largest percent growth with 17.6%. This is followed by Blair Township which saw the second largest percent growth as well as the second largest numeric growth. Garfield, Blaire, and East Bay Townships saw the largest numeric growth in the county and are within easy commuting distance from Traverse City.

Table 2: Regional Population by County, State 2019

County	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	9,986,857

Source: US Census, 2019 ACS Estimate

Table 3: Population Change by Municipality, 2010, 2019

Municipality	2010 Estimated Population	2019 Estimated Population	Numeric Change	Percent Change	Jurisdiction Status*
Grand Traverse County	86,061	92,181	6,120	7.1%	2
Fife Lake Village	357	382	25	7.0%	2
Kingsley Village	1,511	1,352	-159	-10.5%	2
<hr/>					
Acme Township	4,416	4,694	278	6.3%	2
Blair Township	7,956	8,933	977	12.3%	2
East Bay Township	10,617	11,492	875	8.2%	2
Fife Lake Township	2,617	1,978	-639	-24.4%	2
Garfield Township	15,939	17,319	1,380	8.7%	2
Grant Township	1,034	1,216	182	17.6%	3
Green Lake Township	5,688	6,213	525	9.2%	2
Long Lake Township	8,565	9,321	756	8.8%	2
Mayfield Township	1,506	1,612	106	7.0%	2
Paradise Township	4,655	5,085	430	9.2%	2
Peninsula Township	5,445	5,776	331	6.1%	2
City of Traverse City	14,608	15,338	730	5.0%	2
Union Township	439	411	-28	-6.4%	3
Whitewater Township	2,576	2,793	217	8.4%	2

Source: US Census, 2019 ACS Estimate

* 1. A new participant, 2. A continuing participant, and 3. A non-participant

Like many northwest Michigan communities, Grand Traverse 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 *Northwest Michigan Seasonal Population Analysis*, a 2014 report by the Michigan State University Land Policy Institute, analyzed the 2012 seasonal population for ten counties in northwest Michigan. The data collected for Monthly Permanent, Seasonal and Transient Residents by County estimates the population of Grand Traverse County increases by 19% in the month of July from 89,112 to 110,557. The following ten counties were included in the study: Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, Manistee, Missaukee, and Wexford.

Although the data in this report is several years old, anecdotally, the influx of seasonal residents and tourists has not decreased. While the population staying in overnight accommodations such as motels, hotels, and bed and breakfasts was considered, the boom of short-term rental accommodations changed the overnight stay market considerably. The implications of seasonal and short-term rental accommodations on hazard mitigation planning are included in discussions throughout this plan.

Age, Race & Disability

Understanding the age distribution and median age of Grand Traverse County can help identify social, economic, and public service needs in the community. The county's total 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 2 indicates the cohort group with the largest population is the 20 to 44 year old group. This is closely followed by the 45 to 64 years cohort. As shown in Figure 3, the median age (the midpoint where half the population is younger and half the population is older) of Grand Traverse County is older (42.8) than the State (39.7). The youngest community in the county is Blair Township with a median age of 34.4; the oldest community in the county is Peninsula Township with a median age of 55.2 (Figure 4).

Figure 2: Grand Traverse County Population by Age Cohort, 2019

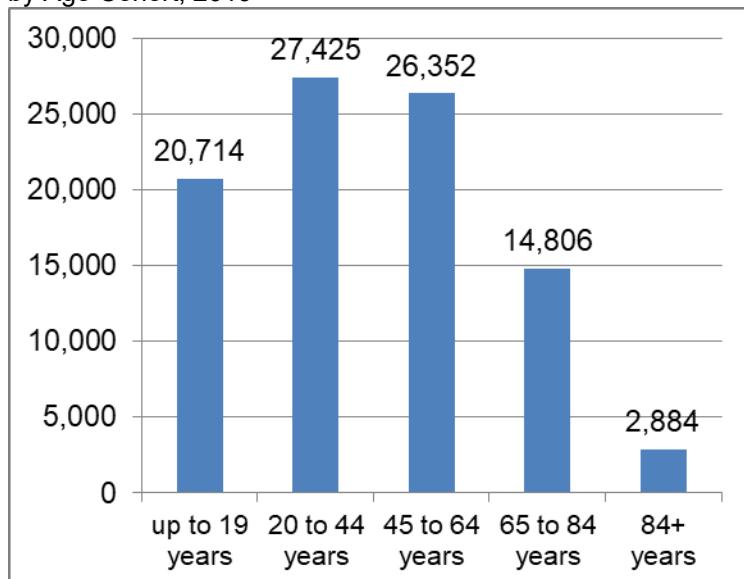
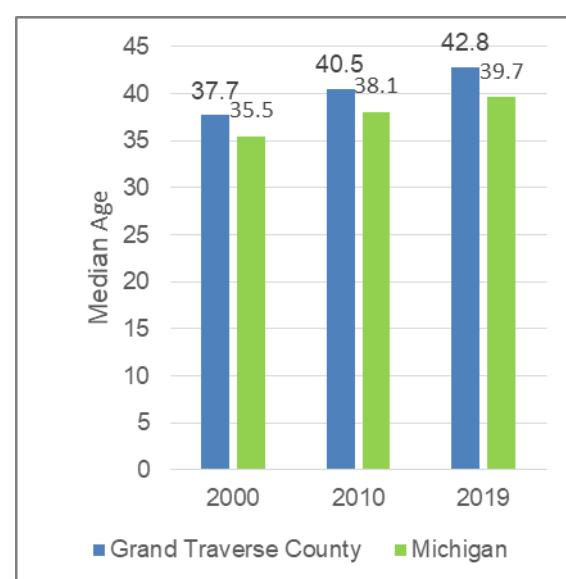
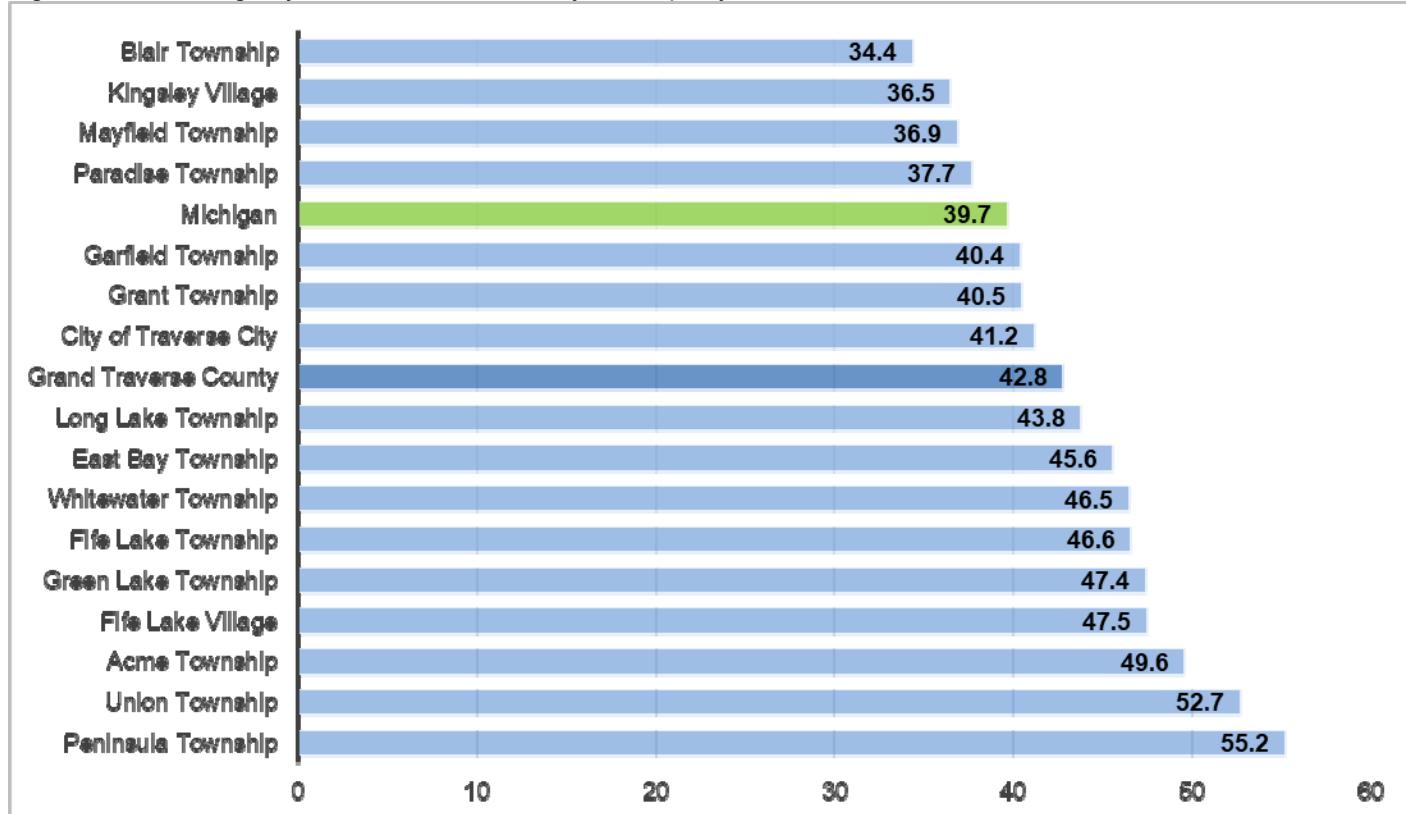


Figure 3: Median Age Trend, 2000, 2010, and 2019



Source: U.S. Census, 2000 Decennial Census and 2010 and 2019 ACS

Figure 4: Median Age by Grand Traverse County Municipality, 2019



Source: U.S. Census, 2019 ACS Estimate

The racial makeup of Grand Traverse County is predominantly white. 94.8% of the population is white while the American Indian and Alaskan Native population is 1.0%, the Black population is 0.9%, and those of two or more races is 2.3%.

Table 4 represents the number of persons with a disability by age group. 11,288 or 12.4% of people are estimated to have a disability. 30.5% of persons 65 years and over are reported to have a disability.

Table 4: Persons with a Disability, 2019

Total Civilian Noninstitutionalized Population	90,808
With a disability	11,288
Under 18 with a disability	805
18 to 64 years with a disability	5,223
65 years and over with a disability	5,260

Source: US Census, 2019 ACS Estimate

Housing Characteristics and Development Trends

The average household size for County residents is 2.44, very similar to the State's average of 2.46. Grand Traverse County has an estimated 37,408 total households. The Census defines a household as all the people who occupy a single housing unit, regardless of their relationship to one another. In 2019, there were 43,942 housing units reported in the 2019 ACS 5-Year Estimates in Grand Traverse County (Table 5), of which 37,319 are occupied. Garfield Township has the largest percentage of housing units of all municipalities in the county (18.7%). 72% (31,837) of units are 1-unit, detached structures or commonly referred to as single-family homes. 57% of structures were built after 1980 (Table 6).

Table 5: Housing Units by Municipality, 2019

Municipality	2019 Housing Units (ACS)	Percent of 2019 Total
Grand Traverse County	43,942	
Fife Lake Village	277	
Kingsley Village	586	
Acme Township	2,634	6.0%
Blair Township	3,629	8.3%
East Bay Township	5,527	12.6%
Fife Lake Township	936	2.1%
Garfield Township	8,203	18.7%
Grant Township	590	1.3%
Green Lake Township	3,190	7.3%
Long Lake Township	4,295	9.8%
Mayfield Township	706	1.6%
Paradise Township	1,873	4.3%
Peninsula Township	3,371	7.7%
City of Traverse City	7,325	16.7%
Union Township	249	0.6%
Whitewater Township	1,414	3.2%

Source: US Census, 2019 ACS Estimate

Table 6: Year Structure Built, 2019

Year Built	Housing Units	Percentage of Units
Built 2010 or later	2,740	6%
Built 2000 to 2009	7,503	17%
Built 1980 to 1999	15,047	34%
Built 1960 to 1979	10,140	23%
Built 1940 to 1959	3,662	8%
Built 1939 or earlier	4,850	11%
Total Housing Units	43,942	

Source: US Census, 2019 ACS Estimate

Housing Tenure, Table 7, summarizes the status of housing units, whether occupied or vacant, as well as the median housing value (\$212,500) and the median gross rent (\$ 951). Of the 43,942 total housing units, 37,319 or 84.93% are occupied.

Table 7: Housing Tenure, 2019

Total housing units	43,942	%
Occupied housing units	37,319	84.93%
Owner-occupied	28,480	87.10%
Median Housing Value	\$ 212,500	
Renter-occupied	8,839	12.90%
Median Gross Rent	\$ 951	
Vacant housing units	6,623	15.07%

Source: US Census, 2019 ACS Estimate

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 8 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. Antrim County has the lowest average annual wage with \$ 33,081. As Grand Traverse County's northern neighbor, it is not unexpected to have residents of Antrim County travel to Grand Traverse County for work.

Table 8: Average Annual Wage by County, 2018

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

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

The Economic Profile of Grand Traverse County is further described in Table 9. The table provides the county's industry makeup divided into 20 different North American Industry Classification Sectors (NAICS) as well as industry's establishments, jobs, percent distribution, and annual average wage. The industry with the largest percent distribution is "Health care, social assistance" with 19.80% followed by "Retail trade" with 15.40%. The annual average wage for "Health care, social assistance" is \$ 54,081 while "Retail trade" is \$ 30,742. "Retail trade" ranks 17 out of the 19 wage figures available. The industry with the highest annual average wage is "Mining" with \$ 114,461 followed by "Utilities" with \$ 103,481. The "Mining, Quarrying, and Oil and Gas Extraction" sector comprises establishments that extract naturally occurring mineral solids, such as coal and ores; liquid minerals, such as crude petroleum; and gases, such as natural gas.

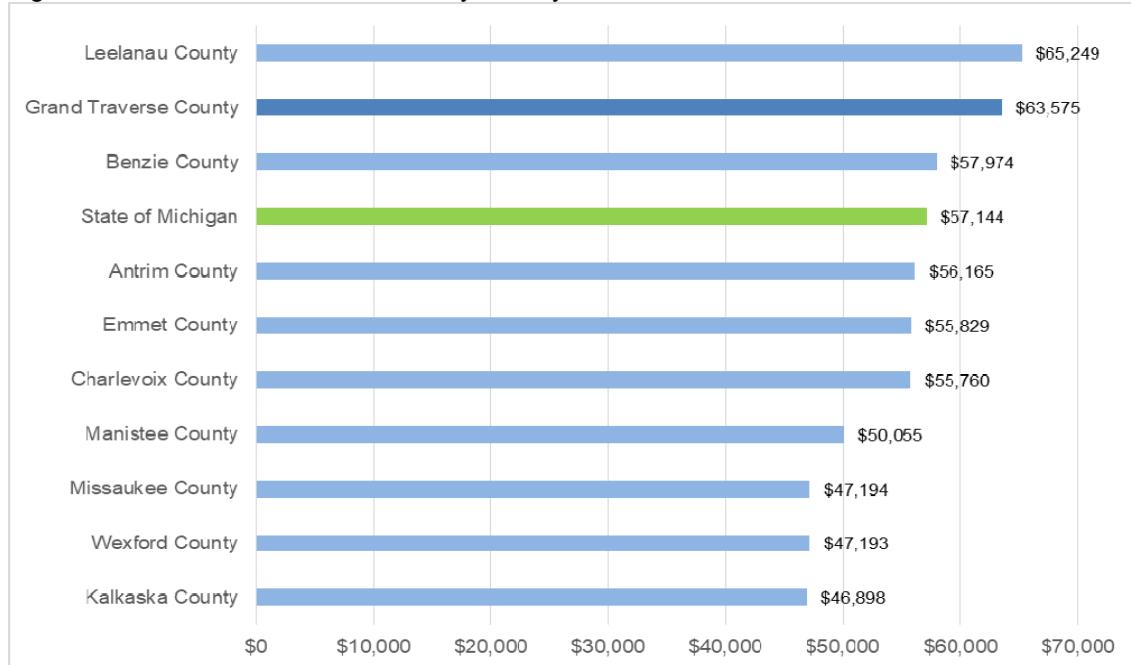
Table 9: Grand Traverse County Economic Distribution by Industry, 2018

Industry Description	Establishments	Jobs	Percent Distribution	Annual Average Wage
Total Covered Employment	3,287	49,968	100%	\$44,562.00
Agriculture, forestry, hunting	38	345	0.70%	\$37,193.00
Mining	31	157	0.30%	\$114,461.00
Construction	354	2,602	5.20%	\$49,056.00
Manufacturing	203	5,236	10.50%	\$51,684.00
Wholesale trade	114	1,306	2.60%	\$55,392.00
Retail trade	479	7,704	15.40%	\$30,742.00
Transportation, warehousing	73	922	1.80%	\$47,573.00
Utilities	11	220	0.40%	\$103,481.00
Information	76	872	1.70%	\$52,805.00
Finance and Insurance	154	2,174	4.40%	\$80,220.00
Real Estate, rental, leasing	135	573	1.10%	\$40,845.00
Professional, technical services	373	1,970	3.90%	\$60,399.00
Administrative, waste services	178	1,394	2.80%	\$37,186.00
Educational services	50	1,111	2.20%	\$33,175.00
Health care, social assistance	324	9,913	19.80%	\$54,081.00
Arts, Entertainment, recreation	65	619	1.20%	\$24,621.00
Accomodation and food services	258	5,986	12.00%	\$20,599.00
Other services, exc. Public admin.	277	1,581	3.20%	\$31,971.00
Public administration	56	1,379	2.80%	\$51,527.00
Other includes (private, management of business, and unallocated)				

Source: 2021 Comprehensive Economic Development Strategy, Networks Northwest

Figures 5 and 6 present a comparison of the median household income (MHI) across the ten county region, the State of Michigan, and local jurisdictions. Grand Traverse County has the second highest median household income (\$ 63,575) behind Leelanau County (\$ 65,249). The 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 30 percent – that a household should spend no more than 30 percent of its income on housing costs. Considering the MHI of Grand Traverse County over twelve months, a household is earning \$5,298 per month. The average household can afford a \$1,589 monthly rent or mortgage payment. The estimated median gross rent in Grand Traverse County is within this range. However, anecdotally, the cost of rent is much higher and demand is driving prices higher still. Home prices are also increasing where the cost to purchase a home is often as much as \$200/square foot or more.

Figure 5: Median Household Income by County, 2019



Source: US Census, 2019 ACS Estimate

Figure 6: Median Household Income by Local Jurisdiction, 2019



Source: US Census, 2019 ACS Estimate

The following tables describe the population with the lowest incomes. It is estimated, in 2019, that 9.6% of all people in the county lived at or below the poverty level (Table 10). The Census describes poverty thresholds differently based on the size of the family and the number of related children living together. 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 living. Based on a calculation of the actual costs of basic necessities such as child care, transportation, housing, and healthcare, the report establishes the ALICE Threshold, “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 11 identifies the number of ALICE and poverty households for each municipality in the county.

Table 10: Poverty Statistics, 2019

Poverty	Statistics
Families in poverty	6.3%
Families in poverty with related children	11.2%
Family income less than \$15,000	4.1%
All people in poverty	9.6%

Source: US Census, 2019 ACS Estimate

Table 11: United Ways of Michigan ALICE Report Findings, 2019¹

ALICE and Poverty Households	Total Households	% of HH in Poverty and ALICE
Acme Township	2,039	19%
Blair Township	3,204	43%
East Bay Township	4,575	27%
Fife Lake Township	618	40%
Garfield Township	7,666	43%
Grant Township	451	30%
Green Lake Township	2,525	30%
Long Lake Township	3,589	19%
Mayfield Township	565	31%
Paradise Township	1,632	37%
Peninsula Township	2,554	22%
City of Traverse City	6,697	40%
Union Township	175	30%
Whitewater Township	1,029	24%
Grand Traverse County	37,319	33%

¹ Michigan Association of United Ways. *ALICE in Michigan: A Financial Hardship Study*. 2021. file:///C:/Users/jenniferneal/Downloads/2021ALICEReport_MI_FINAL.pdf

IV. Hazard Identification and Assessments

Vulnerability Assessment

Natural hazard impact 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, and persons with a disability. Those that live unsheltered or in homeless encampments, assisted living facilities, mobile home parks, or isolated subdivisions are more susceptible to hazardous events. Vulnerable populations are represented on the Vulnerable Populations and Hazard Areas Map in Appendix A. Those locations included on the map were specifically mentioned during public input sessions. There may be additional locations of vulnerable populations that are not listed.

As shown in Table 9, the primary economic generators in Grand Traverse County are health care, social assistance, and retail trade. These industries are primarily located in Traverse City, Garfield Township, East Bay, and Acme Townships. Specific locations include Munson Healthcare (hospital), the central business district in downtown Traverse City, and other established and growing commercial centers in the area. The built environment of north-central Grand Traverse County supports housing and other commercial and professional services for more than one-third of county residents. This area is critically important both economically and as a resource for community members. It is vulnerable to all countywide hazards and flood events. This is further detailed in the hazard analysis. Infrastructure points (stream crossings, bridge conditions, and dams) and their ratings are mapped on the Infrastructure Map in Appendix A.

The natural environment is the primary feature residents choose to live in northwest Michigan and the primary feature visitors choose to vacation in northwest Michigan. Grand Traverse County is home to forest lands, water features, and shorelines and all of the wildlife within them 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 environments may decrease the chances for certain species' survival.

Additionally, countywide critical infrastructure is represented on the Critical Infrastructure Map, shown below. Task Force members and community stakeholders identified the critical facilities and infrastructure on the base map and provided updated GIS shape files for mapping purposes. The Critical Infrastructure Points Map is in Appendix A. Table 12 is a summary of critical infrastructure points in Grand Traverse County:

Table 12: Critical Facilities and Infrastructure

No. of Facilities (TOTAL)	FACILITY TYPE
27	Commercial <ul style="list-style-type: none"> Food processing, packaging, storage Banking and credit Public gathering facilities
4	Communications
22	Emergency Services <ul style="list-style-type: none"> Law enforcement Fire and emergency services
21	Energy <ul style="list-style-type: none"> Electricity Natural gas
25	Government Facilities
16	Healthcare
300.8	active physicians per 100,000 people ² (Michigan)
16	<ul style="list-style-type: none"> Hospital – Munson Medical Center Extended care facilities Local care facilities
3	Industry
37	School <ul style="list-style-type: none"> Higher Education Kindergarten - highschool
4	Transportation <ul style="list-style-type: none"> Airports <ul style="list-style-type: none"> Traverse City Cherry Capital Airport – 602,626 passenger movements (2021) Green Lake Township Airport Mass Transit <ul style="list-style-type: none"> BATA Bus Mail processing

Source: Grand Traverse County Emergency Management

² Gooch, Kelly & Plescia, Marissa. "States ranked by active physicians per capita." Becker's Hospital Review. 2022. <https://www.beckershospitalreview.com/workforce/this-state-has-the-most-physicians-per-capita.html>

Historical Analysis

The Historical Analysis of Grand Traverse County weather-related hazards uses information on impacts and losses from previous hazard events to predict potential impacts and losses during a similar event. Because of the frequency of these events, communities are more likely to have experience with and data on impacts and losses. There have been eight distinct disaster declarations that have involved Grand Traverse County (Table 13). These events are further included in the hazard analysis for individual event types.

Table 13: Presidential and Governor Declared Disasters

Date Declaration	Type of Incident	Affected Area	Type of Declaration/	Notes
			Fed ID #	
3/1/2020	COVID-19; COVID-19 Pandemic	Statewide & National	State of Emergency, National Emergency (3455), and Governor and Presidential Declared Major Disaster (4494)	
1/29/2019	Extreme Cold	Statewide	Governor Declared Emergency	
8/2/2015	Thunderstorms	City of Traverse City; Townships of Acme, East Bay, Garfield, Long Lake, Peninsula, Whitewater; Grand Traverse County; Leelanau County.	Governor Declared Emergency	Extensive debris cleanup
9/4/2005 and 9/7/2005	Hurricane (Katrina) Evacuation	Statewide	Governor Declared Disaster and Presidential Declared Emergency (3225)	Declared due to the emergency conditions in the State of Michigan, resulting from the influx of evacuees from states impacted by Hurricane Katrina beginning on August 29, 2005.
2/21/1986	Great Lakes Flooding, Wave Action	Grand Traverse and other counties	Governor Declared Disaster	
1/26-27/1978	Blizzard, Snowstorm	Statewide	Presidential Declared Emergency (3057); Governor Declared Disaster	
3/2/1977	Drought	Grand Traverse and 43 other counties	Presidential Declared Emergency (3035)	

Source: FEMA

Hazard Descriptions

Grand Traverse County is vulnerable to a wide range of natural hazards. Hazard events have the potential to impact local residents, economic drivers in the community, critical infrastructure and the built environment, and the natural environment. The Grand Traverse County Emergency Management is challenged with managing these threats to protect life and property. This plan includes a profile for each natural hazard event the county is likely to face. Each profile includes the location, extent, previous occurrences, probability of future events, and 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 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 collected from the National Oceanic and Atmospheric Administration's National Centers for Environmental Information data center (NOAA).
- Probability of future events is the likelihood of the hazard occurring in the future and can be described in a variety of ways. Probability may be defined using historical frequencies or statistical probabilities.
- Vulnerability assessment accounts for the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas and provides an estimate of the potential dollar losses to vulnerable assets identified.

Data for natural hazard events in Grand Traverse 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 utilizing the following sections:

- Weather/Climate Events, Information, Assessments
- Climatology and Extreme Events
- NOAA Storm Event Database; started at 1950 to present, however, information for various events is limited. The database utilizes local storm reports, damage reports, events checked for Grand Traverse County included: Drought (Drought), Flood (Flash Flood, Flood), Shoreline (Lakeshore) Flood, Hail (Hail), Extreme Winter Weather (Blizzard, Extreme Cold/Wind Chill, Freezing Fog, Frost/Freeze, Heavy Snow, Ice Storm, Lake-effect Snow, Sleet, Winter Storm, Winter Weather), Tornado (Tornado, Funnel Cloud), Thunderstorm and High Wind (Heavy Rain, High Wind, Lightning, Strong Wind, Thunderstorm Wind), Wildfire (Wildfire)

The *Michigan Hazard Analysis* report by the Michigan Department of State Police in 2019 was used to collect data on wildfires. The National Inventory of Dams was used to collect information on countywide dams.

Event data is added on a rolling basis, and thus the database is always being added to. The most up to date information was collected, but as events occur the database will change. Thus, 2022 is likely only partially represented. As of 5/31/2022, 288 events were reported between 02/01/1950 and 02/28/2022 (26326 days). Those events as well as the emergency declaration events are included in the hazard analysis. The hazard analysis groups the events into the following categories:

Table 14: Reported Grand Traverse County Event by Type, 1950-2022

Type of Event	# of Events	Event Location	Priority
Extreme Winter Weather (Inc. Ice, Snow, Blizzard)	130	Countywide	3
Thunderstorms and Severe Winds	90	Countywide	2
Hail	40	Countywide	
Riverine and Urban Flooding	12	Acme, Blair, East Bay, Fife Lake, Garfield, Grant, Green Lake, Long Lake, Mayfield, Paradise, Union, and Whitewater Townships, Village of Kingsley, Village of Fife Lake, and City of Traverse City	1
Lightning	6	Countywide	
Tornado	4	Countywide	
Extreme Temperatures (Heat / Cold)	2 / 3	Countywide	
Drought	2	Countywide	4
Wildfire	435	MDNR Lands	
Shoreline Hazard(Coastal Flooding / Coastal Recession)	3	Acme, East Bay, Peninsula Townships and City of Traverse City	5
Infectious Disease	1	Countywide	
Invasive Species	1	Countywide	

Source: NOAA: National Centers for Environmental Information and MDNR

Economic Impact Analysis

The economic impact of *reported* Grand Traverse County natural hazards is \$17,402,500 in property damages and \$20,001,000 in crop damages since 1950 (Table 15). Events such as hail likely cause numerous residents small amounts in property damage, but go unreported. The total reported Damaging Events' Costs recorded since 1950 with the National Oceanic and Atmospheric Administration for Grand Traverse County are as follows:

Table 15: Damage Cost by Event Type

Grand Traverse County	Property Damage Cost	Crop Damage Cost
Extreme Winter Weather	\$618,000	\$20,000,000
Thunderstorm and High Wind	\$13,468,500	\$1,000
Hail	\$0	\$0
Riverine and Urban Flooding	\$2,339,000	\$0
Lightning	\$170,000	\$0
Tornado	\$775,000	\$0
Extreme Temperatures	\$0	\$0
Drought	\$0	\$0
Wildfire	\$0	\$0
Shoreline Hazards	\$32,000	\$0
Public Health Emergency	NA	NA
Invasive Species	NA	NA
TOTAL	\$17,402,500	\$20,001,000

Source: NOAA: National Centers for Environmental Information and MDNR

Table 16 provides an overview of each potential hazard's impact on the permanent population and the estimated impact on the State Equalized Values (SEV) for real and personal property (residential and commercial). Population data is collected from the US Census, 2019 ACS data. According to the 2014 Northwest Michigan Season Population Analysis, assume a 19% increase to account for the annual average seasonal population within the county.

Table 16: Geographic Economic Impact by Event

Hazard Event	Geography	Population Totals	State Equalized Value
Extreme Winter Weather, Thunderstorm, Hail, Lightning, Tornado, Extreme Temperatures, Drought	Grand Traverse County	92,181	\$ 7,671,677,680
Inland Flooding	Boardman River and other inland lake jurisdictions	86,405	\$ 22,118,365.90
Wildfire	Areas within Jack Pine forest	22,028	\$ 654,119,413.10
Shoreline Hazards	Acme, East Bay, and Peninsula Townships, City of Traverse City	37,300	\$ 218,792,198.29

Source: 2019 ACS Estimate, Grand Traverse County Equalization

Extreme Winter Weather

National Weather Service defined as: *phenomenon (such as snow, sleet, ice, wind chill) that impacts public safety, transportation, and/or commerce.* The Extreme Winter Weather category 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, Michigan has 360 snowstorms with 0.1 average annual deaths, 0.1 average annual injuries, and \$1.9 million in average annual property and 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 in the northwest region of the Lower Peninsula.

Ice and Sleet Storms are storms that 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. Often times, ice storms are accompanied by snowfall, which sometimes causes extensive damage, treacherous conditions, and power loss. On the other hand, sleet storms are small ice pellets that bounce when hitting the ground or other objects. It does not stick to trees or wires, but can cause hazardous driving conditions. When electric lines are down, households are inconvenienced, and communities experience economic loss and the disruption of essential services.

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 Grand Traverse County is at risk to the occurrence and impacts from extreme winter weather; the county is more susceptible to lake-effect snow due to proximity to Lake Michigan.

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 \$600,000 in reported damages.

The frost/freeze event listed in Table 17 took place on April 27, 2012 across Northwest Lower Michigan, but especially in the Traverse City region. 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.

Extent

Snowstorms can be measured based on snowfall accumulations or damages. The average annual snowfall in Grand Traverse County is 101.4 inches. On March 2, 2012 Grand Traverse County had \$600,000 in property damages and \$5,000,000 in crop damage caused by heavy snow. Extreme winter weather events in total caused \$618,000 in property damages and \$20,000,000 in crop damages between 1950-2021.

Previous Occurrences

Since 1950, there have been 130 extreme winter weather events, including heavy snowstorms, ice storms, frost/freeze, blizzards, winter weather, and winter storms reported in Grand Traverse County (Table 17). In 1978, Grand Traverse County 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 frequent recorded 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.

Table 17: Extreme Winter Weather Previous Occurrences, 1950-2022

Event Type	Number of Events	Property Damage	Crop Damage	Event Year(s)
Winter Weather	1	\$ -	\$ -	2006
Winter Storm	55	\$ 12,000	\$ -	1997-2022
Ice Storm	4	\$ -	\$ -	2001, 2002, 2005, 2008
Heavy Snow	44	\$ 600,000	\$ 5,000,000	1996-2020
Blizzard	6	\$ 6,000	\$ -	1978, 1997, 1998, 1999, 2002, 2019
Frost/Freeze	1	\$ -	\$ 15,000,000	2012
Lake-Effect Snow	19	\$ -	\$ -	2006-2019
TOTAL	130	\$ 618,000	\$ 20,000,000	

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment

Since 1950, Grand Traverse County has had 130 extreme winter weather events. This averages to about two 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. Grand Traverse County remains a leading producer of fruits, tree nuts, and berries with over \$19 million products sold. A frost/freeze event of the magnitude in 2012 would decimate more than three quarters of the products sold today. This would be a huge blow to an economy that is also heavily reliant on agriculture and agri-tourism (wineries, orchards, etc.).

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 work remotely from highly desirable northern and coastal communities like those in Grand Traverse County. Many aspects of Grand Traverse County, including natural wooded areas, are attractive to prospective buyers and the permanent population is expected to continue to grow. 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 are dispatched to rural areas.

Thunderstorms and Severe Winds

Severe thunderstorms are weather systems accompanied by strong winds (at least 56mph), lightning, heavy rain (that could cause flash flooding), hail (at least 3/4." diameter), or tornadoes. 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.

Severe wind events are included in this category. Long-lived wind events associated with fast-moving severe thunderstorms are known as a derecho. A derecho often occurs during the spring or summer; however, it can occur any time of the year. According to The National Severe Storms Laboratory, winds in excess of 58 miles per hour are considered to be a derecho. Severe windstorms can cause damage to homes and businesses, power lines, trees and agricultural crops, and may require temporary sheltering of individuals without power for extended periods of time.

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 Grand Traverse County is at risk to the occurrence and impacts from thunderstorms and severe winds.

The most damaging event occurred on August 2, 2015. A historic severe weather outbreak in northern Michigan, as multiple waves of severe thunderstorms crossed the region. A passing cold front would finally end the activity during the evening hours. 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 \$ 7,800,000 in property damages.

\$ 1,000 in crop damages was reported during an event on August 27, 2004. The narrative describes the event, "Thunderstorms rolled across Lake Michigan into Northern Lower Michigan during the overnight hours. A few of these storms produced damaging wind gusts."

Extent

Thunderstorms can be measured based on wind speed or damages. The average wind speed for events in Grand Traverse County is 52 knots. Grand Traverse County had \$13,468,500 in property damages and \$1,000 in crop damages caused by thunderstorms and severe winds.

Previous Occurrences

Since 1950, there have been 90 thunderstorm events accompanied by strong winds and severe wind events reported in Grand Traverse County. In 2015, Grand Traverse County received a Governor Emergency Declaration for a thunderstorm.

Table 18: Thunderstorm and Wind Events Previous Occurrences, 1950-2021

Event Type	Number of Events	Property Damage	Crop Damage	Event Year(s)
Thunderstorm Wind	81	\$ 13,303,000	\$ 1,000	1950-2021
High Wind	8	\$ 165,000	\$ -	1998, 2003, 2005, 2005, 2010, 2020, 2021, 2021
Strong Wind	1	\$ -	\$ -	2001
TOTAL	90	\$ 13,468,500	\$ 1,000	

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment

Since 1950, Grand Traverse County has had 90 thunderstorm events accompanied by strong winds. This averages to 1.25 events every year. The probability of an event occurring in future years is 100 percent. Damage from straight line winds usually affects multiple counties through the loss of electricity from trees/tree limbs downing power lines; causing widespread property damage; and potentially exposing the public to severe injury or fatality due to flying debris. The magnitude and severity depend on the county population, seasonal activity, and the spread of development. During the warm or summer months, the population expands to include both the permanent resident base population and the seasonal short- and long-term population. The seasonal population is attracted to both rural, sparsely populated rural areas and urban activity centers. Mobile home parks, campgrounds, construction areas, institutions (schools, places of worship, etc.), and numerous festivals that draw a large number of tourists such as the National Cherry Festival were identified as specific areas of concern.

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 Grand Traverse County is at risk to the occurrence and impacts from hailstorms. According to the National Weather Service, Grand Traverse County is in an area of the United States that has on average two days of hailstorm events per year.

During one particularly strong event on July 17, 2006, hail damage was significant. A strong cold front ran headlong into warm and humid air in place over Michigan. Thunderstorms ignited by midday in Eastern Upper Michigan, and became widespread by late afternoon in Northern Lower Michigan. A large number of storms became severe, as this became the largest severe weather outbreak in Northern Michigan in several years. Millions of pounds of fruit crops were destroyed by hail and wind. The reported hail size was .88", roughly the size of a nickel.

Extent

Hailstorms are categorized using the TORRO Hailstorm Intensity Scale, which ranges from H0 (Hard Hail) to H10 (Super Hailstorms) (Table 19). According to the NOAA National Centers for Environmental Information, the approximate size of hail is described as follows:

Table 19: 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 Grand Traverse County was 2 inches on July 7, 1980, which correlates to H6 (destructive) on the TORRO Hailstorm Intensity Scale. According to the scale, hailstones of this size are equivalent to a hen egg and can damage ground aircraft and brick walls. Details pertaining to this event are minimal.

Previous Occurrences

Between 1950 and 2021, Grand Traverse County had 40 hailstorms reported to NOAA (Table 20). There are no damages, injuries, or deaths attributed to hail.

Table 20: Hail Events, 1950-2022

Location	Date	Magnitude
Grant Township	9/7/1958	0.75
Long Lake Township	5/21/1970	1.75
Grant Township	5/18/1971	0.75
Garfield Township	4/18/1975	1.5
Fife Lake	7/7/1980	2
Blair Township	7/14/1982	1
Garfield Township	3/27/1991	0.75
Traverse City	4/24/1993	1
Bates	4/24/1993	1
Traverse City	4/7/1999	0.75
Traverse City	6/9/2000	1.75
Traverse City	9/1/2000	1
Fife Lake	6/8/2003	0.75
Traverse City	8/28/2003	0.88
Interlochen	9/7/2005	0.88
Traverse City	6/28/2006	0.88
Kinglsey	6/28/2006	0.75
Old Mission	7/17/2006	0.88
Traverse City	10/3/2006	1.25
Traverse City	6/15/2008	1.25
Williamsburg	6/15/2008	1
Traverse City	7/28/2010	0.88
Hannah	4/10/2011	0.88
Old Mission	6/8/2011	1.25
Old Mission	6/8/2011	1
Acme	5/3/2012	1
Williamsburg	5/20/2012	1.25
Fife Lake	5/28/2012	1
Interlochen	7/26/2014	0.88
Kinglsey	7/26/2014	0.75
(TVC) Traverse City	7/27/2014	0.75
Grawn	7/27/2014	1
Williamsburg	8/14/2015	0.75
Fife Lake	8/14/2015	1
(TVC) Traverse City	7/8/2016	1
Kinglsey	4/20/2017	1
Interlochen Arpt	7/31/2017	1
Grawn	5/25/2019	0.75
Traverse City	5/25/2019	1.25
Grawn	10/13/2020	0.88

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment

With 40 events reported in the past 72 years, Grand Traverse County has a 55% chance of a major hailstorm every 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. Several manufactured home parks are located throughout the county and are more susceptible to hail damage. 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

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.

Urban flooding occurs when water flows into low-lying areas because it does not have a place to go. 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.

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 MDEQ 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. Grand Traverse County experienced twelve flood events since 1999, with \$2,361,000 in property damages. The largest was a failure by a temporary dam structure in 2012 which impacted 53 homes.

Location

The City of Traverse City is the urbanized center of the county and the most likely location to experience both riverine and urban flooding. Ten of the twelve flooding events occurred in or near Traverse City. Not only does the city have a significant amount of impervious surface coverage, but also the county's major river system, the Boardman (Ottaway) River, travels north through the city to reach the Grand Traverse Bay. Boardman River starts in Kalkaska County to the east, and travels through Whitewater, Union, Fife Lake, Acme, East Bay, Paradise, Garfield, Blair, and Mayfield Townships and Village of Fife Lake, and Village of Kingsley. These townships and villages are likely to experience riverine flooding from the Boardman River tributaries. Long Lake, Green Lake, and Grant Townships 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.

The Boardman-Ottaway River historically had several dams located in Grand Traverse County. The Brown Bridge Dam, Boardman Dam, and Sabin Dam have been removed and portions of the river are restored to its natural channel. The Union Street Dam is the only remaining high hazard potential dam in the county. The Union Street Dam is located between S. Union Street and Cass Street, south of E. State Street in downtown Traverse City. This is the heart of the central business district which is the economic generator for the county as well home to many senior and economically disadvantaged residents. In addition to flooding businesses and residences on the west side of Traverse City, a dam failure would hit several critical pieces of infrastructure including a transportation facility, schools, and the post office. Hannah Park is directly downstream from the Union Street Dam and would help dissipate water, but largely, downtown would be inundated with water with little means to reach Grand Traverse Bay.

On October 6, 2012, flash flooding occurred along the Boardman River, downstream of the Brown Bridge Dam. A temporary dam and de-watering structure was in place alongside the Brown Bridge Dam on the Boardman River. This temporary dam was to assist in drawing down the small lake (Brown Bridge Pond) behind the dam, prior to the permanent removal of the Brown Bridge Dam. This temporary dam failed on the morning of October 6th, and by late afternoon, most of the remaining water in Brown Bridge Pond had been released downstream. Within an hour, road closing occurred along Garfield and River Roads, and homes were evacuated along the river between Garfield and Keystone Roads. Eventually, 53 homes were impacted, with varying degrees of damage. Environmental damage, related to sediment deposition and fish kills, was possible. This event resulted in \$1,800,000 in damages.

Extent

In Grand Traverse County, flood extent can be measured by the amount of property damage and accumulation of rainfall. On May 28, 2020, the Traverse City experienced a flood event that caused \$ 310,000 in damages. Munson Hospital measured 3.12 inches of rain during the day on the 28th. Most of this was dumped in a short period of time, early in the afternoon. This resulted in a small area flash flooding in downtown Traverse City and on the near west side. Water rose up to three feet high on some roads and parking lots and in a few spots the water was higher. Some people were trapped in vehicles and required rescue. Numerous vehicles were heavily damaged. The basement of Munson Hospital flooded. Kids Creek rose out of banks, flooding roads and some buildings.

In a separate event, on June 10, 2020, Munson Hospital and Kids Creek were again flooded after quick hitting flash flooding developed in the area, in particular, on the near west side of the city. Training thunderstorms brought heavy rain to parts of Traverse City. Munson Hospital measured 2.45 inches of rain during the afternoon and evening. Kids Creek overflowed its banks, and Cedar Street and other roads near Munson Hospital were flooded. This event was extremely similar, though not quite as hard hitting as the flash flood in the same location on May 28, 2020. This event caused \$90,000 in damages.

Other road flooding occurred on October 23, 2020 following very heavy rain across the region. Logan's Landing along the Boardman River saw the parking lot flooded. Eleventh Street and Division Street saw flooding, as did West Front Street and Madison Drive. Flooding also occurred in the Three Mile Road area, near Mitchel Creek. This event caused \$35,000 in damages.

Previous Occurrences

Though not a common occurrence in the county, riverine flooding has occurred when spring snowmelt coincides with prolonged, intense rains. On April 4, 2014 a tardy spring thaw was enhanced by a widespread one to two inches of rain that fell on the 13th and 14th. This resulted in areas of high water in the mid portion of the month. The Boardman River flooded a few homes near Boardman Plains Road. In addition, Townline Road south of South Airport Road was closed by floodwaters. This event caused \$75,000 in damages. The county may see an increase in flood events from an increase in rain and snowfall, and the backwater effect from fluctuating high water levels of the Great Lakes. Overall flooding event caused \$2,361,000 in property damages, however, no deaths or injuries occurred from these events (Table 21).

Table 21: Fluvial and Pluvial Flood Events

LOCATION	DATE	EVENT TYPE	PROPERTY DAMAGE	CROP DAMAGE	FLOOD CAUSE
Traverse City	7/6/1999	Flash Flood	\$0.00	0	
Traverse City	7/27/2000	Flash Flood	\$0.00	0	
COUNTYWIDE	9/1/2000	Flash Flood	\$0.00	0	
NORTH CENTRAL PORTION	4/12/2001	Flash Flood	\$0.00	0	
Mayfield	10/6/2012	Flash Flood	\$1,800,000.00	0	Dam / Levee Break
Traverse City	11/17/2013	Flash Flood	\$14,000.00	0	Heavy Rain
Blair Township	4/14/2014	Flood	\$75,000.00	0	Heavy Rain / Snow Melt
Traverse City	5/28/2020	Flash Flood	\$310,000.00	0	Heavy Rain
Traverse City	6/10/2020	Flash Flood	\$90,000.00	0	Heavy Rain
(TVC) Traverse City	7/18/2020	Flash Flood	\$15,000.00	0	Heavy Rain
Traverse City	10/22/2020	Flood	\$35,000.00	0	Heavy Rain
Traverse City	7/24/2021	Flash Flood	\$0.00	0	Heavy Rain
TOTAL			\$2,361,000.00	0	

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment

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.

Since 1950, Grand Traverse County has had 12 flooding events. There is a 17% chance of an annual flood. The magnitude and severity depend on the county population, seasonal activity, and the spread of development. During the warm or summer months, the population expands to include both the permanent resident base population and the seasonal short- and long-term population. The seasonal population is attracted to both rural, sparsely populated rural areas and urban activity centers. Downtown Traverse City is also the epicenter for festivals and events such as the National Cherry Festival which takes place mid-summer over the Fourth of July holiday. The city's Downtown and Central Business District is located at the mouth of the Boardman River. Dense, urban development, including historical resources, vulnerable impoverished and elderly independent and assisted living facilities are located to the east and west of Boardman Lake. City infrastructure is also vulnerable where it intersects with the Boardman River. Erosion has caused the support to wear away leaving city water and sewer pipes exposed. Additionally, the Union Street Dam located in Downtown Traverse City is a high hazard potential dam.

Garfield Township, the most populated jurisdiction in the county, is located just south of Traverse City. Boardman Lake is located in the north-central portion of the township and the Boardman River traverses through to the south. Garfield Township has a number of elder care and independent living facilities and is expecting more residential development. Inadequate drainage infrastructure under South Airport road near the commercial/retail development Logan's Landing are causing frequent flooding of the road and nearby property, especially during heavy rain events and the spring snow melt season. Kids Creek is located in a heavily developed area of the township and experiences flooding regularly. Additionally, General Growth Dam near the Grand Traverse Mall is a significant hazard potential dam.

Specific flood hazard areas were identified during public meetings and are identified on the Hazard Areas Map provided in Appendix A. Flood hazard information may be obtained from the Flood Rate Insurance Maps (FIRM) available for jurisdictions. In order to delineate potential flood plain areas (seasonal floodplains) for each jurisdiction, Networks Northwest overlaid wetland, soils, and elevation data to determine the most likely flood prone areas. Once overlaid; isolated polygons (areas) were deleted in order to show a more accurate representation of potential flood prone areas along lakes, rivers, and streams. Sources: Temporary/Seasonally Flooded Areas data are from the National Wetland Inventory of the US Fish and Wildlife Service; Hydric soils data are from the county digital soil surveys (were available); and Digital Elevation Model data are from the Center for Geographic Information, Michigan Department of Information Technology.

NFIP Participation Status

Grand Traverse County participating communities received updated digital flood maps in 2018. The Village of Kingsley and Green Lake Township are sanctioned, and Union Township is sanctioned and suspended. These sanctioned and suspended communities did not achieve consensus to approve the maps, and therefore, are nonparticipants.

The county has only one property that has been identified by the National Flood Insurance Program as having suffered repetitive flood losses. The property is a single-family home located in Blair Township. It had been damaged by floods in 2012 and 2014, with similar amounts of damage occurring during each event. This property should be prioritized for flood mitigation activities, in order to prevent or reduce such losses in the future.

Table 22: NFIP Participation

Municipality	NFIP	FIRM Effective Date	Sanctioned Date
Acme Township	P	8/28/2018	
Blair Township	P	8/28/2018	
East Bay Township	P	8/28/2018	
Fife Lake Township	NP		
Village of Fife Lake	NP		
Garfield Township	P	8/28/2018	
Grant Township	NP		
Green Lake Township	NP	8/28/2018	8/28/2019
Village of Kingsley	NP	8/28/2018	8/28/2019
Long Lake Township	P	8/28/2018	
Mayfield Township	NP		
Paradise Township	P	8/28/2018	
Peninsula Township	P	8/28/2018	
City of Traverse City	P	8/28/2018	
Union Township	NP	8/28/2018	8/29/2018
Whitewater Township	P	8/28/2018	

Source: FEMA Community Status Book Report

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 Grand Traverse County is at risk to the occurrence and impacts from lightning.

Extent

Since 1950, six lightning events have been reported to NOAA in Grand Traverse County. Those six events have caused \$170,000 in property damages, one injury, and one fatality. The fatality and injury occurred on September 1, 2000 where a father and son were exposed on a hillside viewing the lightning storm. The 40 year old father was struck and killed by a lightning bolt. His son was thrown to the ground, but only sustained minor injuries. Emergency crews performed CPR on the father immediately and a police officer arrived with a defibrillator. However attempts to revive the man failed. During the same event, lightning later that Friday night also disrupted numerous high school football games. Many games were cancelled or postponed until the following Saturday morning. Many of the schools which began play had lengthy delays and many waited an hour or more before fans and players could return to the field.

Significantly, the March 8, 2000 lightning strike sparked a huge explosion at KCS Oil Company in Blair Township. More than 70 fire fighters from seven fire departments rushed to the scene. Fire fighters believe the lightning bolt struck an oil tank holding more than four hundred gallons of residue oil in it. Crews evacuated nearby houses and contained the fire, thereby preventing it from spreading to other tanks. This event caused \$20,000 in damages.

The event causing the most property damages occurred on April 18, 2002 on Old Mission Peninsula or Peninsula Township. A line of thunderstorms raced from west to east across northern Lower Michigan during the mid and late morning of the 18th. This line of storms produced scattered reports of severe wind gusts and wind damage. In addition, isolated large hail reports were received. A home was destroyed by fire caused by lightning strike. There were \$125,000 in damages.

Previous Occurrences

There have been six lightning strikes reported to NOAA since 1950. There was one injury and one fatality. Other events have resulted in damages to residential property. The following table is a record of lightning events in Grand Traverse County.

Table 23: Lightning Events

LOCATION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE
COUNTYWIDE	3/8/2000	0	0	\$20,000
COUNTYWIDE	9/1/2000	0	0	\$0
TRAVERSE CITY	9/1/2000	0	0	\$20,000
TRAVERSE CITY	9/1/2000	1	1	\$0
OLD MISSION	4/18/2002	0	0	\$125,000
WILLIAMSBURG	7/17/2006	0	0	\$5,000
TOTAL				\$170,000

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment

Since there have been six lightning events reported in the last 72 years, the data shows that there is a 8% chance a lightning strike would occur every year. However, not all lightning events may 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.

All existing and future buildings, exposed infrastructure, and populations are at risk 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. People that work outside or participate in outdoor recreation activities are at a higher risk to be struck by lightning.

Tornado

A tornado is a violently rotating column of air that extends from a thunderstorm to the ground, and can occur anytime during the day and throughout the year. It can only be seen if water droplets, dust, and debris form a funnel. The funnel cloud can have winds that reach up to 300 miles per hour with an interior air pressure that is 10-20% below the surrounding atmosphere's pressure. The length of a tornado path has been reported up to 200 miles. Tornado path widths are generally less than one-quarter mile wide. 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. According to the 2019 Michigan Hazards Plan, Michigan is located on the northern fringe of the nation's tornado belt and has a statewide expected annual loss of about \$19.6 million due to tornadoes. Michigan also has an average of 18 tornadoes, approximately 4 deaths, and approximately 50 injuries per year. 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, tornadoes 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 Grand Traverse County is at risk to the occurrence and impacts from tornadoes. It should be noted that it is impossible to predict where and with what magnitude a tornado will touchdown.

The four tornadoes described in Table impacted different townships and cities in Grand Traverse County. The first reported tornado first touched down in Long Lake Township and headed northeast into Leelanau County. The second reported tornado began in Acme Township, headed east into Whitewater Township, and continued into Kalkaska County. The third tornado began in Peninsula Township and headed northeast into Antrim County. The fourth and last reported tornado in Grand Traverse County began in western Garfield Township and headed at a sharp northeast angle through the City of Traverse City and into Peninsula Township. All tornadoes reported in the county have occurred in the northern areas.

Extent

The Fujita Scale (Table 24) 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, Grand Traverse 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 24: 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

Between 1950 and 2021, Grand Traverse County has had four (4) reported tornadoes touchdown, causing over \$ 775,000 in property damage (Table 25). As a result of these tornadoes, there were no deaths, no injuries, and no reported crop damage. Three of the four tornadoes caused \$ 250,000 in damage. They are tied for most destructive. The fourth tornado caused \$ 25,000 in property damages. The events in 1961, 1964, and 1969 each report property damage that consists of uprooted trees, farm building damage, and damages to residential structures.

Table 25: Tornado Events, 1950-2021

Begin Location	Date	Deaths	Injuries	Scale	Property Damage	Crop Damage
Long Lake Township	4/3/1956	0	0	F4	\$ 250,000	
Acme Township	9/13/1961	0	0	F2	\$ 25,000	
Peninsula Township	5/8/1964	0	0	F2	\$ 250,000	
Garfield Township	6/26/1969	0	0	F3	\$ 250,000	
TOTAL					\$ 775,000	\$ 0

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment

Since there have been four tornadoes events reported in the last 72 years, the data shows that there is a 5.6% chance a tornado would occur every 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. Due to increased residential growth in the county, the chances of a tornado touching down and causing residential damage is very high, especially in Traverse City and surrounding townships where population densities are highest.

The county has operational, manual sirens located at Fire Station 9 in East Bay Township and Station 5 in Blair Township as well as two state campgrounds: Interlochen and Traverse City. The Michigan Department of Natural Resources installed the sirens as well as a tornado shelter at each site with funding from FEMA.

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.

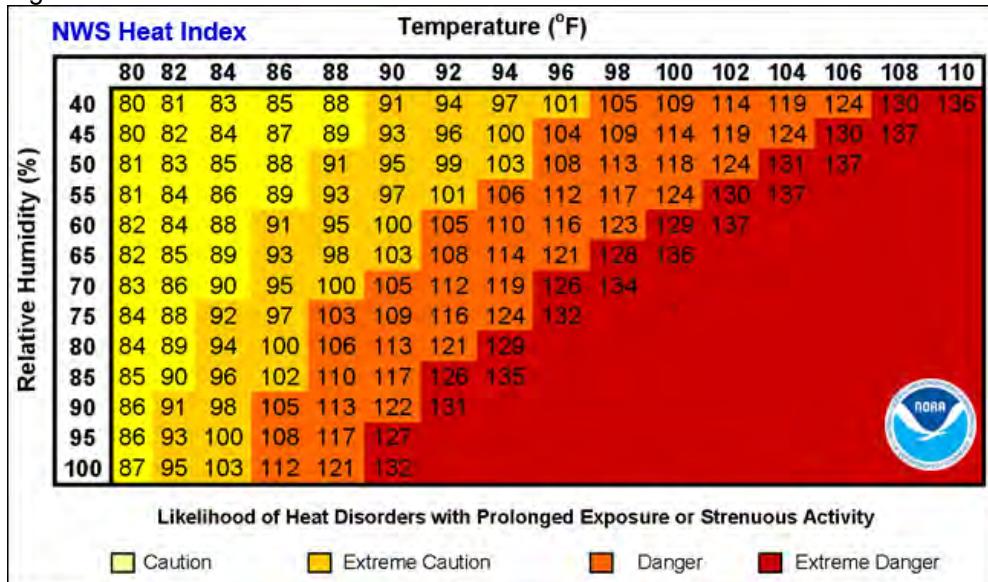
According to the 2019 Michigan Hazard Mitigation Plan, Michigan has 11 average annual extreme heat events with 0.4 average annual deaths and 41 average annual injuries.

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 7). 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.

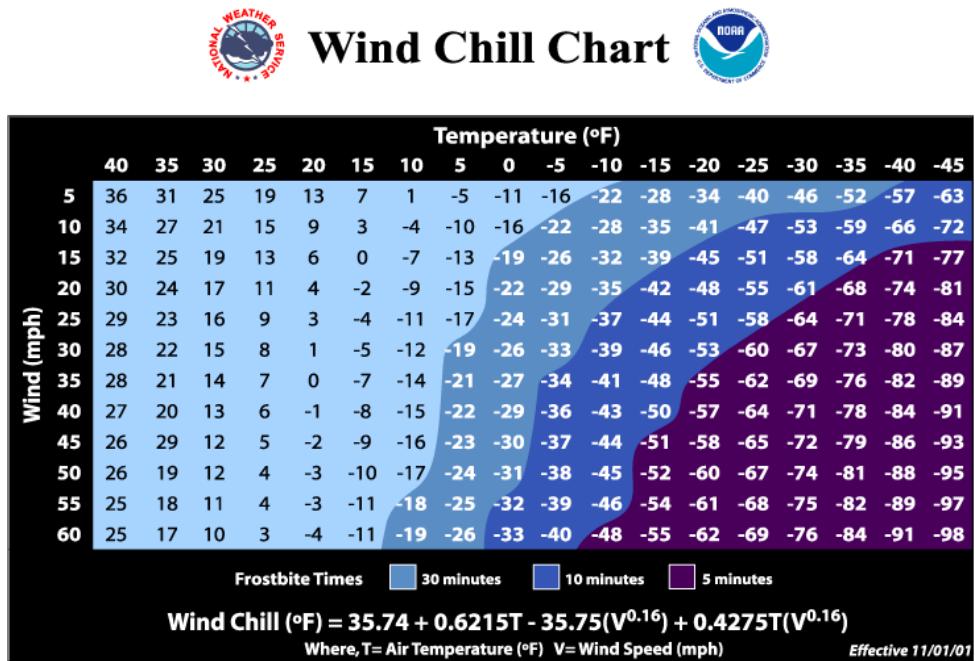
Figure 7: National Weather Service Heat Index



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 8 shows the NOAA Wind Chill Chart as it corresponds to various temperatures and wind speeds.

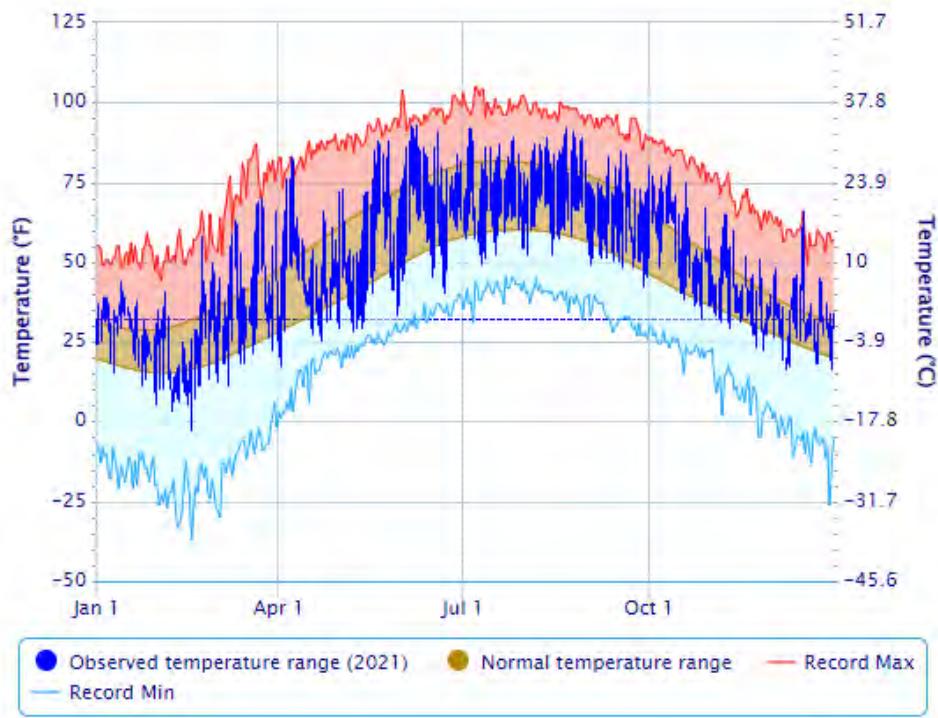
Figure 8: National Weather Service Wind Chill Chart



Source: National Weather Service

Figure 9 are the observed temperatures at Cherry Capital Airport in Traverse City 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 9: 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 Grand Traverse County is at risk to the occurrence and impacts from extreme temperatures.

The first instance of reported excessive heat occurred on August 1, 2001. 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. 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.

Since 1950, there have been three extreme cold events reported in Grand Traverse County. The first occurred on February 4, 2007. Exceptionally cold air surged into Northern Michigan. 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.

The second instance of extreme cold occurred on February 19, 2015. The second blast of extremely cold air into northern Michigan in about a week. This event featured colder air (including the coldest high temperature ever recorded in Gaylord), but not quite as much wind, as the event a week previous. As a result, wind chills were not quite as drastically cold. Still, wind chills reached 30 to 40 below zero across part of northern Michigan, bottoming out at -43 near Cadillac early in the morning on the 19th.

The third and last instance of extreme cold is the Governor Declared Emergency that occurred on January 29, 2019. 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.

Previous Occurrences

Grand Traverse County has had two extreme heat events in 2001 and 2018 (Table 26). The events did not have any deaths, injuries, or property/crop damages. The events consisted of hot and humid conditions that caused outdoor events to be modified and attendance at outdoor events to be lower than normal.

Table 26: Heat Related Events

	DATE	EVENT TYPE	INJURIES, DEATHS, DAMAGES	EVENT DESCRIPTION
GRAND TRAVERSE (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.
GRAND TRAVERSE (ZONE)	6/30/2018	Excessive Heat	0	Higns 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

Since 1950, there have been three extreme cold events reported in Grand Traverse County. The events did not have 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.

Governor Declared Emergency for extreme cold in the State was enacted in 2019 and included Grand Traverse County.

Table 27: Cold Related Events

	DATE	EVENT TYPE	INJURIES, DEATHS, DAMAGES	EVENT DESCRIPTION
GRAND TRAVERSE (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.
GRAND TRAVERSE (ZONE)	2/19/2015	Extreme Cold/wind chill	0	Wind chills reached 30 to 40 below zero across part of northern Michigan, bottoming out at -43 near Cadillac early in the morning on the 19th.
GRAND TRAVERSE (ZONE)	1/29/2019	Extreme Cold/wind chill		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

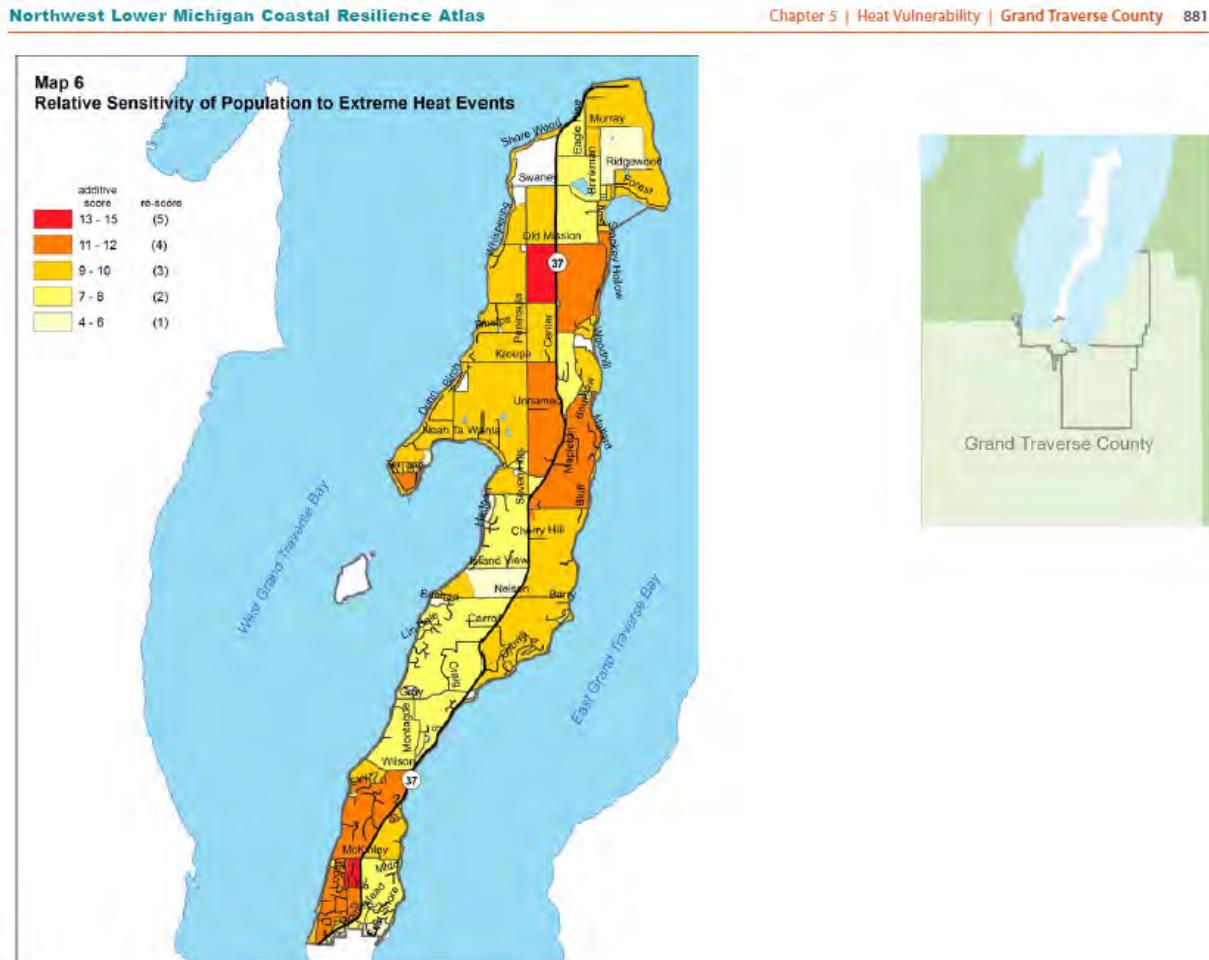
Since 1950, there have been two extreme heat events in Grand Traverse County. This data shows approximately one extreme heat event would occur every 36 years. Since 1950, there have been three extreme cold events in Grand Traverse County. This data shows approximately one event would occur every 24 years. 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. Traverse City's homeless population is especially vulnerable. Seasonal Emergency Shelters such as Safe Harbor are essential services for the community. The *Northwest Lower Michigan Coastal Resilience Atlas* written by the Land Information Access Association completed a Heat Vulnerability Assessment³ 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 following 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)

Peninsula Township has the highest median age (55.2) of all Grand Traverse County communities. Their relative sensitivity to extreme heat events is pictured in Figure 10.

Figure 10: Peninsula 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 causes losses to agriculture; affects domestic water supply, energy production, public health, and wildlife; and contributes to wildfire, to name a few of its effects.

Location

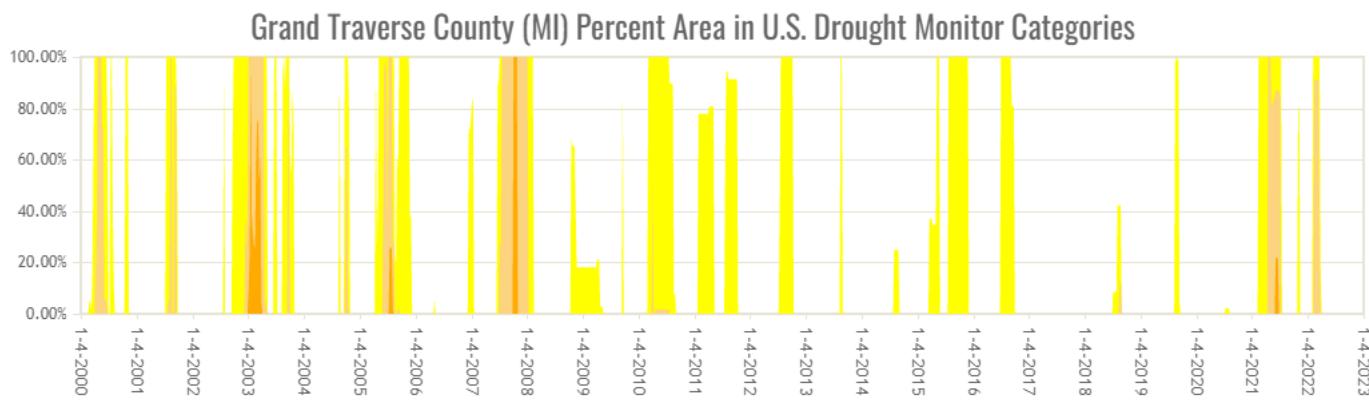
Drought is a regional event that is not confined to geographic boundaries and range in severity across the affected areas. All of Grand Traverse County is at risk to the occurrence and impacts from drought.

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 11) 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 12).

Figure 11: Grand Traverse County Historical Drought Levels



Source: US Drought Monitor

Figure 12: 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

Since 1950, there have been two instances of drought in Grand Traverse County. The first was a Presidential Declared Emergency for drought problems in the State was enacted in 1977 and included Grand Traverse County. The second occurred on August 1, 2001. It was preceded by a warmer than usual July 2001 with less than an inch of rainfall recorded in some areas. This lack of rain and warm conditions became serious during the first two weeks of August when little if any rain fell and temperatures jumped into the 90s. The stress on the crops was most noted in northern Michigan corn, but also hit hay crops to a lesser extent. As a result of the drought, the U.S.D.A. declared several counties disaster areas and granted farmers in counties where the crop losses were 30% or greater, special low interest loans.

Probability of Future Events and Vulnerability Assessment

There is a 2.8% annual chance for a drought event in Grand Traverse County. In Northern Michigan's forested regions, drought can adversely impact timber 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. Southern portions of Grand Traverse County are heavily forested and are therefore highly vulnerable to drought-related wildfire threats. Additionally, the threat to water sources should also be considered. Many county residents rely on ground water wells for drinking water. Even drought events in category D1 experience water well level decline. Drought events combined with excessive heat can have severe impacts on elderly and low income people.

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 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 wildfires is from human activities, specifically burning outdoor debris. Wildfires cause destruction to property and timber resources, and injuries or loss of life to wildlife and persons living or recreating in wildfire prone areas. 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, 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.

However, lightning strikes are not the primary cause of wildfires in Michigan. Recently, only about 4% of all wildfire in Michigan were caused by lightning strikes, and most other causes have been attributed to human activity. Outdoor debris burning is the leading cause of wildfires in Michigan. Most Michigan wildfires occur close to where people live and 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.

Location

All of the county's 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). Approximately 167,301.6 acres or 54% of Grand Traverse County is forested. Jack Pine forests make up 62,500 acres of forested land. As shown on the Environmental Features Map in Appendix A, Pine forests are located primarily in Blair, East Bay, Fife Lake, Grant, Green Lake, Long Lake, Mayfield, Paradise, Union and Whitewater Townships and Village of Kingsley and Village of Fife. These townships and villages are located in the southern area of the county where it is heavily forested and are highly susceptible to wildfire events.

Extent and Previous Occurrences

Extent can be measured by the number of acres burned and the cost of property damage. Between 1996 and 2017 there were no wildfires reported outside of MDNR lands in Grand Traverse County. Between 1981 and 2018 there were 435 reported fires on lands under MDNR jurisdiction. This resulted in 1,484.2 acres burned and 39.1 acres burned per year. No property damages were recorded.

Probability of Future Events and Vulnerability Assessment

There is a 100% chance there will be a wildfire on MDRN lands, and a small chance there will be a wildfire on lands outside of MDNR jurisdiction. Forest types (Red Pine, Eastern White Pine, and Jack Pine) within Grand Traverse County are susceptible to wildfires. Additional factors that increase fire risk include dead or dying Ash trees as a result of disease/invasive species, 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. Unfortunately, rural areas do not have enough fire suppression forces available to protect every

structure from wildfires. Residential development in rural Grand Traverse County is often isolated from town centers and emergency services. Those subdivisions that are located in rural areas near Jack Pine forests are identified on the Vulnerable Populations and Hazard Areas Map in Appendix A.

Shoreline Hazards (Coastal Flooding and Coastal Recessions)

Shoreline hazards include coastal flooding and coastal recession. Coastal recession (subsidence) 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.

Shoreline flooding results when water levels rise and push inland or during rainfall or snowmelt accumulates and is not able to drain properly. Shoreline flooding may also be caused during storms and wind events with high-energy waves. 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. The three scenarios are described as follows:

The first scenario, **“Lucky” Future**: Under the Lucky Climate 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 shoreline and/or adjacent riverine flooding under these conditions, is shown in green on the maps.

“Expected” Future: Under the Expected Climate 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: Under the Perfect Storm Climate 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.

Location

To reference the *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 is 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.” Jurisdictions located on the Lake Michigan coast (Grand Traverse Bay) are impacted by shoreline hazards: Acme, East Bay, Peninsula Townships and City of Traverse City. 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 identified during public input sessions. These are marked as a hazard area on the Hazard Area Map in Appendix A.

Grand Traverse County

Coastal Flooding Scenario Impacts			
Grand Traverse County			
Total SEV	Lucky	Expected	Perfect Storm
\$ 3,500,025,000.00	\$ 75,857,200.00	\$ 209,592,600.00	\$ 465,142,900.00



Source: LIAA, Northwest Lower Michigan Coastal Resilience Atlas

More specifically, three incidents have been reported. The first occurred on February 21, 1986 during the last major high water event prior to 2019. A Governors Disaster Declaration for shoreline problems in the State was enacted in 1985-1986 and included Grand Traverse County.

The second event occurred on October 16, 2019. 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. Peninsula Drive was closed between McKinley and Wilson Roads due to coastal flooding and beach erosion. The east end of Marina Drive in Traverse City was also closed.

The third event occurred on October 21, 2019. 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. On Old Mission Peninsula, docks were washed out. Waves reached the parking lot at Haserot Beach.

Figure 13 describes the three potential flooding scenarios at Haserot Park and surrounding areas in Peninsula Township. “Lucky” scenario flooding is shown in green, “Expected” flooding scenario is shown in yellow, and “Perfect Storm” future scenario is shown in red.

Coastal recession or erosion to Lake Michigan communities is a constant, but very 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 Grand Traverse’s coastal communities. Chapter 4 of the *Northwest Lower Michigan Coastal Resilience Atlas* describes bluffline recession since its recorded shoreline in 1938. 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. The varying lines are shown in Figure 14 depicting the recession of the bluffline in Acme Township near the LochenHeath Golf Club.

Figure 13: Panel #97 Flooding Hazard, Peninsula Township

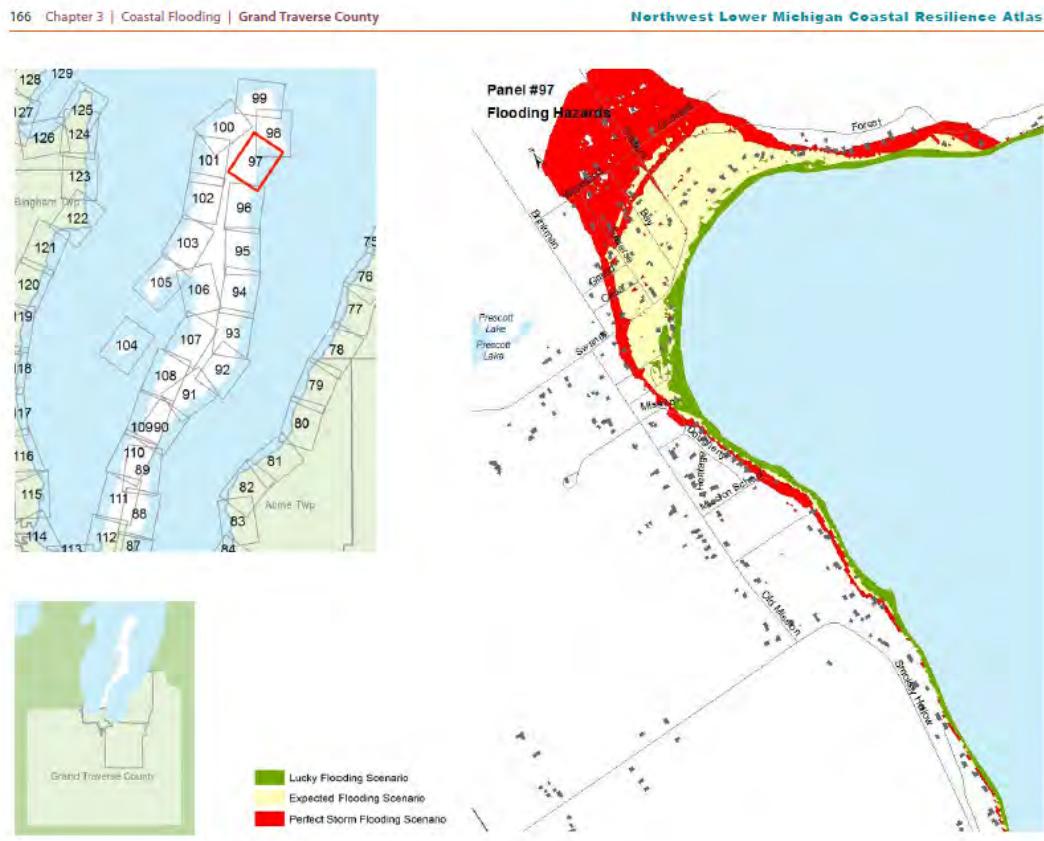


Figure 14: Panel #81 Shoreline Recession, Acme Township



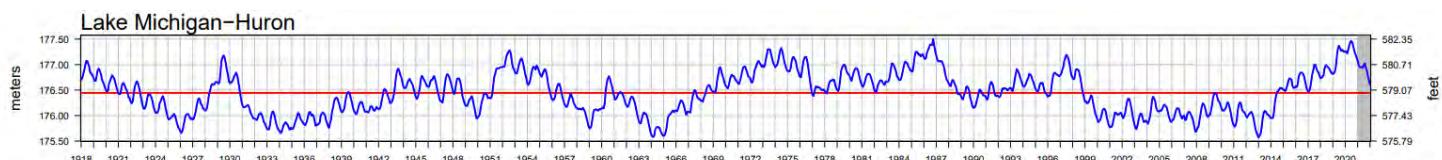
Source: LIAA, Northwest Lower Michigan Coastal Resilience Atlas

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 15), and damages. The two Lakeshore Flooding events in 2019 caused \$32,000 in property damages in Peninsula Township.

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, only second to the October 1986 monthly record high of 582.35.

Figure 15: 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	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	1964	2012	

Source: US Army Corps of Engineers

Previous Occurrences

The Great Lakes experienced record high lake levels in 1985-86, and again in 1997-98. Currently the Great Lakes are experiencing record high lake levels again since 2019. Many cases of erosion are present and high lake levels causing rivers and tributaries to back up have caused infrastructure damage and failures throughout Grand Traverse County and many other areas in Michigan.

Probability of Future Events and Vulnerability Assessment

There is a 4% chance of shoreline flooding and an equally small chance erosion will cause shoreline damages. Shoreline or soil erosion hazards involve the loss of property or necessitate the relocation of homes 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. This hazard is especially relevant to those municipalities that contain residential and commercial development along Grand Traverse Bay (Peninsula, East Bay and Acme Townships; Traverse City) that experience seasonal shifts in water levels and possible ice erosion hazards.

As lake water levels fluctuate and increased storminess occurs, shoreline recession and flooding will continue. In 2021 the levels of Lake Michigan-Huron began to decline, however, as historic data shows us, the water will begin to rise again. 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 likely not a permanent solution.

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 of Grand Traverse County is at risk to 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 Grand Traverse County, the Grand Traverse County Health Department works with local, state, and federal agencies to prepare for and respond to public health threats. It developed a comprehensive emergency preparedness program capable of responding to a variety of emergency situations with funds from the Centers for Disease Control. The Grand Traverse County Health Department reports, as of April 19, 2022, there are 17,282 cumulative cases of COVID-19 and 230 deaths. Those 80 years and older have the most deaths of any age range at 61 deaths.

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.

Probability of Future Events and Vulnerability Assessment

Naturally occurring pandemics may result in widespread precautions around the world. The Grand Traverse County Health Department created a pandemic plan that serves as a template for responding to a large-scale outbreak of influenza and other highly infectious respiratory diseases. That plan is being tested currently since COVID-19 appeared in January 2020. The response is ongoing to this pandemic. 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." Invasive species harmful to Michigan and Grand Traverse 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 (water-dwelling) species include non-native 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.

Location

Combined, terrestrial and aquatic invasive species may be present in Grand Traverse 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."

Extent

According to the 2013 Aquatic Invasive Species State Management Plan, "Since the 1800s, at least 182 nonindigenous aquatic organisms have colonized habitats of the Great Lakes ecosystem. These species include: algae (27), vascular plants (55), invertebrates (66), fish (28), and bacteria and viruses (6) (National Oceanic and Atmospheric Administration 2011). Roughly 55% of these species are native to Eurasia; 13% are native to the Atlantic Coast." The Great Lakes Regional Collaboration estimates that a new aquatic invasive species arrives in the Great Lakes at a rate of one every eight months. The State estimates that \$24 million per year is spent to control aquatic plants in Michigan, including Eurasian Watermilfoil. Additionally, an estimated \$200 million per year is lost by the Great Lakes region due to the effects of ship-born invasive species on sport fishing, commercial fishing, wildlife watching, and raw water usage.

Previous Occurrences

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. There are 32 AIS specifically listed in the State Management Plan. The State TIS Management Plan lists fourteen species including insects, mollusks, plants, mammals, a shrub, and a bird. Top priority plants in the region include garlic mustard, Japanese knotweed, invasive phragmites, and Oriental bittersweet.

Probability of Future Events and Vulnerability Assessment

The Great Lakes and connecting channels and rivers form the largest surface freshwater system in the world. This freshwater system, along with Michigan's inland lakes, streams, rivers, and wetlands represent an invaluable resource and are therefore justifiably a top natural resource management priority. The State of Michigan estimates 42% of threatened or endangered species are considered at risk due to non-native species. The Michigan Department of Environment, Great Lakes, and Energy produced the "Michigan Watch List Aquatic Invasive Plants: A Guide for Identification" for those species that have been identified as posing an immediate or potential threat to Michigan's economy, environment, or human health. Included in the watch list are ten species that have been found in limited parts of Michigan and surrounding states. The State TIS Management Plan provides a list of eleven terrestrial species on the watch list. The Northwest Michigan Invasive Species Network and Grand Traverse Conservation District and other partners "protect, enhance, and promote Northwest Michigan's natural communities through terrestrial invasive plant management and outreach."

Storm Surges (Seiches) and Rip Currents

While storm surges (seiches) and rip current events are a possibility in Grand Traverse County, the likelihood of an event is very small. There are no seiche events listed in the database from 1950 until present. This is the same for rip current events. Seiches and rip currents have been removed from the analysis.

V. Goals and Objectives

The mission of the Grand Traverse 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, breakdown in vital services like transportation and infrastructure, economic slumps, maintain tourist base, and liability issues. 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

- 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, including organizations who advocate for individuals with functional or access needs

Goal 2: Integrate natural hazards mitigation considerations into the community's comprehensive planning and operational processes

Strategies

- Enforce and/or incorporate natural hazards mitigation provisions in building code standards, ordinances, and procedures
- Create or update ordinances to reflect building codes, shoreline protection rules, etc.
- Incorporate natural hazards mitigation into basic land use regulation mechanisms
- Develop community education programs and public warning systems
- Strengthen the role of the Local Emergency Planning Committee in the land development process
- Integrate natural hazards mitigation into the capital improvement planning process so that public infrastructure does not lead to development in natural hazards areas
- Encourage county agencies to assess 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 projects

Strategies

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

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

Strategies

- Encourage public and business involvement in natural hazards mitigation projects

VI. Mitigation Strategies and Priorities

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
- Structure 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 Grand Traverse 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 power, such as electric and gas, 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

Mobile warning system: Grand Traverse County uses the CodeRed Emergency Communications Network, which is an electronic high-speed outbound notification service available to the general public.

Radio warning system: Grand Traverse County uses radio channels 580 AM and 103.5 FM for emergency weather alerts.

Tornado/Severe Weather Systems: Manual sirens are located at Metro Station #9 (East Bay Twp), Rural Station #6 (Fife Lake), and Station #5 (Blair Twp.) fire departments. Automatic sirens were recently installed at Traverse City State Park Campground and Interlochen State Park Campground as part of a tornado shelter project at each park. Weather alert radios were purchased and distributed to all the schools, nursery schools, and senior homes.

Flood warning system: For dam failures/flooding downstream an active warning system is pre-determined utilizing geographic boundary information and the CodeRED Emergency Communications Network and IPAWS alerts.

Priority and Action Strategies	Responsible Parties	Timeframe	Priority
Priority Area 1: Flood Mitigation Strategies			
Participating Jurisdictions: City of Traverse City, Acme Township, Blair Township, East Bay Township, Fife Lake Township, Garfield Township, Grant Township, Green Lake Township, Long Lake Township, Mayfield Township, Paradise Township, Peninsula Township, Union Township, Whitewater Township, Village of Fife Lake, and Village of Kingsley			
a. Replace older, damaged, or undersized culverts/bridges throughout the County as needed including S. Airport Rd at <i>Logan's Landing</i>	Drain Commissioner Road Commission (Lead) County Conservation District Emergency Management Department City of Traverse City Townships and Villages	3-4 years from adoption of the plan	High
b. Replace culvert/road crossings with clear span bridges for increased river function and hydraulic efficiency	MDOT Road Commission City of Traverse City Townships and Villages	3-4 years from adoption	Medium
c. Modification and replacement of Union Street Dam with a more hydraulically efficient new dam as part of the FishPass Project	City of Traverse City Grand Traverse Band of Ottawa and Chippewa Indians MDNR	1-3 years from adoption	High
d. Adherence to City and Township Riparian Buffer Zone ordinances	City of Traverse City Garfield Township	Ongoing	Medium
e. Implementation of Unified Plan of the Lower Boardman River including restoration of the Boardman-Ottaway River	City of Traverse City Grand Traverse Band of Ottawa and Chippewa Indians MDNR	3-4 years from adoption of the plan	High
f. Encourage identified flood prone areas be used for open space	City, Townships and Villages	Ongoing	Medium
g. Establish a "green infrastructure" link system that connects and expands existing parks, preserves, and greenways.	County, City, Townships and Villages Drain Commission Conservation District Grand Traverse County	3-4 years from adoption of the plan	Medium
h. Drainage improvements in high flooding potential areas throughout the County, including upgrading aging storm water abatement infrastructure	City Water Dept. City Dept. of Public Services (Lead) County Drain Commissioner Watershed Foundation County Emergency Management Department City Planning Department Townships and Villages	1-3 years from adoption of the plan	Medium
i. Continue enforcement of building codes and soil erosion regulations	County Building Inspector (Lead) Building Construction Code Dept. County Conservation District	Ongoing	Low
j. Incorporate green infrastructure and stormwater management into Master Plans and Parks and Recreation Plans	City, Townships, and Villages	1-5 years from adoption of the plan	Medium
k. Educate developers and property owners about green infrastructure and floodplain management strategies	City, Townships, and Villages Grand Traverse County Construction Code	1-3 years from adoption of the plan	Low

Priority Area 2: Thunderstorms and High Winds Mitigation Strategies			
Participating Jurisdictions: City of Traverse City, Acme Township, Blair Township, East Bay Township, Fife Lake Township, Garfield Township, Grant Township, Green Lake Township, Long Lake Township, Mayfield Township, Paradise Township, Peninsula Township, Union Township, Whitewater Township, Village of Fife Lake, and Village of Kingsley			
a. Promote the establishment of the State of Michigan's Primary Radio Communication system for throughout the County	Emergency Management Department (Lead) Townships, Villages, City	Ongoing	High
b. Have a debris removal plan for safety	Emergency Management Department (Lead) County Building Inspector Townships, Villages, City	2-4 years from adoption of the plan	High
c. Utilize ham radio channel for local warnings	Emergency Management Department	1-2 years from adoption of the plan	Medium
d. Work with utility companies to identify and construct alternative sources of power	Emergency Management Department (Lead) County Building Inspector Utility Companies	1-3 years from adoption of the plan	High
e. Perform regular tree trimming and removal of dead and dying trees	Utility Companies (Lead) Emergency Management Department Townships, Villages, Private Landowners	1-3 years from adoption of the plan	High
f. Promotion of burying utility lines in new construction	County Building Inspector Utility Companies (Lead) Emergency Management Department Townships, Villages, City	1-3 years from adoption of the plan	Medium
g. Burying power lines in high outage areas	County Building Inspector Utility Companies (Lead) Emergency Management Department Townships, Villages, City	1-3 years from adoption of the plan	High
h. Identify potential wind damage areas	Emergency Management Department (Lead) Townships, Villages, City	1-2 years from adoption of the plan	Medium
i. Establish new generators where needed	Emergency Management Department Townships, Villages, City (Lead)	2-3 years from adoption of the plan	Medium
Priority Area 3: Extreme Winter Weather (Snow Load and Ice Build Up) Mitigation Strategies			
Participating Jurisdictions: City of Traverse City, Acme Township, Blair Township, East Bay Township, Fife Lake Township, Garfield Township, Grant Township, Green Lake Township, Long Lake Township, Mayfield Township, Paradise Township, Peninsula Township, Union Township, Whitewater Township, Village of Fife Lake, and Village of Kingsley			
a. Continue enforcement of building code regarding snow load limits through the permitting process	County Building Inspector (Lead) Townships, Villages, City Emergency Management Coordinator	Ongoing	Medium
b. Promote the establishment of the State of Michigan's Primary Radio Communication system for throughout the County	Emergency Management Department (Lead) Townships, Villages, City	Ongoing	High

c. Utilize a ham radio channel for local warnings	Emergency Management Department RACES (Lead)	1-2 years from adoption of the plan	Medium
---	---	-------------------------------------	--------

Priority Area 4: Wildfire/Urban Interface Mitigation Strategies

Participating Jurisdictions: Blair Township, Fife Lake Township, Grant Township, Mayfield Township, Paradise Township, Union Township, Whitewater Township, Village of Fife Lake, and Village of Kingsley

a. Public education and awareness activities such as programs and brochures regarding fuel management, proper vegetation, fire breaks	Municipal Planners (Lead) Emergency Management Department Building Inspector County Soil Conservation District MI Department of Natural Resources Townships, Villages, City	Ongoing	High
b. Continue enforcement of state fire codes regarding setback requirements	Building Inspector (Lead) Townships, Villages, City	Ongoing	Medium
c. Public education utilizing the MI Department of Natural Resources flyers and the FEMA information at parks and campgrounds	Emergency Management Department (Lead) County Conservation District MI Department of Natural Resources Townships, Villages Parks and Campgrounds, public and private	Ongoing	Medium
d. Real estate and insurance agents to distribute information	Emergency Management Department Townships, Villages Real Estate Assoc. (Lead)	1-3 years from adoption of the plan	Low
e. Assess fire suppression access and make improvements	Emergency Management Department County and local fire departments (Lead)	Ongoing	Medium
f. Research the MI Department of Natural Resources' State Forest wildfire/urban interface rules or plan	Emergency Management Department County and local fire departments (Lead)	1-3 years from adoption of the plan	Medium

Priority Area 5: Shoreline Erosion Mitigation Strategies

Participating Jurisdictions: Acme Township, East Bay Township, Peninsula Township, and City of Traverse City

a. Drainage control projects	Building Construction Code Dept. Drain Commissioner (Lead) County Conservation District Emergency Management Department Townships and City	2-4 years from adoption of the plan	High
b. Enforcement of soil erosion statutes/permits	Building Construction Code Dept. Drain Commissioner (Lead) County Conservation District County Planning Department Emergency Management Coordinator MI Department of Environmental Quality	Ongoing	High

	U.S. Army Corps of Engineers		
c. Enforcement of the building codes	County Building Inspector (Lead)	Ongoing	High
d. Enforcement of the grading levels no more than 10%	Building Construction Code Dept. Drain Commissioner County Conservation District (Lead)	Ongoing	Medium
e. Restoration of native shoreline vegetation	County Building Inspector Building Construction Code Dept. (Lead) Drain Commissioner County Conservation District Townships and City	Ongoing	High

Hail, Lightning, Extreme Temperatures, and Drought Mitigation Strategies

Participating Jurisdictions: City of Traverse City, Acme Township, Blair Township, East Bay Township, Fife Lake Township, Garfield Township, Grant Township, Green Lake Township, Long Lake Township, Mayfield Township, Paradise Township, Peninsula Township, Union Township, Whitewater Township, Village of Fife Lake, and Village of Kingsley

a. Mail safety brochures about the dangers of hail, lightning, extreme temperatures, and drought	Emergency Management Department City, Townships, and Villages	2-4 years from adoption of the plan	High
b. Teach school children about the dangers of hail, lightning, extreme temperatures, and drought and how to take safety precautions.	Emergency Management Department City, Townships, and Villages TCAPS	1-3 years from adoption of the plan	High
c. Consider implementing additional safety standards in the building code for hail and lightning.	Building Construction Code Dept. (Lead) Emergency Management Department City, Townships, and Villages	2-4 years from adoption of the plan	Medium
d. Monitor water supply and its functions to save water supply	Emergency Management Department City, Townships, and Villages	Ongoing	Medium

Pandemic and Invasive Species Mitigation Strategies

Participating Jurisdictions: City of Traverse City, Acme Township, Blair Township, East Bay Township, Fife Lake Township, Garfield Township, Grant Township, Green Lake Township, Long Lake Township, Mayfield Township, Paradise Township, Peninsula Township, Union Township, Whitewater Township, Village of Fife Lake, and Village of Kingsley

a. Designate County website primary source for community information dispersal	Emergency Management Department City, Townships, and Villages	1-3 years from adoption of the plan	High
b. Educate and promote awareness of potential threats	Emergency Management Department City, Townships, and Villages	1-3 years from adoption of the plan	Medium
c. Continue to support County departments and action committees	Grand Traverse County Health Department Grand Traverse County Conservation District Northwest Michigan Invasive Species Network	1-3 years from adoption of the plan	Low

VII. 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.

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 LPT is an inter-agency partnership and will collaborate to accomplish the goals and objectives of the Plan. The 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 Grand Traverse County Emergency Management Coordinator and will coordinate with the County Board of Commissioners.

Natural Hazards Task Force will perform an annual review of the Grand Traverse 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.

- Grand Traverse County Government Staff
- Townships, cities, and villages
- Grand Traverse County Conservation District
- Grand Traverse County Drain Commissioner
- Grand Traverse County Road Commission
- Grand Traverse Band of Ottawa and Chippewa Indians
- Grand Traverse Regional Land Conservancy
- The Watershed Center Grand Traverse Bay
- Networks Northwest
- Michigan State University Extension
- Michigan Department of Environment, Great Lakes, and Energy
- Michigan Department of Natural Resources
- U.S. Environmental Protection Agency
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture Natural Resources Conservation Service
- Insurance Companies
- 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.

Community planning services are provided by the professional staff of each municipality within the county. The respective 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.

Building permits are issued by the Grand Traverse County Construction Code Department, except in Garfield and Fife Lake Townships where they are handled locally.

Funding the Implementation of the Plan

To assist with the funding of the proposed natural hazards mitigation strategies, the following is a list of potential financial assistance entities to help fund the implementation projects 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 Integration

The City of Traverse City, all townships and villages in Grand Traverse County, and local and state agencies will consider integrating information from the hazard mitigation plan into their comprehensive and operations plans. The City of Traverse City and Garfield Township have indicated they will begin updating their plans in the near future, and they will consider incorporating appropriate hazard mitigation information into the plan. The city, all 13 townships, and the two villages administer zoning. As part of the education and outreach aspect of the hazard mitigation effort, the other townships and villages 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

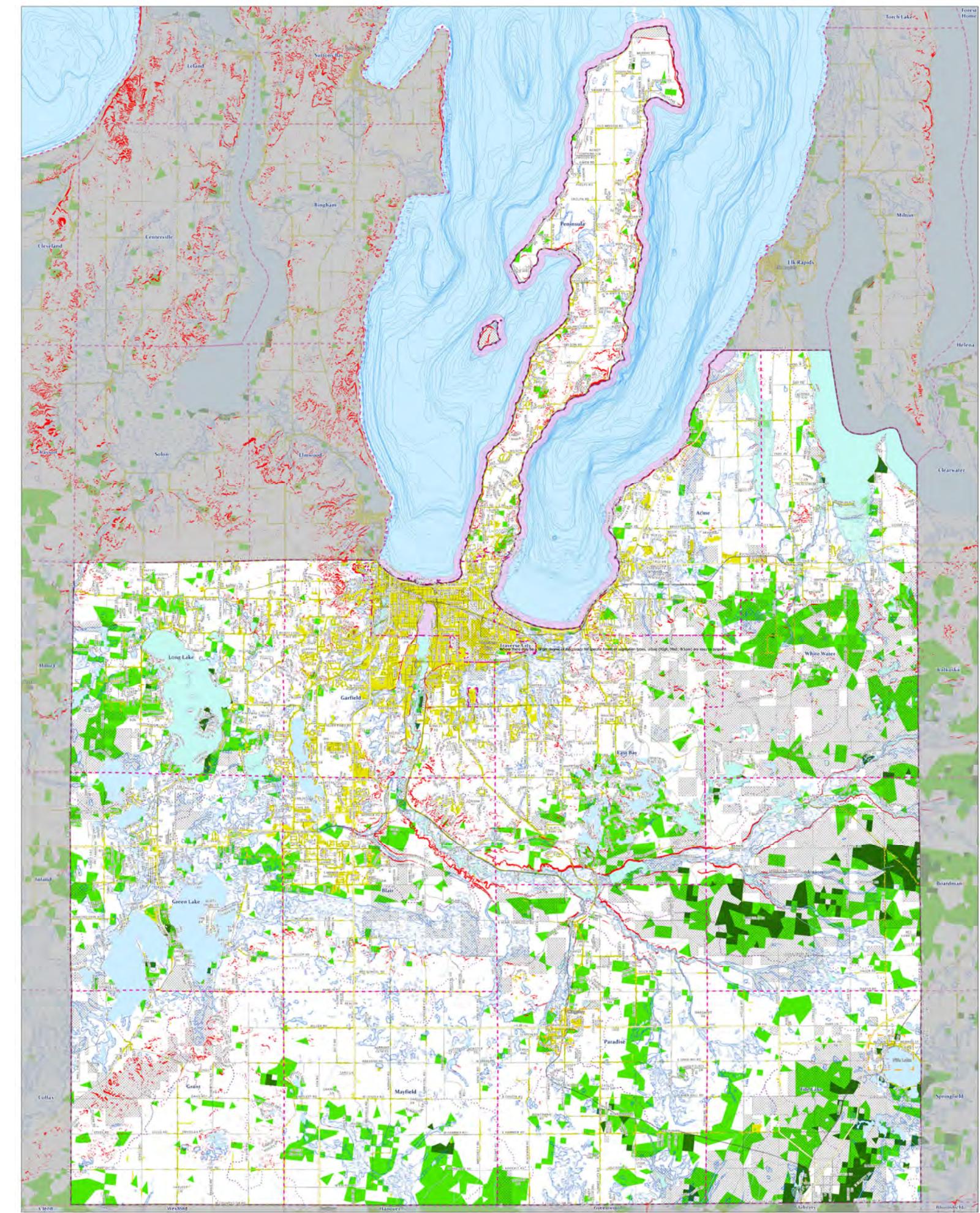
Five Year Plan Review and Update

The Stafford Act, as amended by the Disaster Mitigation Act of 2000, requires the Grand Traverse 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 Grand Traverse Board of Commissioners can review, approve, and adopt the plan. In order to properly update the plan, Grand Traverse County will need to seek funding from appropriate state and federal agencies.

Continued Public Involvement

Grand Traverse 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: COUNTY INFRASTRUCTURE, VULNERABILITY, AND HAZARD MAPS



Grand Traverse County Environmental Features

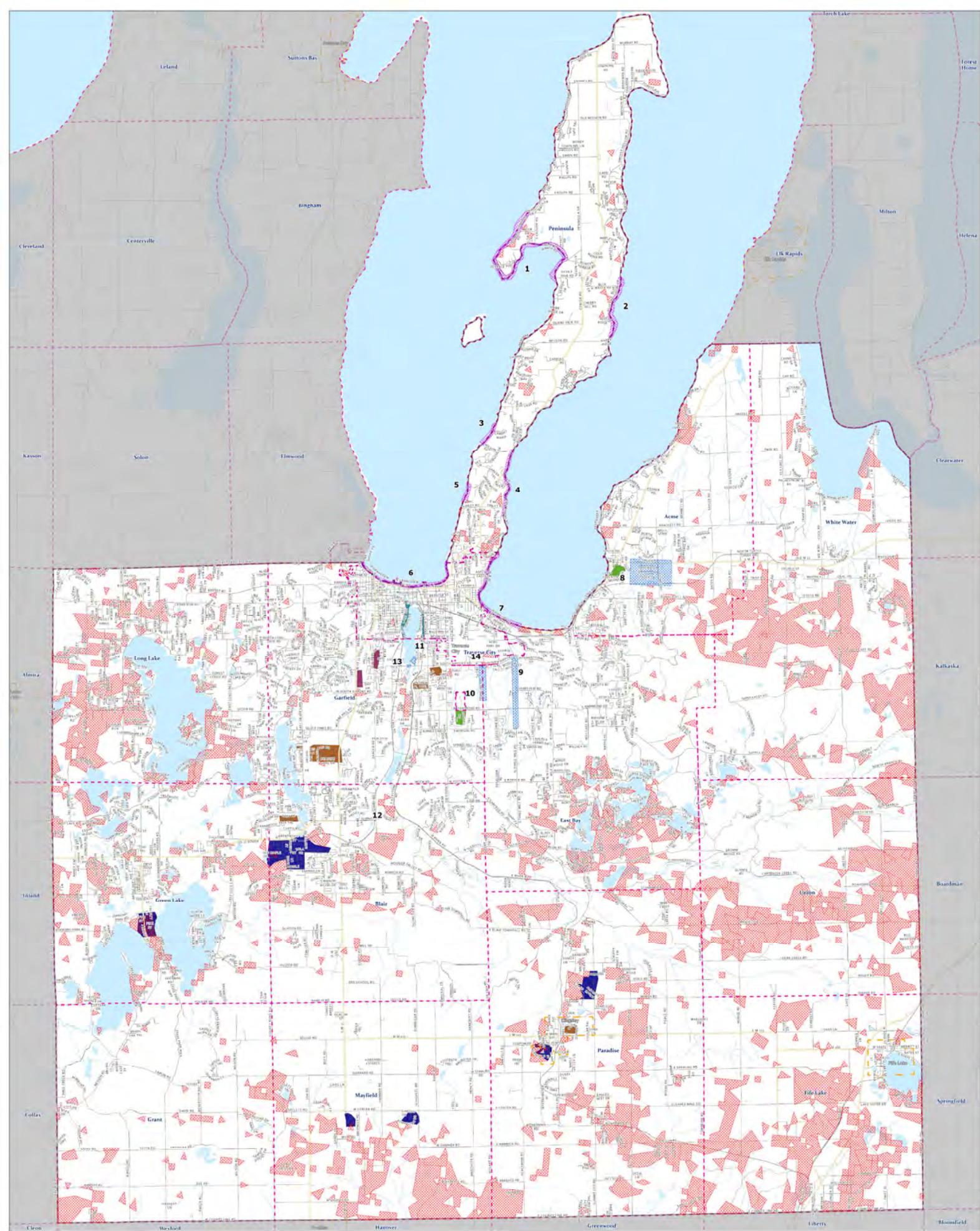
2022 Hazard Mitigation Plan

Legend

Grand Traverse County Hazard Mitigation Planning Process
Plan produced by Remunda Southwest Community Development 2023
Map data sources: State of Michigan, ESRI, NACD, USDA, USGS



Networks
Northwest



Grand Traverse County Vulnerable Populations & Hazard Areas

2022 Hazard Mitigation Plan

Hazard Areas

Legend

Vulnerable Population:

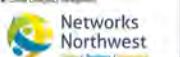
Type:

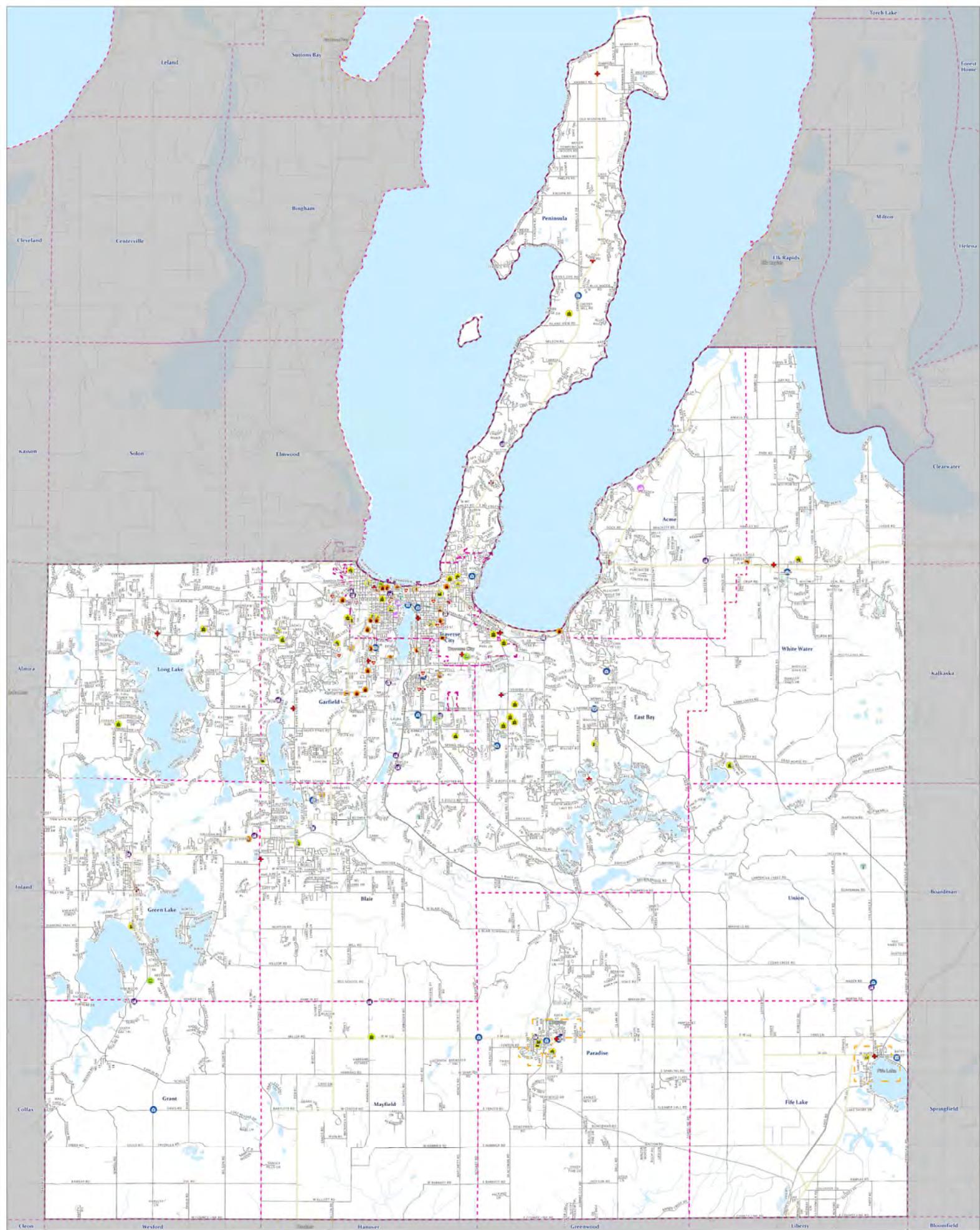
- Apartments
- Assisted Living

138
Lamb
Lamb
Ground Lamb
Ground Lamb

0 13,000 16,000 18,000 20,000
Paid

©2009 Monroe County Board of Education. Printed August 2009.
May be used by Monroe County Board of Education employees, students, and
staff members. Name of Publisher: MCE, 1801 E. 10th Street, Monroe, NY 10540.
www.monroecounty.org/education/mce/





Grand Traverse County Critical Infrastructure Points

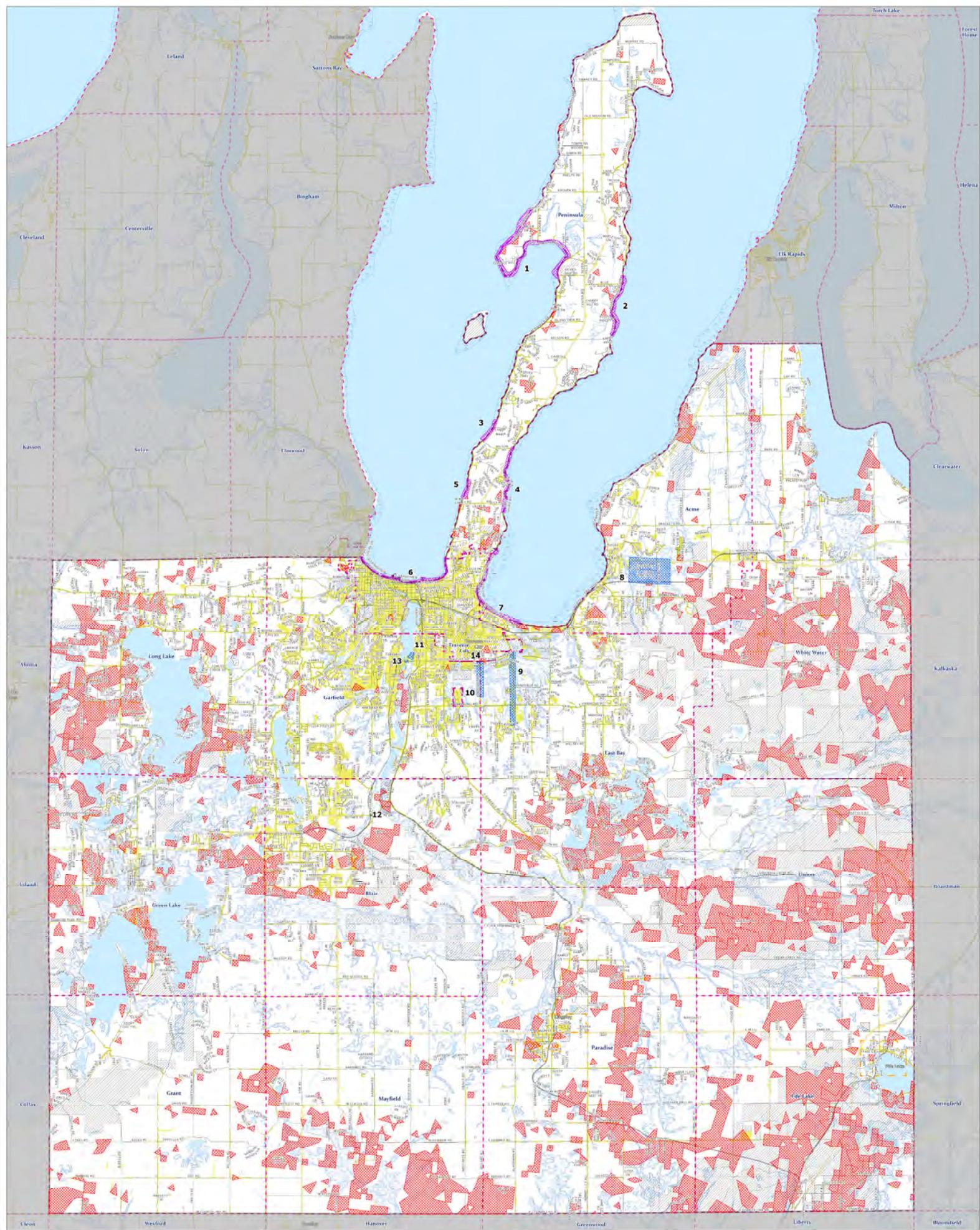
2022 Hazard Mitigation Plan



0 2,500 5,000 10,000 15,000 20,000 Feet
0 0.5 1 1.5 2 4 Miles



Lansing: 1-800-444-4444 | Grand Rapids: 616-459-4444 | Traverse City: 231-946-4444
Map generated by Networks Northwest Community Geographer (2022).
Map data sources: State of Michigan, USGS, MIGIS, USGS, USGS, DMA, MIGIS.
Cover photo: N. G. C. Photography, Inc.



Grand Traverse County Hazard Areas

2022 Hazard Mitigation Plan

Legend

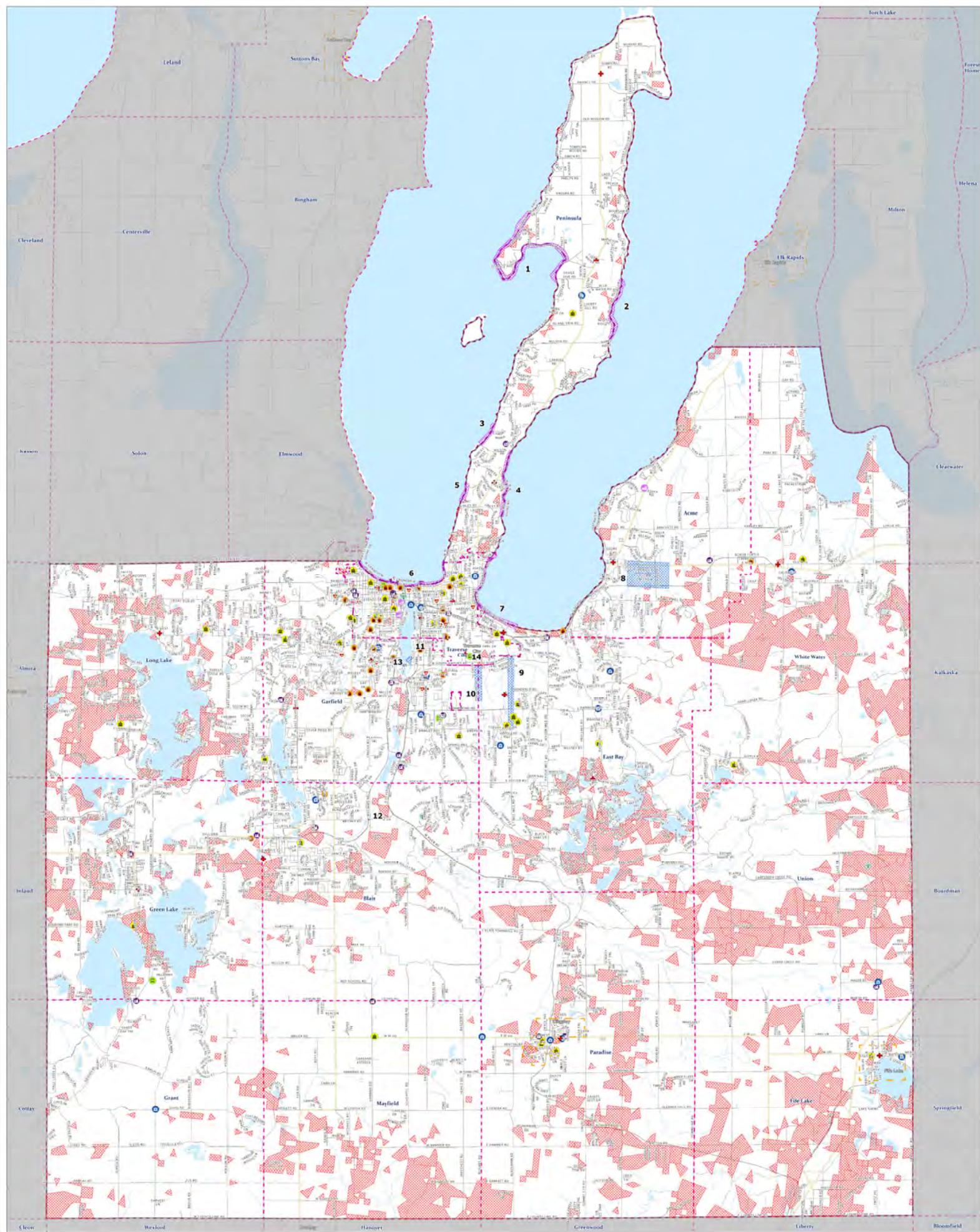
Legend

Hazard Areas	Legend
Tree	Tree
Wetland	Wetland
Forest	Forest
Residential	Residential
Commercial	Commercial
Industrial	Industrial
Developed Land	Developed Land
Urban Land	Urban Land
Villages	Villages
Cities	Cities
Transportation	Transportation

0 2,000 5,000 10,000 15,000 20,000

Grand Traverse County Habitat Mitigation Planning Frame
Map produced by Networks Northwest Community Development 2022
Map data sources: State of Michigan, ESRI, NHD, USGS, CBA, MDT.





**Grand Traverse County
Critical Infrastructure Points
& Hazard Areas**

& Hazard Areas

Legend

Central Infrastructure

A row of four circular icons with colored outlines: a blue outline for Services, a green outline for Communication, an orange outline for Directory Services, and a purple outline for Business.

—
—
—
—
—

11

0 2,500

0,000 10,000

15,000

20,000
F-mol

W-

100

Network North

works
west

Leesa Thomas County-based Research Farming Friends.
They partnered with Northern Northwest Community Development Corp.
They data sources: www.housing.org/2011_NHIC_112DA_Eng_CBA_HREC.html
www.housing.org/2011_NHIC_112DA_Eng_CBA_HREC.html



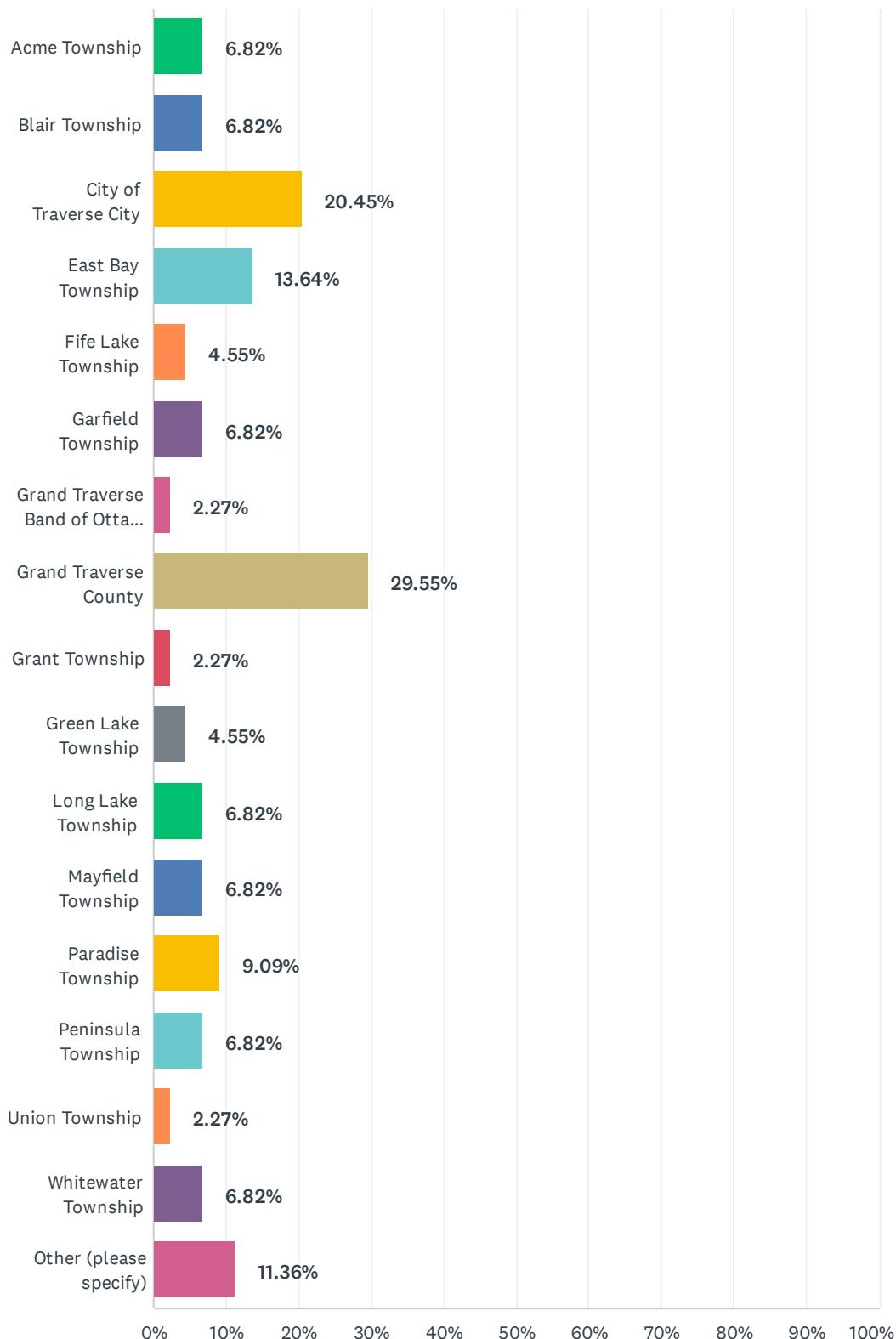
Networks Northwest

APPENDIX B: PUBLIC PARTICIPATION SURVEY

Q1 Which community in Grand Traverse County do you represent and/or reside in? (You may select more than one answer.)

Answered: 44 Skipped: 0

Grand Traverse County Natural Hazard Mitigation Community Survey



Grand Traverse County Natural Hazard Mitigation Community Survey

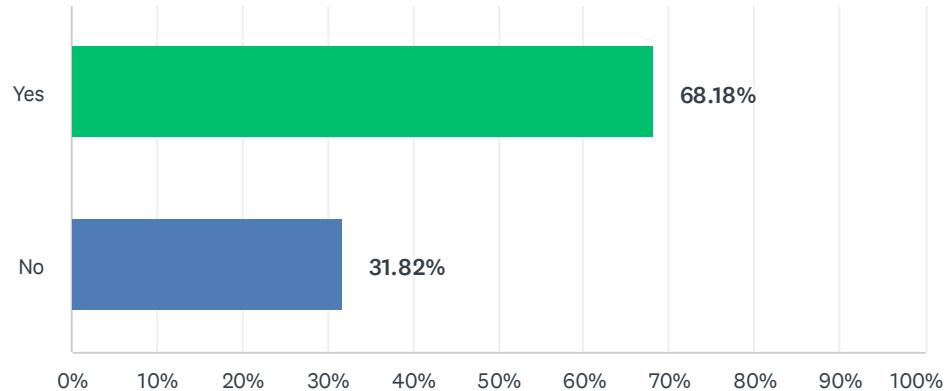
ANSWER CHOICES	RESPONSES
Acme Township	6.82% 3
Blair Township	6.82% 3
City of Traverse City	20.45% 9
East Bay Township	13.64% 6
Fife Lake Township	4.55% 2
Garfield Township	6.82% 3
Grand Traverse Band of Ottawa and Chippewa Indians	2.27% 1
Grand Traverse County	29.55% 13
Grant Township	2.27% 1
Green Lake Township	4.55% 2
Long Lake Township	6.82% 3
Mayfield Township	6.82% 3
Paradise Township	9.09% 4
Peninsula Township	6.82% 3
Union Township	2.27% 1
Whitewater Township	6.82% 3
Other (please specify)	11.36% 5
Total Respondents: 44	

#	OTHER (PLEASE SPECIFY)	DATE
1	Grand traverse county road commission	1/6/2022 9:41 AM
2	All out county areas	1/5/2022 8:23 PM
3	State of MI DNR Traverse City State Park/Arbutus State Forest Campground/Forks State Forest Campground/Scheck's Place State Forest Campground and Horse camp/Muncie Lake Pathway/VASA Single Track and numerous boat launches in the area	1/3/2022 9:30 AM
4	Mobile Medical Response Inc. (MMR) ambulance that covers the City of Traverse City, Garfield, Acme and Whitewater Townships	12/30/2021 1:59 PM
5	Northwest Regional Airport Authority	12/30/2021 10:35 AM

Q2 In the past 5 years, have you experienced a significant natural hazard event (i.e., flood, major winter storm, wind storm, etc.) that resulted in a negative impact on your home, business or community?

Answered: 44 Skipped: 0

Grand Traverse County Natural Hazard Mitigation Community Survey



ANSWER CHOICES	RESPONSES	
Yes	68.18%	30
No	31.82%	14
TOTAL		44

Q3 If so, please describe the type and impact of the natural hazard event, the location, and when you experienced it.

Answered: 30 Skipped: 14

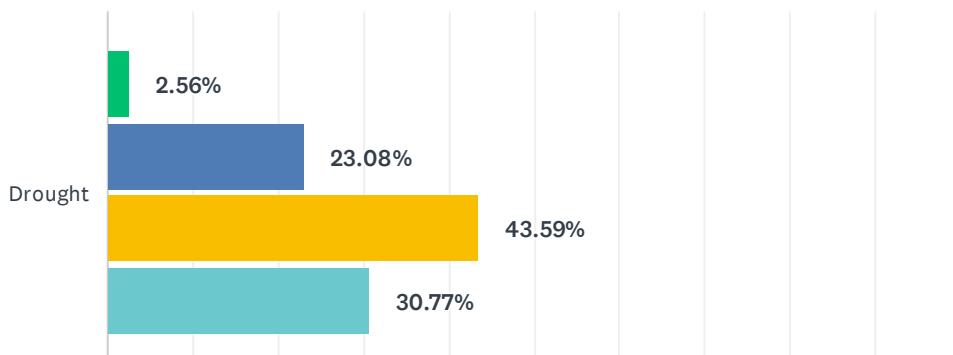
#	RESPONSES	DATE
1	High winds in December 2021 that took down multiple trees closing roads and many lost electricity.	1/17/2022 10:35 AM
2	Straight line winds in the summer of 2015. I was working at Sleeping Bear Dunes at the time and was on clean up duty after the storm.	1/17/2022 8:43 AM
3	Flooding that significantly impacted MMC	1/14/2022 5:08 PM
4	Major tree and building damage	1/14/2022 10:21 AM
5	High winds causing property damage throughout Village	1/13/2022 4:12 PM
6	Major winter storm, makes it difficult for staff to make it into work and creates risk for power outages.	1/13/2022 10:16 AM
7	Flooding, wind storms, high water tables, soil erosion	1/13/2022 8:00 AM
8	Flooding needing Road repairs, high winds causing trees down, Blizzard making road clearing difficult	1/12/2022 8:36 PM
9	Power outage 12/16/2021 to 12/18/2021 Leelanau and Grand Traverse counties.	1/12/2022 4:51 PM
10	High Water Levels of Lake Michigan combined with severe rain events on several occasions	1/12/2022 4:23 PM
11	Nearly every August we have a high wind, rain storm that takes down trees and damages power lines which results in lost power.	1/12/2022 3:40 PM
12	Wind blew my fence over	1/12/2022 3:35 PM
13	Wind storm, heavy rain with street-building flooding from runoff x 3. All within the City.	1/11/2022 8:47 AM
14	n/a	1/6/2022 9:41 AM

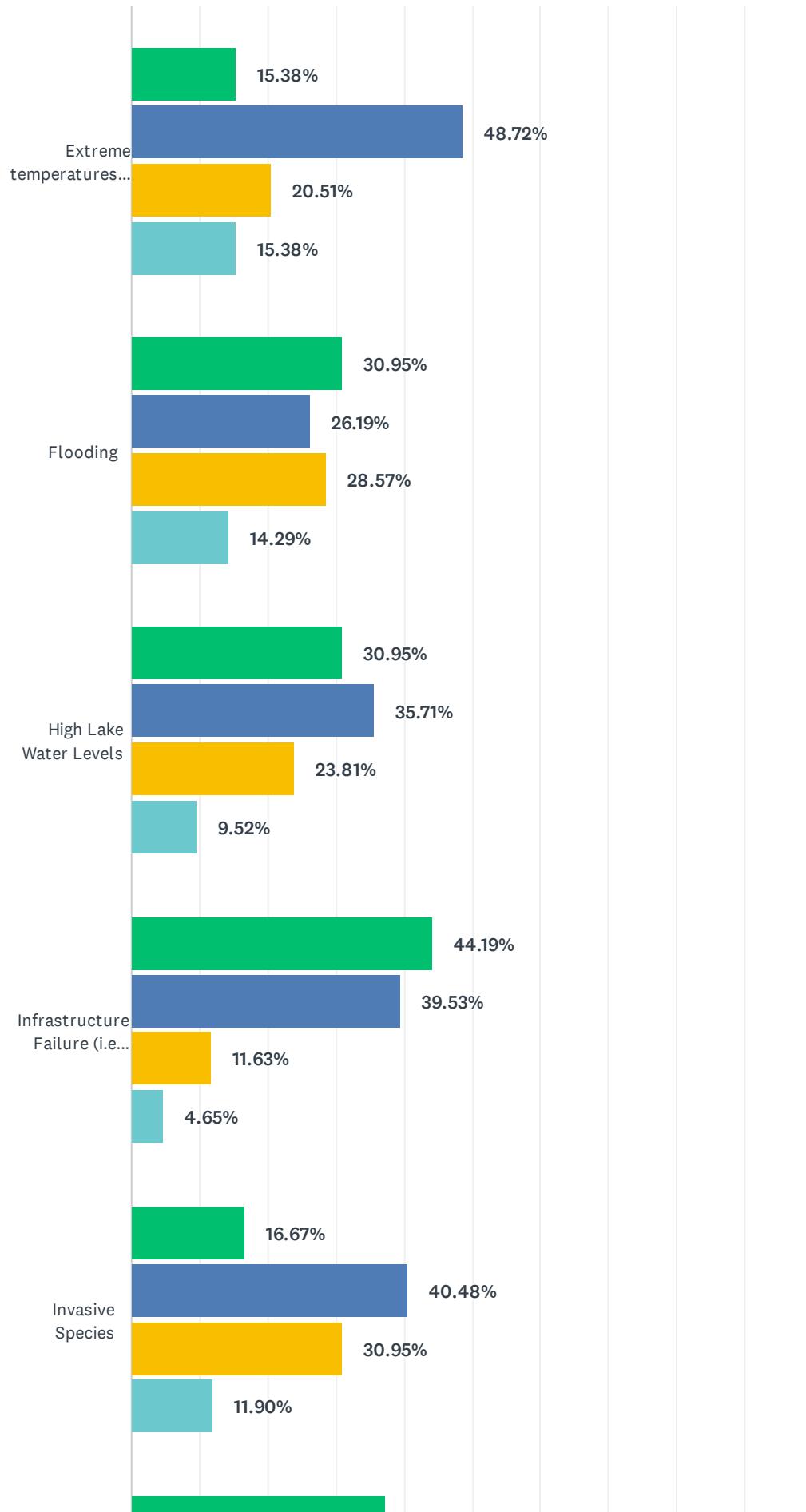
Grand Traverse County Natural Hazard Mitigation Community Survey

15	We had damage to our apartment complex due to severe flooding from rain. Conclusion was our building was not built with the paper draining system in our courtyard to take the water away from the building. 2020	1/4/2022 4:00 PM
16	August 2021, wind event similar to the one in 2015. Whitewater Township most damage south end of Elk and Skegemog Lake	1/4/2022 1:46 PM
17	Additional resources and staffing costs and use due to natural hazard event	1/4/2022 11:19 AM
18	Several wind storms have affected Interlochen State Park leading to trees down and long-term power outages.	1/4/2022 10:02 AM
19	Lake Michigan shoreline erosion - countywide - ongoing Increasing duration and intensity of rainfall events (3"+) - ongoing Covid-19 pandemic - ongoing High wind event (70+ mph) - December 2021 Severe thunderstorms - September 2021 Flooding of Acme Creek - August 2021 County-wide flooding - October 2020 County-wide flooding - May 2020	1/4/2022 8:55 AM
20	High waters affected the Beach Area at KJC Traverse City State Park. Caused damage to the seawall and eroded the beach access causing significant dropoffs. 2019/2020	1/3/2022 9:30 AM
21	Flooding from heavy rains in the summers of 2020 and 2021, especially on the west side around Slabtown and the Commons. Coastal flooding and erosion due to high water along Grand Traverse Bay (ongoing).	1/3/2022 8:52 AM
22	High Winds and Severe Winter Weather	1/2/2022 11:47 AM
23	August 2, 2015 Straight Line winds Numerous winter storms and wind events.	12/31/2021 10:42 AM
24	Flooding from rain events in various locations throughout the City causing property damage. Shoreline erosion and flooding from high water levels in Lake Michigan which damaged beach areas and threatened roadways. Wind storms that uprooted trees and damaged power lines and buildings. Extreme cold weather that damaged water service lines.	12/31/2021 7:09 AM
25	Whitewater Township, wind related events. We do not have any trees to cause damage but power outages due to poor tree maintenance (Consumers) was a problem resulting in loss of multiple appliances and personal refrigerated food and sensitive medications. When, regularly up to three in one week.	12/30/2021 3:06 PM
26	Winter Storm and Wind Storm	12/30/2021 1:59 PM
27	Multiple snow storms and wind storms	12/30/2021 1:31 PM
28	Winter weather always has an impact on flights and airport operations - summer time thunderstorms and high winds also cause disruptions	12/30/2021 10:35 AM
29	Loss of power due to high wind causing trees to cut power.	12/30/2021 9:01 AM
30	The County has experienced major rain events that has caused flooding in several areas.	12/30/2021 8:50 AM

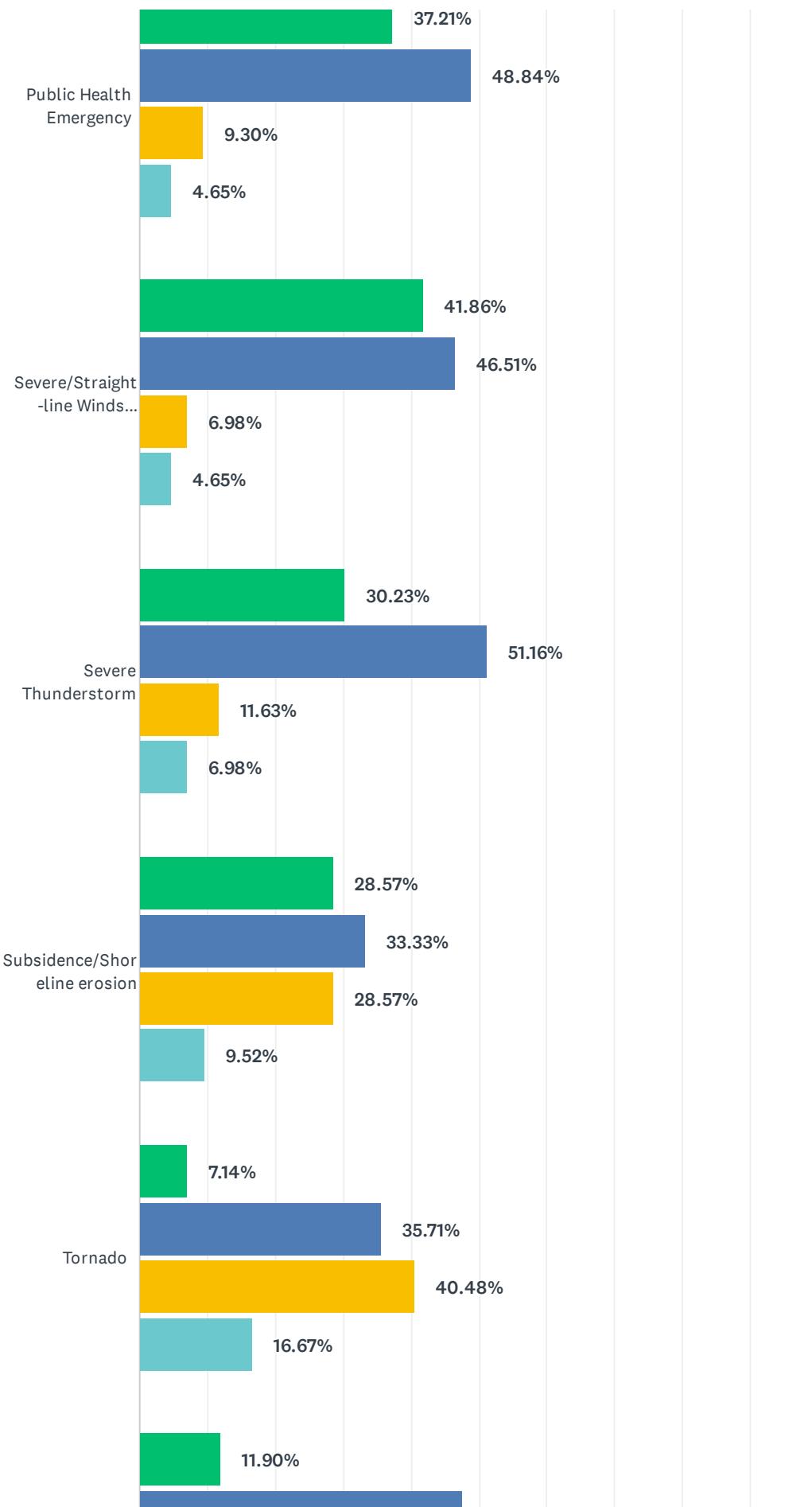
Q4 How concerned are you about the following natural hazard events affecting your community?

Answered: 43 Skipped: 1

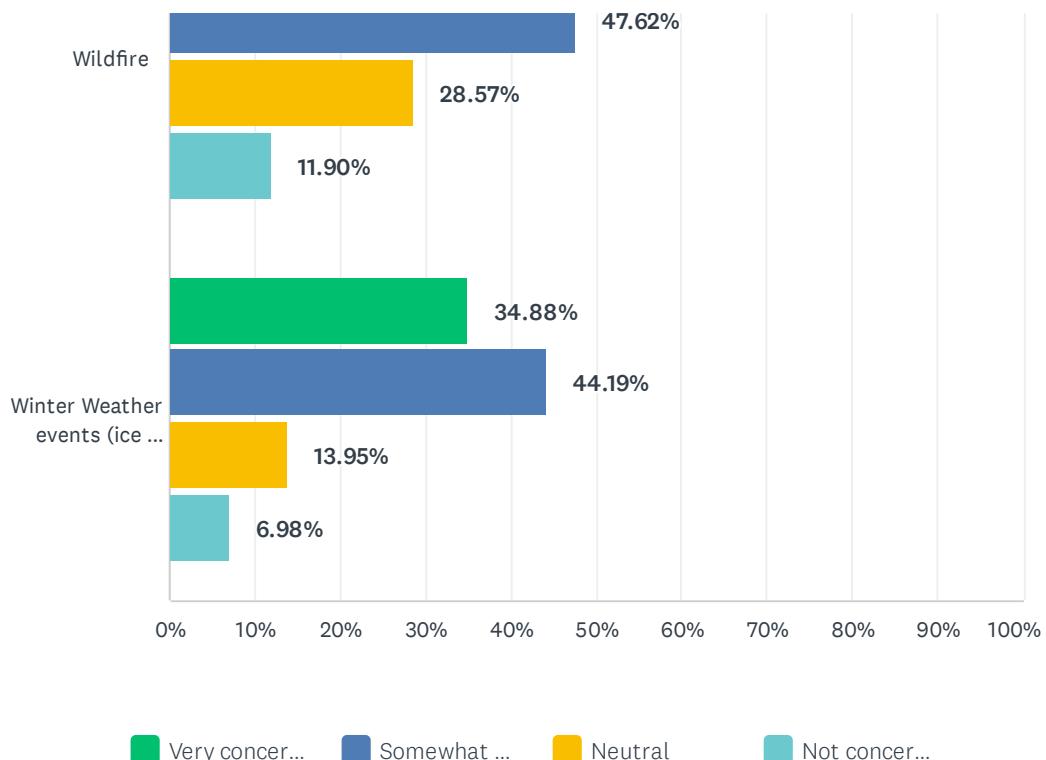




Grand Traverse County Natural Hazard Mitigation Community Survey



Grand Traverse County Natural Hazard Mitigation Community Survey



Grand Traverse County Natural Hazard Mitigation Community Survey

	VERY CONCERNED	SOMEWHAT CONCERNED	NEUTRAL	NOT CONCERNED	TOTAL
Drought	2.56% 1	23.08% 9	43.59% 17	30.77% 12	39
Extreme temperatures (heat/cold)	15.38% 6	48.72% 19	20.51% 8	15.38% 6	39
Flooding	30.95% 13	26.19% 11	28.57% 12	14.29% 6	42
High Lake Water Levels	30.95% 13	35.71% 15	23.81% 10	9.52% 4	42
Infrastructure Failure (i.e., road washout, bridge collapse, dam failure, utility service loss)	44.19% 19	39.53% 17	11.63% 5	4.65% 2	43
Invasive Species	16.67% 7	40.48% 17	30.95% 13	11.90% 5	42
Public Health Emergency	37.21% 16	48.84% 21	9.30% 4	4.65% 2	43
Severe/Straight-line Winds (Derecho)	41.86% 18	46.51% 20	6.98% 3	4.65% 2	43
Severe Thunderstorm	30.23% 13	51.16% 22	11.63% 5	6.98% 3	43
Subsidence/Shoreline erosion	28.57% 12	33.33% 14	28.57% 12	9.52% 4	42
Tornado	7.14% 3	35.71% 15	40.48% 17	16.67% 7	42
Wildfire	11.90% 5	47.62% 20	28.57% 12	11.90% 5	42
Winter Weather events (ice and sleet, blizzard)	34.88% 15	44.19% 19	13.95% 6	6.98% 3	43

#	PLEASE ELABORATE ON THE ANSWERS YOU PROVIDED!	DATE
1	We are very concerned about invasive species in our lakes and the process to control invasive species on land and in the water. There are some items on the list that at this time don't seem to be a concern, yet they might be in the future. Storms with high winds are always a threat to our infrastructure and resident's safety.	1/17/2022 10:35 AM
2	Many of these events are certainly capable of greatly impacting my community. It is tricky to determine which ones I am more concerned about. In my mind, the straight line winds storm of 2015 had the greatest impact on the community, so it would be important to prepare for storms like that in the future. Likewise, other severe storm events, such as severe thunderstorms, tornados, and winter weather events are also a big concern. Flooding is another event that should be a concern. The flooding downtown has caused a lot of trouble in the past. High lake levels and shoreline erosion have caused many issues in recent years. While high lake levels and shoreline erosion have not seemed to be as potentially severe as flooding or storm events, I could see that it has the potential to be bad. The same can be said for invasive species. We currently have populations of zebra mussels and sea lamprey in the Grand Traverse Bay and both of these invasive species have an impact on the fish population. If the populations got out of control or if an even more aggressive invasive species was introduced (e.g. Asian Carp), then we could see huge impacts on our fishing industry, which would harm our local economy.	1/17/2022 8:43 AM
3	Those that indicate "very concerned" I believe we have the highest risk and would have the most significant impact.	1/13/2022 10:16 AM
4	I work for the Road Commission and am concerned with the impacts to the R-O-W	1/12/2022 8:36 PM
5	GTB loses power in surrounding communities due to overhead lines down due to inclement	1/12/2022 4:51 PM

Grand Traverse County Natural Hazard Mitigation Community Survey

weather events (high winds, severe weather, snow storms and hot summer conditions) and trees falling on lines. Majority of tribal facilities do not have generators to support communitywide power failures for emergency shelters or warming shelters for community members. Public health emergency (Covid19) has been a constant issue to ensure health and safety standards are provided to keep public safe.

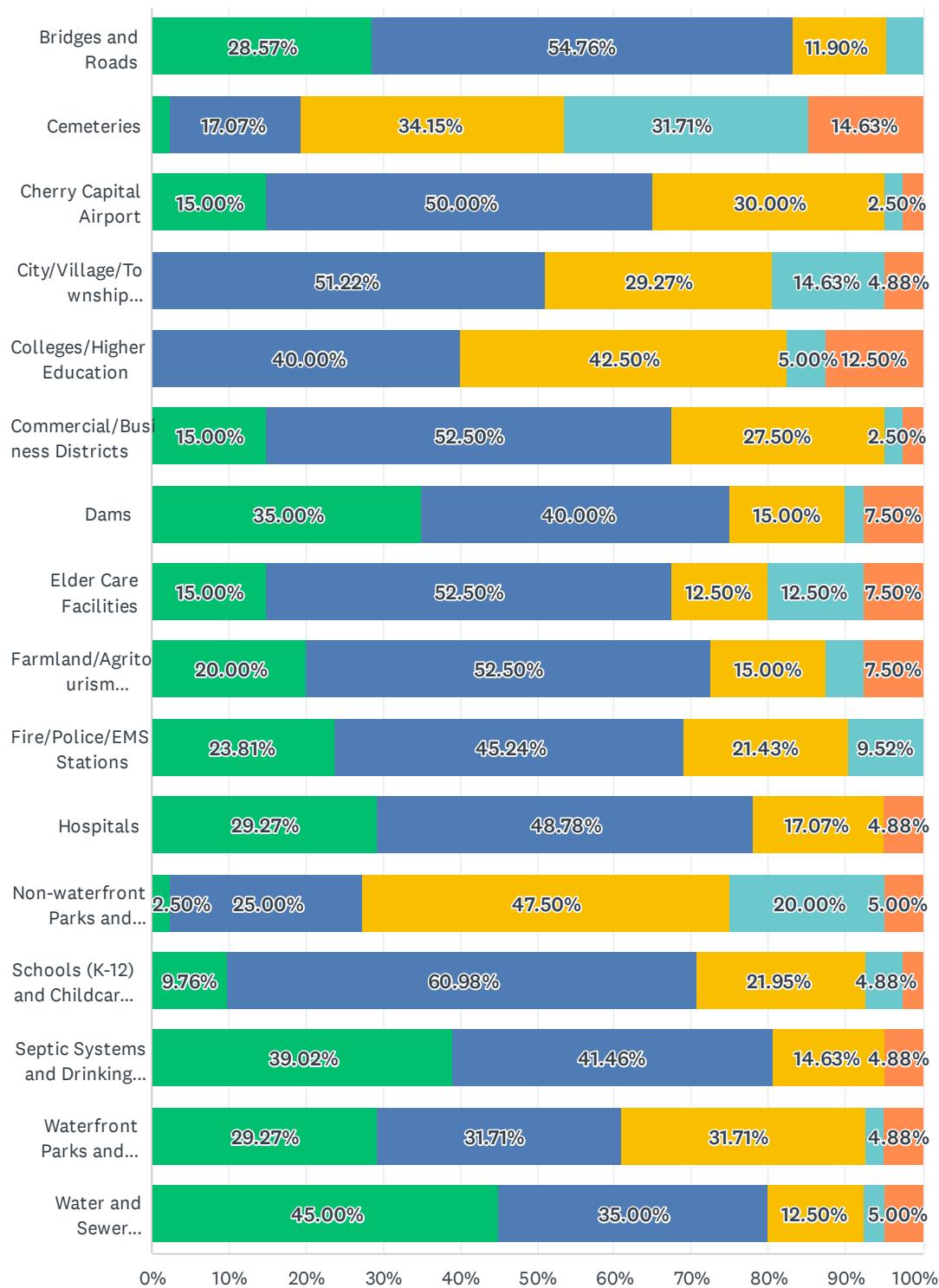
6	We have had some very dry summers and then bad behavior on the trails in the woods with folks making fires. A wildfire could spread quickly and destroy historic structures at Lighthouse Park.	1/12/2022 3:40 PM
7	I answered the above based on what I have seen happening in the community already. I am concerned about trickle down effects on agriculture and tourism.	1/7/2022 9:55 AM
8	We have seen some extremes in this area and have weathered pretty well. Little to no loss of life. I believe it may be due to geographical reasons rather than emergency preparedness. Plane crash is more concerning to me having an airport so close to residential communities.	1/6/2022 9:41 AM
9	We are a business that care of individuals with brain injuries that require 24 hour care. Our location has trees and open fields around it.	1/4/2022 4:00 PM
10	During the 2015 event, a larger area of the Grand Traverse County was affected along with parts Leelanau County which triggered a response from Emergency Management. The 2021 event hit the Whitewater Township areas almost as hard, without any response. Elected local unit leaders need emergency management lite training on a regular basis. Possible develop a "mini disaster" plan for events that do not qualify for a larger response.	1/4/2022 1:46 PM
11	Windstorms like we experienced in August 2015 and other weather related items are the main concern mainly due to the subtle changes in the weather that I have seen in my lifetime.	1/3/2022 5:04 PM
12	Concerned about any event that would negatively effect the county road system and safety of the traveling public.	1/3/2022 11:47 AM
13	high water levels- Causes damage on our beaches Infrastructure damage- we experience washouts at the Arbutus Lake Boat launch and campground that sometimes causes bad roads. Utility service loss causes cranky campers when they cant use the restrooms and run the air conditioning. Invasive Species- always a concern Public Health Emergency- It is super hard for us to access the beach from the campground when we get a call for an emergency at the beach. Taking a left hand turn out of the park to get to the beach is nearly impossible in the summer. Straight line winds- Causes damage to the trees in the park and causes campers to have damage to their camping units not to mention damage to our picnic tables/electrical pedestals, buildings and fire rings	1/3/2022 9:30 AM
14	Areas of great concern are events that have greater likelihood of occurring, and that have a greater likelihood of causing loss of life. Areas of lesser concern have either a lesser likelihood of occurring, or a lesser likelihood of causing loss of life.	12/31/2021 7:09 AM
15	Most of these items are simply part of life in a northern climate. Poor planning and lack of utility maintenance are what make them an issue.	12/30/2021 3:06 PM
16	Most can affect Grand Traverse County.	12/30/2021 1:59 PM
17	I would be concerned about all hazards, my answers would indicate priorities.	12/30/2021 8:21 AM

Q5 Please rank the following types of community infrastructure and assets on their level of vulnerability to damage/failure during a natural hazard event.

Answered: 43 Skipped: 1

Grand Traverse County Natural Hazard Mitigation Community Survey

Level of Vulnerability



█ Most Vulnerable █ Somewhat Vulnerable █ Neutral █ Not Likely to be Impacted
█ Not Vulnerable

Grand Traverse County Natural Hazard Mitigation Community Survey

Level of Vulnerability						
	MOST VULNERABLE	SOMEWHAT VULNERABLE	NEUTRAL	NOT LIKELY TO BE VULNERABLE	NOT VULNERABLE	TOTAL
Bridges and Roads	28.57% 12	54.76% 23	11.90% 5	4.76% 2	0.00% 0	42
Cemeteries	2.44% 1	17.07% 7	34.15% 14	31.71% 13	14.63% 6	41
Cherry Capital Airport	15.00% 6	50.00% 20	30.00% 12	2.50% 1	2.50% 1	40
City/Village/Township Buildings	0.00% 0	51.22% 21	29.27% 12	14.63% 6	4.88% 2	41
Colleges/Higher Education	0.00% 0	40.00% 16	42.50% 17	5.00% 2	12.50% 5	40
Commercial/Business Districts	15.00% 6	52.50% 21	27.50% 11	2.50% 1	2.50% 1	40
Dams	35.00% 14	40.00% 16	15.00% 6	2.50% 1	7.50% 3	40
Elder Care Facilities	15.00% 6	52.50% 21	12.50% 5	12.50% 5	7.50% 3	40
Farmland/Agritourism Businesses	20.00% 8	52.50% 21	15.00% 6	5.00% 2	7.50% 3	40
Fire/Police/EMS Stations	23.81% 10	45.24% 19	21.43% 9	9.52% 4	0.00% 0	42
Hospitals	29.27% 12	48.78% 20	17.07% 7	0.00% 0	4.88% 2	41
Non-waterfront Parks and Recreation Areas	2.50% 1	25.00% 10	47.50% 19	20.00% 8	5.00% 2	40
Schools (K-12) and Childcare Facilities	9.76% 4	60.98% 25	21.95% 9	4.88% 2	2.44% 1	41
Septic Systems and Drinking Water Wells	39.02% 16	41.46% 17	14.63% 6	0.00% 0	4.88% 2	41
Waterfront Parks and Recreation Areas	29.27% 12	31.71% 13	31.71% 13	2.44% 1	4.88% 2	41
Water and Sewer Infrastructure	45.00% 18	35.00% 14	12.50% 5	2.50% 1	5.00% 2	40

#	PLEASE ELABORATE ON ANY OF YOUR ANSWERS PROVIDED!	DATE
1	This is a vague question since everything is vulnerable depending on where the natural hazard occurs. I answered from what I know historically has happened here in FLT.	1/17/2022 10:35 AM
2	I do not have much experience with the locations of all of these assets, which would be an important factor in determining how vulnerable they are. I marked things as most vulnerable if they are downtown, where flood issues occur. This is also where the union street dam is, which is at risk of failure. I also marked things as most vulnerable if I would be concerned if they lost power like elderly care facilities and child care facilities.	1/17/2022 8:43 AM
3	We have a history of sewage ending up in the Boardman lake due to high water levels or significant rainfall. The marina floods as well. Most vulnerable indications are likely to have the most impact or most likely to occur in this county.	1/13/2022 10:16 AM
4	Infrastructure needs to support roads, utilities, dams, floods, and housing of most vulnerable when water/sewer/utilities out. Pandemic concerns of any public health emergency and staffing	1/12/2022 4:51 PM

Grand Traverse County Natural Hazard Mitigation Community Survey

to support emergencies.

5	We enjoy the look of Old Mission Peninsula and we need to make good decisions to keep the infrastructure from drastically changing the look of the farmland and beautiful views.	1/12/2022 3:40 PM
6	Sewer and water infrastructure has been around for long time especially within the city with only repairs on a reactive basis. With the environmental sensitivity to the Great Lakes, this needs to be a priority. With the environmental sensitivity to the Great Lakes, this should be a major priority rather than more parking or additional retail building. Our road system has many miles of road segments which are in close proximity to water and the susceptibility of erosion from high water. Road funding is not nearly sufficient to address these concerns. Relocation of airport would be another future issue to address to prevent a large loss-of-life incident in the event of a plane crash.	1/6/2022 9:41 AM
7	We are licensed by the state of Michigan to provide proper care and resources for the clients.	1/4/2022 4:00 PM
8	All of these items are simply an issue with preparedness. I live in and do business in areas with private water and sewer. Loss of power is the only issue and that can be addressed with a generator. You cannot stop the snow, sleet, rain, or wind but you can maintain things properly.	12/30/2021 3:06 PM

Q6 What initiatives, improvements or efforts do you think could be implemented to reduce the impacts of natural hazard events in your community?

Answered: 29 Skipped: 15

#	RESPONSES	DATE
1	We can't stop most natural hazards, but we can better prepare for them by having a strong infrastructure. We can have strong bridges, dams and good emergency plans in place to protect our residents and infrastructure.	1/17/2022 10:35 AM
2	I am not familiar enough with hazard preparedness plans to make any suggestions.	1/17/2022 8:43 AM
3	Infrastructure improvements/updates. Plans and procedures	1/13/2022 4:12 PM
4	Improvement of infrastructures to be able to withstand severe weather events.	1/13/2022 10:16 AM
5	Be aware of your surroundings	1/13/2022 8:00 AM
6	Underground utilities, drainage improvements, generators built into facilities, tree management, debris removal plan, soil erosion regulations, redundant interoperable communication system.	1/12/2022 4:51 PM
7	Start with a plan and priorities	1/12/2022 4:23 PM
8	Natural methods to deal with shoreline erosion and development of the farmland.	1/12/2022 3:40 PM
9	I do not know	1/12/2022 3:29 PM
10	Overall plan to reduce impact of rain-flood water events. Including improvements to infrastructure: Roads, storm sewers, re-shaping land, etc.	1/11/2022 8:47 AM
11	Obtaining grants to assist agricultural community with mitigation of the effects of climate change.	1/7/2022 9:55 AM
12	Many large grants and cohesion between local governments in a remedy. Politics aside.	1/6/2022 9:41 AM
13	None	1/4/2022 4:00 PM
14	Mini Disaster Plans	1/4/2022 1:46 PM
15	Pre-planning and exercise events for response to natural hazard events; infrastructure improvements.	1/4/2022 10:02 AM
16	Our county has a single person responsible for the health, safety, and welfare of residents via surface water management over 385,000 acres. Properly staffing and compensating a Drain	1/4/2022 8:55 AM

Grand Traverse County Natural Hazard Mitigation Community Survey

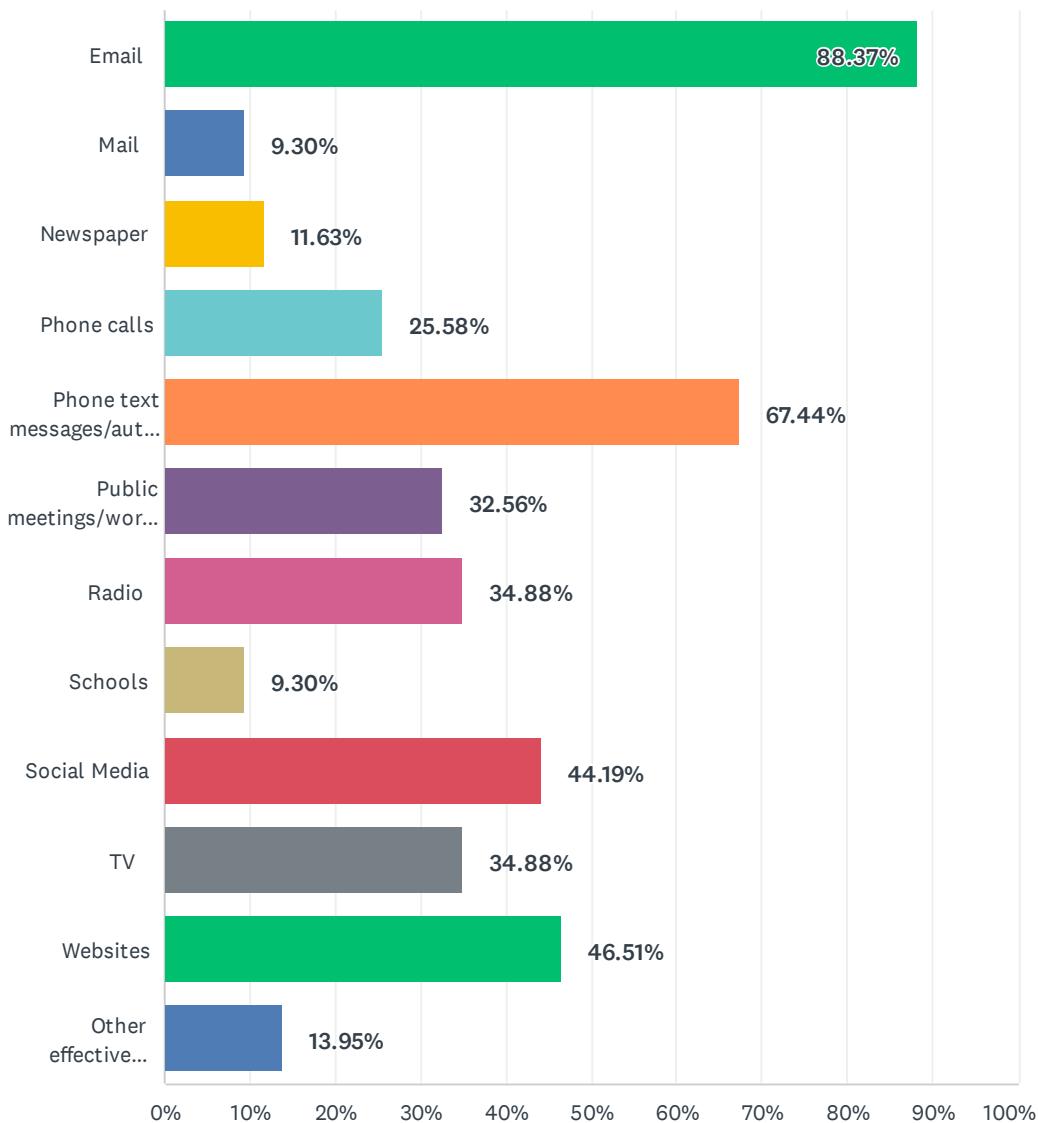
Commission would be a great step forward. Shoreline erosion continues to be an ongoing concern. Private residents, Townships, and other municipal agencies struggle both to understand responsibilities as well as funding-wise. A concerted effort with Army Corps. of Engineers and EGLE should be revisited (was previously in the works before Covid).

17	Continued planning and risk mitigation exercises are valuable.	1/3/2022 5:04 PM
18	proactive replacement of the twin culverts on S. Airport Rd crossing the Boardman River with a bridge located east of Logan's Landing	1/3/2022 11:47 AM
19	maybe more trainings with community involvement.	1/3/2022 9:30 AM
20	Improved stormwater management, better coastal planning and design of public and private properties, FishPass to replace the Union Street Dam, reduced carbon emissions, continue planting trees throughout the city.	1/3/2022 8:52 AM
21	Being prepared and making an investment on mitigation.	12/31/2021 10:42 AM
22	Improve watershed management activities. Improve maintenance of urban forest. Keep hazard mitigation plan current and routinely educate the public about the plan and about measures that individuals can take.	12/31/2021 7:09 AM
23	Charge utility companies for outages. Right now it is easier and cheaper to just let the power go out than it is to invest in proper line maintenance. They also are not covering the cost of emergency fire and police crews baby-sitting their downed lines.	12/30/2021 3:06 PM
24	Warning systems	12/30/2021 1:59 PM
25	Utility infrastructure. A positive plan for shoreline erosion. Upgrades to public buildings.	12/30/2021 1:31 PM
26	The JOC has been a great tool during the pandemic.	12/30/2021 10:35 AM
27	Better communication between private and government sectors.	12/30/2021 9:01 AM
28	Locally, adopt a countywide resilience plan that could be used by stakeholders to plan for or mitigate the impacts of natural hazards. On a statewide level, amend existing state incentive programs such as brownfield redevelopment program and the PACE energy efficiency program that would incentivize green infrastructure and storm water best management practices for private development.	12/30/2021 8:50 AM
29	Improve redundancy in utilities, roads.	12/30/2021 8:21 AM

Q7 Which of the following methods are effective ways for you to receive information about how to be prepared for a natural hazard event? (You may select as many as you like.)

Answered: 43 Skipped: 1

Grand Traverse County Natural Hazard Mitigation Community Survey



Grand Traverse County Natural Hazard Mitigation Community Survey

ANSWER CHOICES		RESPONSES	
Email		88.37%	38
Mail		9.30%	4
Newspaper		11.63%	5
Phone calls		25.58%	11
Phone text messages/automated alerts		67.44%	29
Public meetings/workshops		32.56%	14
Radio		34.88%	15
Schools		9.30%	4
Social Media		44.19%	19
TV		34.88%	15
Websites		46.51%	20
Other effective communication method? (please specify)		13.95%	6
Total Respondents: 43			

#	OTHER EFFECTIVE COMMUNICATION METHOD? (PLEASE SPECIFY)	DATE
1	work networking	1/13/2022 10:16 AM
2	I personally prefer push notifications from apps and text messages	1/7/2022 9:55 AM
3	Regular webinars that are recorded and downloadable	1/4/2022 1:46 PM
4	Organizational associations such as Michigan Townships Association or Michigan Association of Planning Local government resources through Michigan State University	12/30/2021 8:46 PM
5	I'm already prepared but info would be the most helpful by phone for most individuals. Cell service and text are the least likely to go out and a phone can be charged in your car. Websites that people can search are also helpful.	12/30/2021 3:06 PM
6	Put the options on the table, as well as the policies and process deemed essential to provide some clarity and avoid wasting resources.	12/30/2021 8:21 AM

Q8 Is there any additional information you would like us to consider as we update Grand Traverse County's Natural Hazard Mitigation Plan?

Answered: 16 Skipped: 28

#	RESPONSES	DATE
1	Yes, involve the local townships and provide them functional plans for natural hazards. Have a training for township supervisors on what we should be providing to our residents during a natural hazard and how notify and provide the residents those provisions and services.	1/17/2022 10:35 AM
2	No	1/17/2022 8:43 AM
3	not sure	1/14/2022 10:21 AM
4	Communication is a necessary tool in the times of a severe event, improving communication methods and ensuring consistent voices would improve response plans to emergencies, even	1/13/2022 10:16 AM

Grand Traverse County Natural Hazard Mitigation Community Survey

if we were otherwise unprepared.

5	No	1/13/2022 8:00 AM
6	Drainage improvements to reduce flood impacts, bury utility lines to reduce outages, tree management and generators in new construction and natural vegetation to reduce fires and flooding.	1/12/2022 4:51 PM
7	Pursuing funding available to begin work on climate resilience.	1/7/2022 9:55 AM
8	no.	1/6/2022 9:41 AM
9	None	1/4/2022 4:00 PM
10	How about a copy of the plan in advance of the survey?	1/4/2022 1:46 PM
11	No	1/4/2022 10:02 AM
12	Not that I can think of at this time.	1/3/2022 5:04 PM
13	Thanks for being involved in this project.	12/31/2021 10:42 AM
14	Locations where downed trees can be disposed of, would reduce the quantity of extra-large volumes of downed timber or half-downed timber on public and private property. Disposal can be a real issue and downed trees can be a cause or an issue getting access to the next outage.	12/30/2021 3:06 PM
15	No	12/30/2021 1:59 PM
16	No	12/30/2021 9:01 AM

APPENDIX C: 2015 PLAN MITIGATION STRATEGIES

PRIORITY AND ACTION STRATEGIES	Responsible Parties	Timeframe
Priority Area 1: Flood Mitigation Strategies		
a. Drainage improvements in high flooding potential areas, including upgrading the twin culverts on S. Airport Rd at <i>Logan's Landing</i>	Drain Commissioner Road Commission County Conservation District Emergency Management Department Townships, Villages, City	2-4 years from adoption of the plan
<i>This strategy was modified and updated to reflect current needs.</i>		
b. Removal of unsafe dams on the Boardman River	County Conservation District County Planning Department Emergency Management Department MI Department of Natural Resources Townships of Garfield, Blair, Paradise, East Bay, City of Traverse City	4-8 years from adoption of the plan
<i>This strategy was modified and updated to reflect relevant dams.</i>		
c. Continue enforcement of building codes and soil erosion regulations	County Building Inspector Building Construction Code Dept. County Conservation District	Ongoing
<i>This strategy was kept and is unchanged.</i>		
Priority Area 2: Thunderstorms and High Winds Mitigation Strategies		
a. Promote the establishment of the State of Michigan's Primary Radio Communication system for throughout the County	Emergency Management Department County Planning Department Townships, Villages, City	1-2 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
b. Have a debris removal plan for safety	Emergency Management Department County Planning Department County Building Inspector Townships, Villages, City	2-4 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
c. Utilize ham radio channel for local warnings	Emergency Management Department	1-2 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
d. Work with utility companies	Emergency Management Department County Planning Department County Building Inspector Utility Companies	1-3 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
e. Tree management	Utility Companies Emergency Management Department Townships, Villages, Private Landowners	1-3 years from adoption of the plan
<i>This strategy was modified to be more specific.</i>		
f. Promotion of burying utility lines in new construction	County Building Inspector Utility Companies	1-3 years from adoption of the plan

	Emergency Management Department County Planning Department Townships, Villages, City	
<i>This strategy was kept and is unchanged.</i>		
PRIORITY AND ACTION STRATEGIES	Responsible Parties	Timeframe
Priority Area 2: Thunderstorms and High Winds Mitigation Strategies (continued)		
a. Burying power lines in high outage areas	County Building Inspector Utility Companies Emergency Management Department County Planning Department Townships, Villages, City	1-3 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
b. Identify potential wind damage areas	Emergency Management Department County Planning Department Townships, Villages, City	1-2 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
c. Establish new generators where needed	Emergency Management Department County Planning Department Townships, Villages, City	2-3 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
Priority Area 3: Extreme Winter Weather (Snow Load and Ice Build Up) Mitigation Strategies		
a. Continue enforcement of building code regarding snow load limits through the permitting process	County Building Inspector Townships, Villages, City County Planning Emergency Management Coordinator	Ongoing
<i>This strategy was kept and is unchanged.</i>		
b. Promote the establishment of the State of Michigan's Primary Radio Communication system for throughout the County	Emergency Management Department County Planning Department Townships, Villages, City	1-2 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
c. Utilize a ham radio channel for local warnings	Emergency Management Department	1-2 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
Priority Area 4: Wildfire/Urban Interface Mitigation Strategies		
a. Public education and awareness activities such as programs and brochures regarding fuel management, proper vegetation, fire breaks	County Planning Department Emergency Management Department Building Inspector County Soil Conservation District MI Department of Natural Resources Townships, Villages, City	1-3 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
b. Continue enforcement of state fire codes regarding setback requirements	Building Inspector Townships, Villages, City	Ongoing
<i>This strategy was kept and is unchanged.</i>		
c. Public education utilizing the MI Department of Natural Resources	Emergency Management Department County Conservation District	1-3 years from adoption of the plan

flyers and the FEMA information at parks and campgrounds	MI Department of Natural Resources Townships, Villages Parks and Campgrounds, public and private	
<i>This strategy was kept and is unchanged.</i>		
d. Real estate and insurance agents to distribute information	Emergency Management Department County Planning Department Townships, Villages	1-3 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
e. Assess fire suppression access and make improvements	Emergency Management Department County and local fire departments	1-3 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
f. Research the MI Department of Natural Resources' State Forest wildfire/urban interface rules or plan	Emergency Management Department County and local fire departments County Planning Department	1-3 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		

PRIORITY AND ACTION STRATEGIES	Responsible Parties	Timeframe
Priority Area 5: Shoreline Erosion Mitigation Strategies		
a. Drainage control projects	Building Construction Code Dept. Drain Commissioner County Conservation District Emergency Management Department Townships, Villages, City	2-4 years from adoption of the plan
<i>This strategy was kept and is unchanged.</i>		
b. Enforcement of soil erosion statutes/permits	Building Construction Code Dept. Drain Commissioner County Conservation District County Planning Department Emergency Management Coordinator MI Department of Environmental Quality U.S. Army Corps of Engineers	Ongoing
<i>This strategy was kept and is unchanged.</i>		
c. Enforcement of the building codes	County Building Inspector	Ongoing
<i>This strategy was kept and is unchanged.</i>		
d. Enforcement of the grading levels no more than 10%	Building Construction Code Dept. Drain Commissioner County Conservation District County Planning Department	Ongoing
<i>This strategy was kept and is unchanged.</i>		
e. Placement of vegetation and utilizing native vegetation	County Building Inspector Building Construction Code Dept. Drain Commissioner County Conservation District County Planning Department Townships of Peninsula, East Bay, Acme, City of Traverse City	Ongoing
<i>This strategy was kept and is unchanged.</i>		

APPENDIX D: LOCAL PLANNING TEAM MEETING DOCUMENTATION

A G E N D A
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Community Partners Meeting
Thursday, October 29, 2020 - 8:30 am
400 Boardman Ave, 2nd Floor Training Room
Traverse City MI 49684
Or via Google Meet
<https://meet.google.com/zgk-defc-sbz>
Join by phone
(US) +1 567-236-0769 PIN: 322 557 558#

Chairman: Chief Pat Parker, MFD
Vice Chairman: Chief Jim Tuller, TCFD
Secretary: Deb Hunt, GTCRC

- 1. Call Meeting to Order**
- 2. Approval of Agenda**
- 4. Approval of Community Partner Minutes of March 19, 2020**
- 5. Agency Presentations & Schedule**
 - a. Nothing for today's meeting
 - b. John Stalmack, Lambda Energy – **to be scheduled at an upcoming Hazmat meeting**
- 6. Committee & Team Reports**
 - a. Regional Hazmat Team Report/Sara Title II & III (Jim Tuller – City Fire)
 - b. School Drill Schedule and Report (Mark Bak - TCAPS)
 - c. Emergency Manager/Planning Team (Gregg Bird – EM)
 - d. TBARG - (Glen Johnson)
- 7. Drills/Exercises and Training/Education**
- 8. Old Business**
- 9. New Business**
 - a. Natural Hazard Mitigation Plan Update
- 10. Open Discussion**
- 11. Future Meetings**
December 17, 2020, 8:30 am – HAZMAT
- 12. Adjournment**

M I N U T E S
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Community Partners Meeting
Thursday, October 29, 2020 - 8:30 am
Via Google Meet, Traverse City MI 49684

Chairman: Chief Pat Parker, MFD
Vice Chairman: Chief Jim Tuller, TCFD
Secretary: Deb Hunt, GTCRC

1. Call Meeting to Order

The regular meeting was called to order at 8:30 am. The virtual meeting was called to order at 8:34 am by Chair Parker.

Attendees introduced themselves.

2. Approval of Agenda

The agenda was approved as distributed.

4. Approval of Community Partner Minutes of March 19, 2020

Motion by Jewett, seconded by B. Parker, to approve the Minutes of March 19, 2020.
CARRIED

5. Agency Presentations & Schedule

- a. No presentation was scheduled for this meeting.
- b. John Stalmack, Lambda Energy, will be scheduled for a future in-person, HazMat meeting.

6. Committee & Team Reports

a. Regional Hazmat Team Report/Sara Title II & III (Jim Tuller – City Fire)

In Tuller's excused absence, Chair Parker reported on Metro Fire has trained with the 51st Region and has been on-call to assist during visits by candidates.

b. School Drill Schedule and Report (Mark Bak - TCAPS)

Bak reported the majority of first school drills are complete. Drill procedures will be modified to reflect Covid concerns. TCAPS continues to assist non-TCAPS schools.

c. Emergency Manager/Planning Team (Gregg Bird – EM)

In Bird's excused absence, Chair Parker reported on continued Covid efforts and the Natural Hazard Mitigation Plan by the Emergency Manager.

d. TBARG - (Glen Johnson)

Johnson reported assistance with given to the recent drowning off the Frankfort pier. Cost sharing partners are being sought to assist in acquiring the DRM/Talk Groups system. He also shared his efforts regarding possible application of the StarLink system.

7. Drills/Exercises and Training/Education

Chair Parker stated "300" classes are now available on line, with discussion underway about developing "400" classes on line. He advised attendees of the November 7, 2020 non-sanctioned "Non-Ice-Man Race." January 14 will be a planning meeting for the VASA events scheduled for February 13 and 15.

8. Old Business

There were no items of Old Business.

9. New Business**a. Natural Hazard Mitigation Plan Update**

Chair Parker highlighted the updates to Grand Traverse County's *Natural Hazard Mitigation Plan*. A major change was to the top five priorities. Fires were eliminated from the top five and erosion was added to the top five. Draft copies have been supplied to townships and other involved agencies for their input.

10. Open Discussion

There were no items of open discussion.

11. Future Meetings

November 19, 2020 has been canceled.
December 17, 2020, 8:30 am – HAZMAT

12. Adjournment

The Committee adjourned at 9:05 am.

Submitted by Debra Hunt

A G E N D A
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Community Partners Meeting
Thursday, January 21, 2021 - 8:30 am
Virtual Meeting

Google Meet Meeting ID
meet.google.com/dur-vrdw-nvd

Dial In
(US)+1 423-607-0073
PIN: 135035257#

Chairman: Chief Pat Parker, Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept.
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order – G. Bird

2. Approval of Agenda

3. Election of Officers

Nominations for the positions of Chair, Vice-Chair and Secretary will be taken.

4. Approval of Community Partner Minutes of October 29, 2020

5. Agency Presentations & Schedule

The 2021 meeting schedule is enclosed for review and a call for 2021 presentations will be given

6. Committee & Team Reports

a. Regional Hazmat Team Report/Sara Title II & III (Jim Tuller – City Fire)

b. School Drill Schedule and Report (Mark Bak - TCAPS)

c. Emergency Manager/Planning Team (Gregg Bird – EM)

d. TBARG - (Glen Johnson)

7. Drills/Exercises and Training/Education

8. Old Business

a. Natural Hazard Mitigation Plan renewal update discussion

9. New Business

10. Open Discussion

11. Future Meetings

12. Adjournment

M I N U T E S
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Community Partners Meeting
Thursday, January 21, 2021 - 8:30 am
meet.google.com/dur-vrdw-nvd
Dial In (US) +1 423-607-0073 PIN: 135 035 257#

1. Call Meeting to Order

Meeting was called to order by Gregg Bird.

2. Approval of Agenda

Motion by Jewett, seconded by B. Parker, to approve the agenda.
CARRIED

3. Election of Officers

Bird called for nominations for the position of Chair. Pat Parker was the sole nominee and accepted the nomination. Pat Parker was elected as Chair by unanimous vote.

Pat Parker called for nominations for the position of Vice-Chair. Jim Tuller was the sole nominee and accepted the nomination. Jim Tuller was elected as Vice-Chair by unanimous vote.

Pat Parker called for nominations for the position of Secretary. Deb Hunt was the sole nominee and accepted the nomination. Deb Hunt was elected as Secretary by unanimous vote.

4. Approval of Community Partner Minutes of October 29, 2020

Motion by Jewett, seconded by Tuller, to approve the October 29, 2020 Community Partner meeting minutes.
CARRIED

5. Agency Presentations & Schedule

At this time, meetings are anticipated to be virtual. Bird extended the offer for community partners to do presentations.

The 2021 meeting schedule stands as distributed. Dates are subject to change as the need arises.

6. Committee & Team Reports

- a. Regional Hazmat Team Report/Sara Title II & III (Jim Tuller – City Fire)
Tuller reported on a December incident occurring in Leelanau County.

P. Parker commented on the local first responders joint efforts in hosting the Presidential/Vice-Presidential visit last November.

Both men reported they are currently developing capital equipment items.

- b. School Drill Schedule and Report (Mark Bak - TCAPS)
Bird reported schools have been rescheduling drills/lockdowns.

- c. Emergency Manager/Planning Team (Gregg Bird – EM)

Bird shared updates regarding vaccination efforts of the Health Department. The annual HazMat grant has been submitted. Bird have worked on the Local HazMat Mitigation Plan. The document was submitted to MSP EMHSD, rejected and an appeal was submitted. The appeal was denied as compliance to new, but not released requirements, is being required. More updates are being made and the plan will be re-submitted. The group discussed the ranking of the natural hazards affecting the county and the different jurisdictions and municipalities. Municipal liaisons were asked to take back the hazards to their planning staff again.

d. TBARG - (Glen Johnson)

Johnson shared Cherryland Electric has financially participated in a 2,000W generator. This generator will allow a wide range of online verbal and document transmission to occur by connecting to the StarLight satellite system once the final equipment is procured.

7. Drills/Exercises and Training/Education

All training for FEMA compliance is still be done via online learning. Most recent class offerings from state and federal consortium partners have been emailed to members and continue to be distributed as they are received.

Great Lake Homeland Security Meeting postponed until August 17- 19 in Grand Rapids.

MI Hazmat First Responders Conference will be held April 7 – 9 at Crystal Mountain.

8. Old Business

There were no items of Old Business.

9. New Business

There were no items of New Business.

10. Open Discussion

No topics were presented for Open Discussion.

11. Future Meetings

February 18 - HazMat

March 18 - Community Partners

April 15 - Community Partners

12. Adjournment

Motion by Jewett, seconded by Down, to adjourn.

The Committee adjourned at 9:02 a.m.

Submitted by Debra Hunt

A G E N D A
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, March 18, 2021 - 8:30 am
Virtual Meeting

Google Meeting ID
meet.google.com/ixy-hteh-qgu

Phone Numbers
(US)+1 401-646-2312
PIN: 609 301 975#

Chairman: Chief Pat Parker, MFD
Vice Chairman: Chief Jim Tuller, TCFD
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

2. Approval of Agenda

3. Approval of Minutes of January 21, 2021

4. Agency Presentations & Schedule

5. Committee & Team Reports

- a. Hazmat Team Report/Sara Title II & III)
 - 1. Tier II status 2021 update
 - 2. HAZMAT Elite training & equipment from Region 7 Homeland Security Grant Program
 - 3. Recent HAZMAT incident(s) review

b. School Drill Schedule and Report

c. Emergency Manager/Planning Team

d. TBARG / RACES

6. Drills/Exercises and Training/Education

7. Old Business

- a. Natural Hazard Mitigation plan update discussion – input for projects

8. New Business

9. Open Discussion

10. Future Meetings

April 15 -

May 21 -

June 17 -

11. Adjournment

M I N U T E S
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Community Partners Meeting
Thursday, March 18, 2021 - 8:30 am
Virtual Meeting
Google Meeting ID
meet.google.com/yfk-meav-iyt

Phone Numbers
(US)+1 707-395-8051#
PIN: 999 681 189#

Chairman: Chief Pat Parker, MFD
Vice Chairman: Chief Jim Tuller, TCFD
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

The meeting was called to order at 8:30 am Chair Parker.

2. Approval of Agenda

Motion by Jewett, seconded by Lemcool, to approve the agenda as presented.

CARRIED

3. Approval of Minutes of January 21, 2021

Motion by Jewett seconded by Dituri, to approve the January 21, 2021 minutes as presented.

CARRIED

4. Agency Presentations & Schedule

There was no agency presentation scheduled for this meeting. Bird extended the invitation for agencies to present their agency's operations and/or how they functioned during the 2020 pandemic. Thus far, Cherry Capital Airport is scheduled for the August presentation.

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

1. Tier II status 2021 update

Drewery stated the current 120 sites as well as new sites, are reporting. Information is forthcoming for locations needing to update their correct fire department. This information will be relayed to Dispatch. He shared his experience with a local firm requesting oversight in disposing of a small, but critical chemical being phased out of service. An increase in oil well activity is possible with gas/oil prices escalating.

2. HAZMAT Elite training & equipment from Region 7 Homeland Security Grant Program

Tuller reported training is continuing as usual. A vent was purchased for the trailer and a gas monitor. Several trucks are up for replacement.

Drewery reported similar activity for Metro. He is working with B. Parker to develop start solutions, with two full drill scenarios planned. Other agencies were invited to participate.

Drewery stated his gratitude to Region 7 for their \$73K equipment grant for an Ideal Lead. The ability of this device to identify materials in ample excess exceeds some local agency's similar equipment. It is also blue tooth compatible.

3. Recent HAZMAT incident(s) review

There were no recent Hazmat incidents to review.

b. School Drill Schedule and Report

Chair Parker reported that school drills are occurring weekly with no issues arising.

c. Emergency Manager/Planning Team

Bird reviewed the issues associated with gaining approval of our Natural Hazmat Mitigation Plan. With some revisions, our plan has been **denied** approval by the State and is currently under FEMA review. Approval of this plan will allow many municipalities the ability to apply for grants. A review of projects – both completed and proposed for the new plan was conducted with much discussion.

CODE RED has expanded the base of their services, including One Notification Express (ONE). Grand Traverse County was requested to be a test site for this service, which will allow simple text/email notification to predetermined groups. Once setup, this improves the timing of efficient notification in a simplified method. Bird with working with Hornacek on the setup.

d. TBARG / RACES

No report was provided.

6. Drills/Exercises and Training/Education

Drewery has scheduled March 24-26 has individual 8-hour training days for the new Ideal Lead equipment.

Bird anticipates a new Local Officials training, as MiSIMS. (**MI Critical Incident Management System MICIMS**)

Chair Parker indicated ICS 300/400 may return in April to face-to-face training.

7. Old Business

There were no items of Old Business.

8. New Business

The group commented on J ewett's statement at Grand Traverse County's sex pected to receive \$18M in Stimulus Funds. The funds will be limited to four categories of expenditures which are not yet fully defined. Members were encouraged to prepare potential uses.

9. Open Discussion

There were no topics of Open Discussion.

10. Future Meetings

Bird is hopeful face-to-face meeting may resume in April. He will locate a site to safely seat up to 25 participants. Each future meeting agenda will have a Hazmat component.

April 15

May 21

June 17

11. Adjournment

The Committee adjourned at 9:00 am.

Submitted by Secretary Hunt.



**Grand Traverse County
Local Planning Team (LPT)**
May 10, 2021
1300hrs
EOC

Agenda

Chair: Chief Jim Tuller
Vice Chair: Chief Fred Gilstroff
Secretary: Director Nick Lemcool

1. Meeting Call to Order:

2. Approve Today's Agenda:

3. R7HSPB Updates:

a) 2018, 2019, & 2020 Grants –

- LETPA – robots project (Law Enforcement) – at Crawford Co Sheriff's Office. Training on 5/12/21

**b) 2021 Grant (utilizing National Priority Area Project ideas from MSP)
Region 7 allotment \$318,362.00**

- Hazmat – training & robot piece (emerging threats)
- Cyber summit (enhancing cyber security & elections)
- Contractor Active Shooter training (Soft Targets & Crowded Spaces)
- MIOC Fusion Center Training (Intelligence & Info Sharing)
- Field Force Training for LE (Combating Domestic Violent Extremism)
- OWL Pro meeting system (EOC improvements)

4. Old Business:

- a) COVID-19 update (if GT HD personnel are available)**
- b) Natural Hazard Mitigation Plan renewal update**

5. Training & Exercises

- a) Local (elected) Officials EM Orientation **5/11/21****
- b) Michigan Critical Incident Management Software (MICIMS) class update**
- c) Joint FSX w/USCG**
- d) RTF functional exercises**

6. New Business:

- a) 2021 event planning**
 - 1. NCF (Gillis / Tuller)
- b) Planning team interest for countywide Special Operations Teams consolidation**

7. Open Discussion / Round Table:

8. Next Meetings: June 21, 2021

Called to order – 13:01

Approval –

R7HSPB Updates

a) 2018, 2019, & 2020 Grants –

- LETPA – robots project (Law Enforcement) – at Crawford Co Sheriff's Office. Training on 5/12/21

b) 2021 Grant (utilizing National Priority Area Project ideas from MSP)

Region 7 allotment \$318,362.00

- Hazmat – training & robot piece (emerging threats)
 - Completed in GTC.
- Cyber summit (enhancing cyber security & elections)
 - Training and summits in region coming soon.
- Contractor Active Shooter training (Soft Targets & Crowded Spaces)
 - Same contractor as Upper Peninsula, more to come.
- MIOC Fusion Center Training (Intelligence & Info Sharing)
- Field Force Training for LE (Combating Domestic Violent Extremism)
- OWL Pro meeting system (EOC improvements)

Potential for 5% cut in training funding.

Old Business.

- a) No GT HD personnel present
- b) Natural Hazard Mitigation plan update: Submitted to FEMA three months ago. Came back last week, not approved. Eight criteria not met. Gregg beginning to go through process to break down issues and correct.
 - a. Two more municipalities joined between this renewal and last.
 - b. Flood maps not updated between 1988 and 2013.
 - c. 63 counties have expired plans that are attempting to renew however, have been denied.
 - d. Many counties beginning to opt out of renewing plans.
 - e. Some issues between BETA software and what actually happens. Want a breakdown of why. (growth density in individual municipalities).
 - f. Gregg has a copy of rejected plan if anyone would like to review.

Training Exercise –

- a) 5/11 Local elected officials
- b) MICIMS – Emailed out today 5/10 – Limited spots
- c) Joint FSX w/ USCG
 - a. Would like to do more training.

- b. Agency specific trainings
- c. Large Scale exercise
- d) RTF functional exercises.
- e) Family Assistance Center Training – Tabletop

New Business:

- a) 2021 Event Planning
 - a. NCF
 - i. No official meeting as of today.
 - ii. Boom Boom Club going through final preps for July 4.
 - 1. Plan going to City Commission 5/17
 - iii. No fireworks, no airshow, no concerts for 2021.
 - iv. Still some type of event at open space.
 - v. Festival of Races is being planned.
 - b. Fife Lake
 - i. Planning fireworks on 4th.
- b) Planning team interest for countywide Special Operations Team.
 - a. Brought up to County Chiefs. Gregg willing to host and coordinate leadership.
 - b. Thoughts on all teams becoming one regional team like Law Enforcement ERT.
 - i. Trench, Hazmat, Ropes, SAR ect.
 - ii. MABAS requirement potentially coming.
 - c. J. Torrey – Thoughts from dispatch and coordinating teams with ease of dispatch.
 - d. Creating County based team to help with personnel and building a robust team.
 - e. Much like ERT.
 - f. Questions to G. Bird.

Open Discussion/ Round Table –

- a) Eagle View Pictometry – Coordinating those images into emergency response. Many local communities already utilize this program.
 - a. GT Dispatch looking at how to coordinate a rollout to responders and looking at options.
- b) Chief B. Parker
 - a. May 31, 2021 – Turtle Creek Baseball stadium open. Unknown of capacity due to recent Executive Orders.
 - b. Concerts Pushed back again.
 - c. Fair up and running for 2021.
- c) MSP Advised state IPAWS contract.
 - a. EMENET previously. OnSolved – new contact.
 - i. Gregg, Leah and Jason working on new features and options. More to come.

Adjourn @ 13:38 by Chair Chief Tuller.

Next meeting June 21, 2021.

A G E N D A
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, June 17, 2021 - 8:30 am
Government Center, 400 Boardman Ave, 2nd Floor Training Room

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

2. Approval of Agenda

3. Approval of Minutes of March 18, 2021

4. Agency Presentations & Schedule

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

1. Tier II status 2021 update
2. 2020-21 Hazardous Materials Emergency Preparedness (HMEP) grant status
3. Recent HAZMAT incident(s) review

b. School Drill Schedule and Report

c. Emergency Manager/Planning Team

d. TBARG / RACES

6. Drills/Exercises and Training/Education

7. Old Business

- a. Natural Hazard Mitigation plan update discussion – accepting further comments on draft plan

8. New Business

9. Open Discussion

10. Future Meetings

August 19 – Annual Cherry Capital Airport plan review

September 16 -

October 21 -

11. Adjournment

M I N U T E S
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, June 17, 2021 - 8:30 am
Government Center, 400 Boardman Ave, 2nd Floor Training Room

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Department
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

Chief Pat Parker called the meeting to order at 8:30 am.

2. Approval of Agenda

Motion by Jewett, seconded by Sal, to approve the agenda as presented.

CARRIED

3. Approval of Minutes of March 18, 2021

Motion by Jewett, seconded by Lemcool, to approve the minutes as amended.

CARRIED

4. Agency Presentations & Schedule

There was not an agency presentation. Two presentations were scheduled.

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

1. *Tier II status 2021 update*

Flynn reported his efforts, along with Bird's to resolve the Tier II issue as to reporting the proper fire department. It was determined the drop-down menu was quite errant and is now current.

P. Parker commented on the changes on how PFAS acceptable levels continue to minimize. EGLE will begin a second phase of pickups.

2. *2020-21 Hazardous Materials Emergency Preparedness (HMEP) grant status*

Bird reported the 2021 HEMP was approved for submittal. This is the \$1500 annual grant we apply for to fund the Tier II reporting system.

3. *Recent HAZMAT incident(s) review*

Bird shared Tuller's report of the two Sky Tracks tipping over during the Cass Dam Project. Very minimal hydrocarbons and diesel were released and then were contained.

b. School Drill Schedule and Report

There was no report from TCAPS. The concept of a potential annual School Safety Event was discussed. Superintendents, law enforcement, emergency management and fire departments were suggested attendees. The session could last two-four hours, with a meal provided. August 15 is the date.

c. Emergency Manager/Planning Team

Event planning is well underway. National Cherry Festival will feature two new offsite venues to be reviewed. The expansion of the Horseshow in volume and venue size was discussed. Turtle Creek/Pit Spitter large event has an exhaustive plan in place already. Impacts from the Benzie County Ironman Race may impact Grand Traverse County's response teams.

P. Parker commented on Grand Traverse County's preparedness to provide mutual aid for adjoining municipalities.

Bird stated efforts are underway to have a third-party EOC review conducted. This would address technology, security and organizational structure of the facility.

d. TBARG / RACES

A report was not provided from TBARG/RACES.

6. Drills/Exercises and Training/Education

In the fall, Lambda will conduct boom training.

7. Old Business

a. Natural Hazard Mitigation plan update discussion – accepting further comments on draft plan
Bird requested all participants in the plan to provide written comments on the plan; even if what is “No comment.” Most Municipal representatives, (Fire/EMS chiefs), verbally identified no issues with the draft plan.

Explicit examples of the difficulties encountered to obtain an approved plan were shared. It was clear to all attending, essentially, until either or both FEMA/MSP either/both publish/share the standards agencies are required to meet, all efforts are merely “our best shot.”

Some agencies have been successful if a COG was the plan author. Bird is working with Networks Northwest regarding this type of venture.

8. New Business

Bolde asked attendees to share that Munson and its health care partners are subject to a higher standard of COVID restrictions. All those who work/attend one of MMC's facilities are required to wear a Munson-provided mask.

Sal added TSA requires all persons inside an airport facility to also wear a mask.

Oosee stated Grand Traverse Sheriff deputies will begin wearing body cameras in 20 days.

Powers stated the Red Cross nationally requires masking. Additionally, the social distance for cots has doubled since use of hotels is diminishing.

P. Parker will contact C. Clark regarding advance training for GTSD regarding RTF. This is scheduled for October 13-15.

Bird stated Grand Traverse County was put under a Red Flag Warning this morning.

It was suggested a comparison of infrastructure to HazMat Site for evacuation purposes be conducted.

Winter offered Salvation Army resources to the Red Cross if needed.

9. Open Discussion

Case reported on the increase in state park occupancies. Interlochen is the largest. Concerts are resuming in August at the Interlochen Arts Academy.

Powers asked if fire safety literature was available regarding resident outdoor facilities.

A Road Construction Summit was proposed by P. Parker. It would involve the City, MDOT, and GTCRC. A date prior to November 15 was suggested by Tuller. A joint list of the new season construction projects would be developed at this meeting. Detours and signage could be discussed to aid first responders. This could be in the form a special LPT meeting as the sole topic. This may encourage those participants to attend.

10. Future Meetings

August 19 – Annual Cherry Capital Airport plan review

September 16 – Central Dispatch, Hornacek

October 21 – Munson Medical Center, Bolde

11. Adjournment

The Committee adjourned at 9:38 am.

Submitted by Debra Hunt.



**Grand Traverse County
Local Planning Team (LPT)
June 21, 2021
1300hrs
EOC**

Agenda

Chair: Chief Jim Tuller
Vice Chair: Chief Fred Gilstroff
Secretary: Director Nick Lemcool

1. Meeting Call to Order:

2. Approve Today's Agenda:

3. R7HSPB Updates:

a) 2018, 2019, & 2020 Grants –

- LETPA – robots project (Law Enforcement) – at Crawford Co Sheriff's Office. Training on 5/12/21

**b) 2021 Grant (utilizing National Priority Area Project ideas from MSP)
Region 7 allotment \$318,362.00**

- Hazmat – training & robot piece (emerging threats)
- Cyber summit (enhancing cyber security & elections)
- Contractor Active Shooter training (Soft Targets & Crowded Spaces)
- MIOC Fusion Center Training (Intelligence & Info Sharing)
- Field Force Training for LE (Combating Domestic Violent Extremism)
- OWL Pro meeting system (EOC improvements)

4. Old Business:

- a) COVID-19 update (if GT HD personnel are available)**
- b) Natural Hazard Mitigation Plan renewal update**

5. Training & Exercises

- a) Joint FSX w/USCG**
- b) RTF functional exercises**
- c) School Safety Summit – PROPOSED Aug???**

6. New Business:

- a) 2021 National Cherry Festival IAP**
- b) NW MI Fair planning update**
- c) Old Dominion concert @ Turtle Creek Stadium planning update**

7. Open Discussion / Round Table:

8. Next Meetings: July 19, 2021 (if needed)



**Grand Traverse County
Local Planning Team (LPT)
June 21, 2021
1300hrs
EOC**

Minutes

Chair: Chief Jim Tuller
Vice Chair: Chief Fred Gilstroff
Secretary: Director Nick Lemcool

- 1. Meeting Call to Order:** 13:01 – By Chair Tuller
- 2. Approve Today's Agenda:** Add approval of May Minutes. Motion – B. Jewett, Chief B. Parker – All aye.
- 3. Approve May Minutes:** Motion – B. Jewett, Jason Torrey – All aye.
- 4. R7HSPB Updates:**

- a) 2018, 2019, & 2020 Grants –**
 - LETPA – robots project (Law Enforcement) – at Crawford Co Sheriff's Office. Training on 5/12/21-
 - Still have questions about Robot Grant. May have extra equipment ordered in Roscommon and not in GT. Original plan was to have both robots the same.
 - Robots will have hazmat capability. Waiting on parts that have been ordered to connect to hazmat team monitors.
 - Training will follow
- b) 2021 Grant (utilizing National Priority Area Project ideas from MSP)**
Region 7 allotment \$318,362.00
 - Hazmat – training & robot piece (emerging threats)
 - Cyber summit (enhancing cyber security & elections)
 - Contractor Active Shooter training (Soft Targets & Crowded Spaces)
 - MIOC Fusion Center Training (Intelligence & Info Sharing)
 - Field Force Training for LE (Combating Domestic Violent Extremism)
 - OWL Pro meeting system (EOC improvements)

5. Old Business:

- a) COVID-19 update**
 1. Mike L.
 - a. Numbers in right direction. Spent time planning Cherry Festival events old practices and new practices due to COVID-19.
 - b. Testing site set up at Health Department
 - c. Vaccination site set up at Cherryland Center.
 - d. Many extra supplies – PPE available. Get with Gregg or Mike to obtain if needed.



b) Natural Hazard Mitigation Plan renewal update

1. Will be reoccurring. Gathering feedback from municipalities. Working on finding some consultants to help finish up project. Will have open forum and open meeting to review and approve when complete. Asked Fire/EMS chiefs to confirm w/their municipalities if they are still the representative. Invite also sent out to municipal planners. Plans are more extensive than ever before. Over half of state do not have updated plans. Currently delay due to COVID-19 and new requirements that have not been released publicly as of yet.

6. Training & Exercises

a) Joint FSX w/USCG

1. Still in planning stages.

b) RTF functional exercises

1. Thursday 24th 0900-1200, TCFD Station 1 initial RFT training for those that have not been involved with yet.
2. FSX planning for this fall. Planning team will be set up prior. Before September 30th.
3. Thoughts on setting up remote training “sites” where certain skills can be practiced while officers/ deputy/ EMS and fire crews can do (Door entry, movements.

c) School Safety Summit – PROPOSED

1. August 18th noon-1600.

- a. Admin Staff – overview of County policies. Lockdowns, drills, law enforcement presentation, fire presentation. Group all together in one place to discuss.

d) MICIMS training completed last week. Certificates should be in MITRAIN.

7. New Business:

a) 2021 National Cherry Festival IAP

1. Draft sent out Friday. Still missing EMS category from MMR. MMR Admin is currently working on their portion. Will plan 204 for EMS mutual aid.
 - a. Motion to approval IAP without EMS-plan and will publish on Wednesday awaiting EMS Plan – Motion B. Jewett, Chief P. Parker. All aye.

b) NW MI Fair planning update

1. Planning meeting last Thursday. Normal Schedule with full concerts. Round-about completion is only concern. Command Trailer will be on site starting the 3rd.

c) Old Dominion concert @ Turtle Creek Stadium planning update

1. Planning meeting last week. Solid robust plan for parking. Estimating just under 10,000 people. 4,000 people on field. Extra exits and first aid tent on field. Concern of parking. Unified Command Post in conference center and secondary command post onsite. September 17th. Gates open at 16:30.

8. Open Discussion / Round Table:

a. NWRTC – Blue Card training over last few weeks. Meeting tomorrow to discuss how that plays into Fire Scene command for GT County.

9. Next Meetings: July 19, 2021



Adjournment 13:57 by Chair Chief Tuller



A G E N D A
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, August 19, 2021 - 8:30 am
Government Center, 400 Boardman Ave, 2nd Floor Training Room

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

2. Approval of Agenda

3. Approval of Minutes of June 17, 2021

4. Agency Presentations & Schedule

August 19 – Annual Cherry Capital Airport plan review

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

1. Tier II status 2021 update
2. 2020-21 Hazardous Materials Emergency Preparedness (HMEP) grant status
3. Recent HAZMAT incident(s) review

b. School Drill Schedule and Report

c. Emergency Manager/Planning Team

d. TBARG / RACES

6. Drills/Exercises and Training/Education

7. Old Business

- a. Natural Hazard Mitigation plan update discussion – status of draft plan

8. New Business

9. Open Discussion

10. Future Meetings

September 16 – Hornacek, Central Dispatch - “Three Words”

October 21 – Bolde, Munson – Emergency Plan

11. Adjournment

M I N U T E S
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, August 19, 2021 - 8:30 am
Government Center, 400 Boardman Ave, 2nd Floor Training Room

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Department
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

Chief Pat Parker called the meeting to order at 8:30 am.

2. Approval of Agenda

Motion by Jewett, seconded by Lemcool, to approve the agenda as presented.
CARRIED

3. Approval of Minutes of June 17, 2021

Motion by Jewett, seconded by Lemcool, to approve the minutes as amended.
CARRIED

4. Agency Presentations & Schedule

Dan Sal, Cherry Capital Airport presented the airport's Emergency Action Plan for annual review

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

1. Tier II status 2021 update – 115 sites current, 9 of which need some type of revision for 2021 yet.

2. *2020-21 Hazardous Materials Emergency Preparedness (HMEP) grant status*

Bird reported the 2021 HEMP was approved. \$1,500 should be direct deposited to the county from MSP EMHSD soon.

b. School Drill Schedule and Report

Bird reported that the first Grand Traverse School Safety Summit was held and deemed a success. Presentations were presented by Emergency Management, TCPD & GTSO, TCFD & Grand Traverse Metro (on behalf of all county fire/EMS). There were 36 school leadership and faculty from all 5 school districts present. The School Drill Schedule form for the 2021-22 school year is live until September 15

c. Emergency Manager/Planning Team

1) Thirlby Field plan is to be reviewed and revised by TCAPS, TCFD, TCPD, and Emergency Management

2) FirstNet and Rugged Depot representative meeting w/Gregg about possible technology upgrades in the EOC.

3) Awarded a USCG Spill Response Trailer from Sector Sault Ste. Marie. Transfer of ownership paperwork processing through Cleveland Region USCG command.

d. TBARG / RACES

A report was provided from TBARG/RACES and is attached.

6. Drills/Exercises and Training/Education

Numerous upcoming routine drills/exercises to be conducted. Need to work on scheduling ICS-300 & 400 again in winter/spring 2022

7. Old Business

a. Natural Hazard Mitigation plan update discussion – GT County accepted a proposal from Networks Northwest to finish and hopefully get the plan approved by 1/2022. To date, there have not been any comments received from municipalities or citizens.

8. New Business

None presented

9. Open Discussion

None

10. Future Meetings

August 19 – Annual Cherry Capital Airport plan review

September 16 – Central Dispatch, Hornacek

October 21 – Munson Medical Center, Bolde

November or December – Mobile Medical Response, Mark Thompson, CEO

11. Adjournment

The Committee adjourned at 9:24 am.

Submitted by Gregg Bird for Deb Hunt.



A G E N D A
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, September 16, 2021 - 8:30 am
Government Center, 400 Boardman Ave, Commission Chambers

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

2. Approval of Agenda

3. Approval of Minutes of August 19, 2021

4. Agency Presentations & Schedule

September – Leah Hornacek, Central Dispatch – “Three Words”

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

- 1. Tier II status 2021 update
- 3. Recent HAZMAT incident(s) review

b. School Drill Schedule and Report

c. Emergency Manager/Planning Team

d. TBARG / RACES

6. Drills/Exercises and Training/Education

7. Old Business

8. New Business

9. Open Discussion

10. Future Meetings

September 16 – Hornacek, Central Dispatch - “Three Words”

October 21 – Bolde, Munson – Emergency Plan

November or December – Mobile Medical Response, Mark Thompson, CEO

11. Adjournment



M I N U T E S
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, September 16, 2021 - 8:30 am
Government Center, 400 Boardman Ave, Commission Chambers

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

The Chair called the meeting to order at 8:30 am.

2. Approval of Agenda

Motion by Tuller, seconded by B. Parker, to approve the agenda.

CARRIED

3. Approval of Minutes of August 19, 2021

Motion by Tuller, seconded by Lemcool, to approve the August 19, 2021 minutes.

CARRIED

4. Agency Presentations & Schedule

Leah Hornacek, Central Dispatch, gave a detailed overview of Central Dispatch's operations, software programs and equipment used in performing their duties. She also explained the theory and use of the "three words" locating system developed for global use. The program is available to all and can be downloaded to various devices. Hornacek stated their dispatchers have received calls for persons using this program.

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

1. Tier II status 2021 update

There were no items to report.

2. Recent HAZMAT incident(s) review

Tuller commented on the PFAS Project by Department of Homeland Security.

Bird stated the State's HazMat Roster is being updated.

b. School Drill Schedule and Report

Bak reported the 2021 School Drill calendar is 90% complete. Greenspire High School emergency plan falls under two different set of regulations, but is sorted out. He shared a concern regarding one school's position on lockdown drills.

c. Emergency Manager/Planning Team

Natural Hazard Mitigation Plan update: Bird stated Networks Northwest work on the Natural Hazard Mitigation Plan is approximately 80% complete. The plan should be submitted to MSP/FEMA by the end of the year. Bird has recently provided draft copies to municipality representatives again to solicit additional comments/changes, etc.

Emergency teams are geared up for two local major events being held this Friday. Grand Traverse County's Critical State Infrastructure data base is underway; this is a massive project. Region 7 has donated a radiological backpack monitor; training and details are forthcoming. Transferring title of the Coast Guard's Spill Response Trailer to the County is in progress. The Coast Guard Auxiliary HazMat team is willing to partner with us on public safety responses.

d. TBARG / RACES

Johnson stated TBARG is a 501C agency. A digital antenna is now located in Munson which allows communication throughout their facility.

6. Drills/Exercises and Training/Education

There were not items to report.

7. Old Business

There were no items of Old Business.

8. New Business

There were no items of New Business.

9. Open Discussion

There were no topics for Open Discussion.

10. Future Meetings

October 21 – Bolde, Munson – Emergency Plan

November 18/December 16 – Mobile Medical Response, Mark Thompson, CEO

11. Adjournment

Upon a motion to adjourn, the Committee adjourned at 9:06 am.

Submitted by Secretary Hunt



**Grand Traverse County
Local Planning Team (LPT)
October 11, 2021
1300hrs
EOC**

Agenda

Chair: Chief Jim Tuller
Vice Chair: Chief Fred Gilstroff
Secretary: Director Nick Lemcool

1. Meeting Call to Order:

2. Approve Today's Agenda:

3. Special Orders of Business:

- a) MDOT presentation on 2023 Grandview Parkway construction project

4. R7HSPB Updates:

- a) 2019, 2020, 2021 Grants –
 - See attached reference from Oct 7 R7HSPG meeting

5. Old Business:

- a) COVID-19 update (if GT HD personnel are available)
- b) Natural Hazard Mitigation Plan renewal update

6. Training & Exercises

- a) North American Active Assailant Conference, Troy – Oct 13-15
- b) International Association of Emergency Managers (IAEM), Grand Rapids – Oct 18-20

7. New Business:

- a) Critical Infrastructure & Key Resources (CIKR) list for GT County
- b) Readiness: Emergency Management for Schools (REMS) “SiteAssess” school vulnerability assessment app for smart phones and tablets

8. Open Discussion / Round Table:

9. Next Meetings: December 20, 2021



**Grand Traverse County
Local Planning Team (LPT)
October 11, 2021
1300hrs
EOC**

Minutes

Chair: Chief Jim Tuller – Absent

Vice Chair: Chief Fred Gilstorff

Secretary: Director Nick Lemcool

1. Meeting Call to Order: October 11th, 2021 @ 13:01 – by Vice Chair Chief Gilstorff, Introductions.

2. Approve Today's Agenda: Motion Brad J., Second Nick L.

3. Special Orders of Business:

- a) MDOT presentation on 2023 Grandview Parkway construction project
 - 1. Two halves – Delmar Resort to Garfield, done before Cherry Fest. Pause for Cherry Fest and Complete west half after two week break.
 - 2. One lane of traffic (west or east, not both) From Garfield to Delmar. Potential to use railroad. To 8th street for west bound detour. Larger detour planned for commercial traffic.
- b) 2024 – Plan reconstruction from Division to M72 and M72 to Cherry Bend. More to come.

4. R7HSPB Updates:

- a) 2019, 2020, 2021 Grants –
 - See attached reference from Oct 7 R7HSPG meeting
 - Grant closes out in May with some money left over. Have projects however cannot spend monies until approved. Still waiting on approval.
 - HazMat project approved for funding – 2 Backpacks like 51st support team. One GT and one with Otsego County. Extra monies spent further down the road.
 - FY2020 New criteria attached in packet.
 - 2021 allotment down almost \$20k. Questions asked to the state, awaiting answers.
 - Many requests for funding. Law Enforcement trainings and Radio discussions.

5. Old Business:

- a) COVID-19 update (if GT HD personnel are available) – No one present.
- b) Natural Hazard Mitigation Plan renewal update
 - 1. Contract with Networks Northwest to complete the last 20% of the project. Completion date is in May. Actively starting re-gathering of data



6. Training & Exercises

- a) North American Active Assailant Conference, Troy – Oct 13-15
- b) International Association of Emergency Managers (IAEM), Grand Rapids – Oct 18-20

7. New Business:

- a) Critical Infrastructure & Key Resources (CIKR) list for GT County
 - 1. 130 CIKR's listed.
 - a. Consumers has given all requested information
 - b. Others Requesting FOIA to release information.
 - c. Needs help with Ag and Manufacturing facilities.
 - 2. This is how funding will be awarded for community grants and AFG.
- b) Readiness: Emergency Management for Schools (REMS) "SiteAssess" school vulnerability assessment app for smart phones and tablets
 - 1. Link sent out. All schools got newsletter from MSP regarding REMS. Not very many of local schools have completed project. Idea for school to do their own vulnerability assessment and then work with EM to complete the project. Gregg working with schools to complete this. EOP and vulnerability studies due in January 2022.
- c) Approval of Meeting Minutes
 - 1. Should meeting minutes be taken and approved. Discussion, decided to start today with approval and making it number 3 on Agendas.
 - 2. Motion Brad J. Second By Brandon F. Of June meeting minutes.

8. Open Discussion / Round Table:

- a) None

9. Next Meetings: December 20, 2021

Adjourn @ 14:06 Motion by Pat P. Second by Brad J.



A G E N D A
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, November 18, 2021 - 8:30 am
Government Center, 400 Boardman Ave, 2nd Floor Training Room

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services (Absent & Excused)
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

Chief Tuller called the meeting to order at 8:20 am.

2. Approval of Agenda

Motion by Bill Parker, seconded by Dan Sal, to approve the agenda as presented.

CARRIED

3. Approval of Minutes of September 16, 2021

Motion by N. Lemcool, seconded by B. Flynn, to approve the minutes of September 16, 2021 as presented.
CARRIED

4. Agency Presentations & Schedule

Bolde, Munson – Emergency Plan, to be presented at the February 2022 meeting.

Glen Johnson, RACES/TBARG, reviewed of series of several future communication devices and the features. His handout is attached.

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III

1. Tier II status 2021 update

There are three dates for webinar training for Tier I and Tier II. Each date will address separate topics.

b... Recent HAZMAT Incident(s) Review

No incidents were reported in the City. DH4 -Trucks and personnel, and equipment.

b. School Drill Schedule and Report

M. Bak auto systems are working which cover locks, audio and voice and blue lights. He reported two drills at private schools went well. Camera replacements are at 70% complete. These cameras will increase the resolution for wide angle view.

c. Emergency Manager/Planning Team

Bird reported on the school online drill schedule/forms.

Facilities and outside vendors will be upgrading the EOC.

Networks Northwest plans to have the Natural Hazard Mitigation Plan to FEMA by May 2022.

EMPG and SHSP Grants are in various stages of opening/closing.

d. TBARG / RACES

Johnson's update was given under Item 4, Agency Presentation.

6. Drills/Exercises and Training/Education

2021

December 9 – Lanmda Energy hosting a table top in Manistee Co.

2022 Draft

January 12, 19 and 26 – Series of Tier I and Tier II training via webinar
August 20-222 – Cherry Capital Airport full-scale drill.

7. Old Business

There were no items of Old Business.

8. New Business

There were no items of New Business.

9. Open Discussion

Amy Fairchild - MMR stated the Tribe has received \$30K that is eligible for local distribution.

Discussion regarding the Airport's August full drill evolved into consideration of an expanded event among various agencies. The concept was well received.

10. Future Meetings

December 16, 2021 ~~is canceled~~. As the minutes were drafted, this cancelation is under review.

January 20 – Mobile Medical Response, Mark Thompson, CEO

February 17 – John Bolde, Munson Medical

11. Adjournment

The Committee adjourned at 9:34 am.

Submitted by Deb Hunt



A G E N D A
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, December 16, 2021 - 8:30 am
Government Center, 400 Boardman Ave, 2nd Floor Training Room

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

2. Approval of Agenda

3. Approval of Minutes of November 18, 2021

4. Agency Presentations & Schedule

Networks Northwest – Jenni Neal, Grand Traverse Co. Natural Hazard Mitigation Plan

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

1. Tier II status 2021 update (if any)
2. Recent HAZMAT incident(s) review (if any)

b. School Drill Schedule and Report

c. Emergency Manager/Planning Team

d. TBARG / RACES

6. Drills/Exercises and Training/Education

7. Old Business

8. New Business

- a. Election of Officers for 2022
- b. 2022 Meeting dates

9. Open Discussion

10. Future Meetings

January 20, 2022 – Mobile Medical Response, Mark Thompson, CEO

February 17, 2022 – Munson Medical Center, John Bolde

11. Adjournment



M I N U T E S
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, December 16, 2021 - 8:30 am
Government Center, 400 Boardman Ave, 2nd Floor Training Room

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Deb Hunt, Volunteer

1. Call Meeting to Order

The meeting was called to order by Bird at 8:39 am. Chair Parker arrived at 8:57 am due to providing emergency service relative to the windstorm.

2. Approval of Agenda

Motion by Jewett, seconded by Lemcool, to approve the agenda as presented.

CARRIED

3. Approval of Minutes of November 18, 2021

Motion by Lemcool, seconded by Jewett, to approve the November 18, 2021 minutes as presented.

CARRIED

4. Agency Presentations & Schedule

Networks Northwest – Jenni Neal, Grand Traverse Co. Natural Hazard Mitigation Plan

Neal and attendees introduced themselves. A review of the first chapter on "Community Profile" was conducted page-by-page, with attendees questioning several statistics as to accuracy and timing, as well as overall asking for explanations. The handout will be attached.

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

1. Tier II status 2021 update (if any)

No report was required.

2. Recent HAZMAT incident(s) review (if any)

There were no incidents to report. P. Parker reported Michigan MABAS is working on the credential process. An inventory of our equipment is being prepared.

b. School Drill Schedule and Report

Bird reported the first round of lockdown drills is nearly done.

c. Emergency Manager/Planning Team

d. TBARG / RACES

No report was provided.

6. Drills/Exercises and Training/Education

No report was provided.

7. Old Business

There were no items of Old Business.

8. New Business**a. Election of Officers for 2022**

Call for Chair nominees resulted in the sole nomination of Pat Parker to remain as Chair. P. Parker accepted the nomination

Unanimously elected.

Call for Vice-Chair nominees resulted in the sole nomination of Jim Tuller to remain as Vice-Chair. (Tuller accepted electronically as nominated.)

Unanimously elected.

Calls for Secretary resulted in the sole nomination of Nick Lemcool. Lemcool accepted the nomination.

Unanimously elected.

b. 2022 Meeting dates

The draft 2022 Meeting Schedule was approved as presented. Dates may change as the need arises.

9. Open Discussion

B. Parker commented on how well Cherryland Electric, and Consumers Energy did to restore power during the windstorm.

10. Future Meetings

January 20, 2022 – Mobile Medical Response, Mark Thompson, CEO

February 17, 2022 – Munson Medical Center, John Bolde

11. Adjournment

The meeting adjourned at 9:45 am.

Submitted by:

Debra Hunt

VI. COMMUNITY PROFILE

Natural Features

Grand Traverse County is located in northwest lower Michigan, and is bordered by Leelanau County, the Grand Traverse Bay and Antrim County to the north, Kalkaska County to the east, Wexford County to the south, and Benzie County to the west. The county is approximately 384,640 acres or 601 square miles in area. A portion of the county area includes 137 square miles of area in the water. County residents take advantage of diverse environments ranging from dense, urban areas to rural communities and unspoiled natural areas. Its landscape features rolling and hilly forest uplands, extensive wetlands and low areas, numerous inland lakes and streams, and the shorelines of East and West Grand Traverse Bay. The Boardman River, considered one of the top trout streams in Michigan, bisects the County as it outlets into the Bay. The influence of glacial activity is clearly evident in the outwash plains and steep gravel and clay slopes that make up the majority of the southern two-thirds of the County. With 1,071 feet in elevation and 620 feet in depth in Grand Traverse Bay, these geographies lend special character to the County – lofty vistas of the bay, lakes, farmlands, and deep wooded valleys.

In addition to the lakes and rivers, the county is blessed with 66.72 miles of shoreline on the Grand Traverse Bay. Approximately 60% of the county is located in the Grand Traverse Bay Watershed. According to the 2017 Census of Agriculture, the county had 50,886 acres of land in farms for a total of 497 farms. Fruits, tree nuts, and berries had the highest market value of agriculture products sold with \$ 19,175,000. This ranks 8th in the State of Michigan overall. The predominant land use is residential followed by other types of land not classified as agricultural, commercial, industrial, or residential (Table).

Table : Land Use Classifications, 2020

	Total Acres	% of Total
Agricultural	41,858.91	14.15%
Commercial	12,037.24	4.07%
Industrial	3,310.79	1.12%
Residential	144,542.91	48.85%
Other	94,161.64	31.82%
Total	295,911.48	

Source: Grand Traverse County GIS

Population

Grand Traverse County is the most populated county in the ten county region (Table) and is the 22nd most populated county in the state. The 2019 American Community Survey estimated the county population to be 92,181 people. A comparison of the 2010 and 2019 indicates an upward county population growth trend with a 7.1% increase from 2010 where the population was an estimated 86,061 (Table). The 2010 population per square mile is 187.3 people.

Grand Traverse County is comprised of thirteen (13) townships, two (2) villages, and one (1) city. The City of Traverse City, which is also the county seat, makes up 17% of the population. However, nearby Garfield Township is the most populated jurisdiction in the county with 17,319 people (19% of the population). The combined populations of Traverse City, Garfield Township and portions of other surrounding jurisdictions including Blair Township, East Bay Township, and Long Lake Township are likely to create a new metropolitan statistical area with the result of the 2020 decennial Census. All communities, with the exception of Kingsley Village, Fife Lake Township, and Union Township, experienced growth during the subject years (shown in green). Grant Township, located in the southwest part of the county, saw the largest percent growth with 17.6%.

Table : Regional Population by County, State 2019

County	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	9,986,857

2020
Census

Table : Population Change by Municipality, 2010, 2019

Municipality	2010 Estimated Population	2019 Estimated Population	Numeric Change	Percent Change
Grand Traverse County	86,061	92,181	6,120	7.1%
Fife Lake Village	357	382	25	7.0%
Kingsley Village	1,511	1,352	-159	-10.5%
Acme Township	4,416	4,694	278	6.3%
Blair Township	7,956	8,933	977	12.3%
East Bay Township	10,617	11,492	875	8.2%
Fife Lake Township	2,617	1,978	-639	-24.4%
Garfield Township	15,939	17,319	1,380	8.7%
Grant Township	1,034	1,216	182	17.6%
Green Lake Township	5,688	6,213	525	9.2%
Long Lake Township	8,565	9,321	756	8.8%
Mayfield Township	1,506	1,612	106	7.0%
Paradise Township	4,655	5,085	430	9.2%
Peninsula Township	5,445	5,776	331	6.1%
City of Traverse City	14,608	15,338	730	5.0%
Union Township	439	411	-28	-6.4%
Whitewater Township	2,576	2,793	217	8.4%

Source: US Census, 2019 ACS Estimate

Like many northwest Michigan communities, Grand Traverse 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 *Northwest Michigan Seasonal Population Analysis*, a 2014 report by the Michigan State University Land Policy Institute, analyzed the 2012 seasonal population for ten counties in northwest Michigan. The data collected for Monthly Permanent, Seasonal and Transient Residents by County estimates the population of Grand Traverse County increases by 19% in the month of July from 89,112 to 110,557. The following ten counties were included in the study: Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, Manistee, Missaukee, and Wexford.

Although the data in this report is several years old, anecdotally, the influx of seasonal residents and tourists has not decreased. While the population staying in overnight accommodations such as motels, hotels, and bed and breakfasts was considered, the boom of short term rental accommodations changed the overnight stay market considerably. The implications of seasonal and short term rental accommodations on hazard mitigation planning are included in discussions throughout this plan.

Age, Race & Disability

Understanding the age distribution and median age of Grand Traverse County can help identify social, economic, and public service needs in the community. The county's total 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. The cohort group with the largest population is the 20 to 44 year old group. This is closely followed by the 45 to 64 years cohort. As shown in Figure , the median age (the midpoint where half the population is younger and half the population is older) of Grand Traverse County is older (42.8) than the State (39.7). The youngest community in the county is Blair Township with a median age of 34.4; the oldest community in the county is Peninsula Township with a median age of 55.2 (Figure).

Figure : Grand Traverse County Population by Age Cohort, 2019

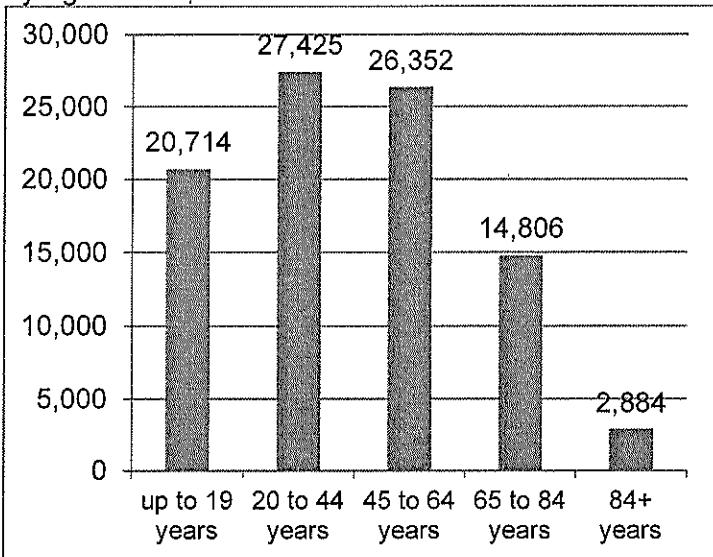
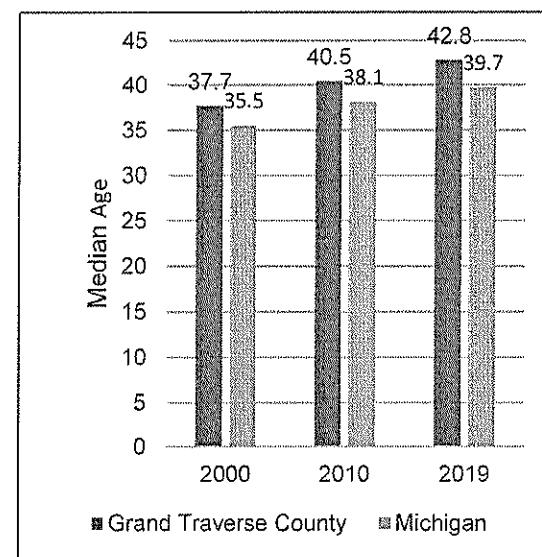
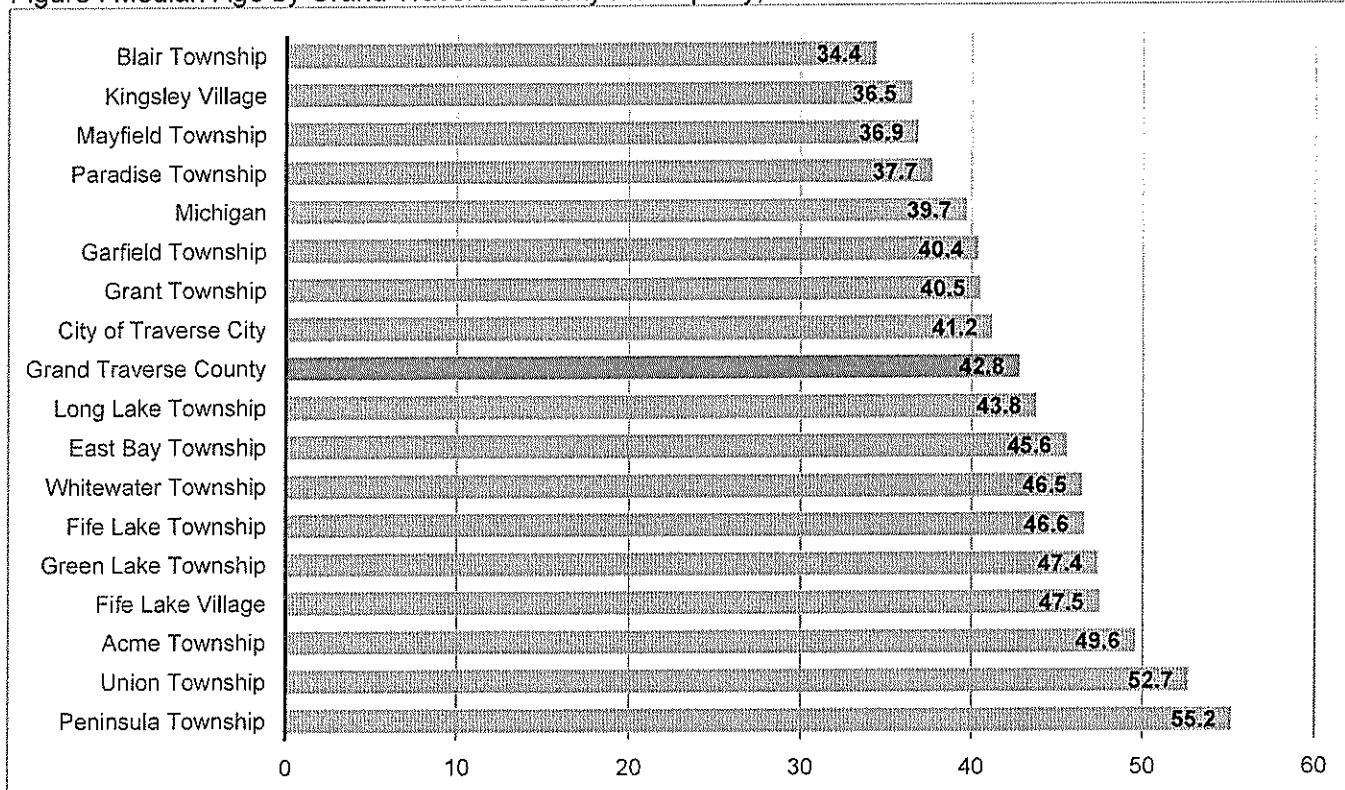


Figure : Median Age Trend, 2000, 2010, and 2019



Source: U.S. Census Bureau, 2000 Decennial Census and 2010 and 2019 5 Yr ACS

Figure : Median Age by Grand Traverse County Municipality, 2019



Source: US Census, 2019 ACS Estimate

The racial makeup of Grand Traverse County is predominantly white. 94.8% of the population is white while the American Indian and Alaskan Native population is 1.0%, the Black population is 0.9%, and those of two or more races is 2.3%.

Table represents the number of persons with a disability by age group. 11,288 or 12.4% of people are estimated to have a disability. 30.5% of persons 65 years and over are reported to have a disability.

Table : Persons with a Disability, 2019

Total Civilian Noninstitutionalized Population	90,808
With a disability	11,288
Under 18 with a disability	805
18 to 64 years with a disability	5,223
65 years and over with a disability	5,260

Source: US Census, 2019 ACS Estimate

Housing Characteristics and Development Trends

In 2019, there were 43,942 housing units reported in the 2019 ACS 5-Year Estimates in Grand Traverse County (Table), of which 37,319 are occupied. Garfield Township has the largest percentage of housing units of all municipalities in the county (18.7%). 72% (31,837) of units are 1-unit, detached structures or commonly referred to as single-family homes. 76% of structures were built in 1979 or earlier (Table). The average household size is 2.41 persons.

Table : Housing Units by Municipality, 2019

Municipality	2019 Housing Units (ACS)	Percent of 2019 Total
Grand Traverse County	43,942	
Fife Lake Village	277	
Kingsley Village	586	
Acme Township	2,634	6.0%
Blair Township	3,629	8.3%
East Bay Township	5,527	12.6%
Fife Lake Township	936	2.1%
Garfield Township	8,203	18.7%
Grant Township	590	1.3%
Green Lake Township	3,190	7.3%
Long Lake Township	4,295	9.8%
Mayfield Township	706	1.6%
Paradise Township	1,873	4.3%
Peninsula Township	3,371	7.7%
City of Traverse City	7,325	16.7%
Union Township	249	0.6%
Whitewater Township	1,414	3.2%

Source: US Census, 2019 ACS Estimate

Table : Year Structure Built, 2019

Year Built	Housing Units	Percentage of Units
Built 2010 or later	2,740	6%
Built 2000 to 2009	7,503	17%
Built 1980 to 1999	15,047	34%
Built 1960 to 1979	10,140	23%
Built 1940 to 1959	3,662	8%
Built 1939 or earlier	4,850	11%
Total Housing Units	43,942	

Source: US Census, 2019 ACS Estimate

Housing Tenure, Table , summarizes the status of housing units, whether occupied or vacant, as well as the median housing value (\$212,500) and the median gross rent (\$ 951). Of the 43,942 total housing units, 37,319 or 84.93% are occupied.

Table : Housing Tenure, 2019

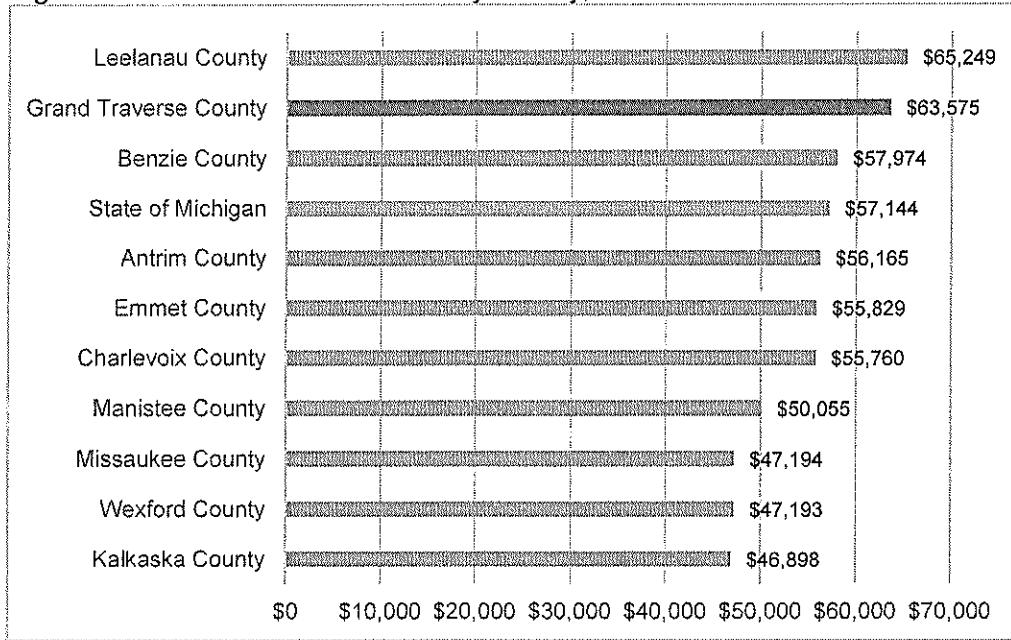
Total housing units	43,942	%
Occupied housing units	37,319	84.93%
Owner-occupied	28,480	87.10%
Median Housing Value	\$ 212,500	
Renter-occupied	8,839	12.90%
Median Gross Rent	\$ 951	
Vacant housing units	6,623	15.07%

Source: US Census, 2019 ACS Estimate

Income and Poverty

Figure presents a comparison of the median household income across the ten county region and the State of Michigan. Grand Traverse County has the second highest median household income (\$ 63,575) behind Leelanau County (\$ 65,249). The economic profile can be further described by the affordability index when you consider the ratio of the Median Housing Value to the Median Household Income. An affordability index of no more than 2.6 is considered an affordable community. Grand Traverse County's affordability index is 3.3. An ideal affordability index of 2.6 is derived from historic data of nationwide averages under healthy economic conditions. This was cited by Forbes, Bloomberg and many others as well as being stated to be used widely by real estate agents

Figure : Median Household Income by County, 2019



Source: US Census, 2019 ACS Estimate

The following tables describe the population with the lowest incomes. It is estimated, in 2019, that 9.6% of all people in the county lived at or below the poverty level. The Census describes poverty thresholds differently based on the size of the family and the number of related children living together. 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 living. Based on a calculation of the actual costs of basic necessities such as child care, transportation, housing, and healthcare, the report establishes the ALICE Threshold, "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, 2). Table identifies the number of ALICE and poverty households for each municipality in the county.

Table : Poverty Statistics, 2019

Poverty	Statistics
Families in poverty	6.3%
Families in poverty with related children	11.2%
Family income less than \$15,000	4.1%
All people in poverty	9.6%

Source: US Census, 2019 ACS Estimate

Table : United Ways of Michigan ALICE Report Findings, 2019

ALICE and Poverty Households	Total Households	% of HH in Poverty and ALICE
Acme Township	2,039	19%
Blair Township	3,204	43%
East Bay Township	4,575	27%
Fife Lake Township	618	40%
Garfield Township	7,666	43%
Grant Township	451	30%
Green Lake Township	2,525	30%
Long Lake Township	3,589	19%
Mayfield Township	565	31%
Paradise Township	1,632	37%
Peninsula Township	2,554	22%
City of Traverse City	6,697	40%
Union Township	175	30%
Whitewater Township	1,029	24%
Grand Traverse County	37,319	33%

Economic Profile

The Economic Profile of Grand Traverse County is described in Table. The table provides the county's industry makeup divided into 20 different sectors as well as industry's annual average wage. The industry with the largest percent distribution is Health care, social assistance with 19.80% followed by Retail trade with 15.40%. The annual average wage for Health care, social assistance is \$ 54,081 while Retail trade is \$ 30,742. Retail trade ranks 17 out of the 19 wage figures available. The industry with the highest annual average wage is Mining with \$ 114,461 followed by Utilities with \$ 103,481.

Table : Economic Census by Industry, 20XX

Industry Description	Percent Distribution	Annual Average Wage
Total Covered Employment	100%	
Agriculture, forestry, hunting	0.70%	\$ 37,193
Mining	0.30%	\$ 114,461
Construction	5.20%	\$ 49,056
Manufacturing	10.50%	\$ 51,684
Wholesale trade	2.60%	\$ 55,392
Retail trade	15.40%	\$ 30,742
Transportation, warehousing	1.80%	\$ 47,573
Utilities	0.40%	\$ 103,481
Information	1.70%	\$ 52,805
Finance and Insurance	4.40%	\$ 80,220
Real Estate, rental, leasing	1.10%	\$ 40,845
Professional, technical services	3.90%	\$ 60,399
Administrative, waste services	2.80%	\$ 37,186
Educational services	2.20%	\$ 33,175
Health care, social assistance	19.80%	\$ 54,081
Arts, Entertainment, recreation	1.20%	\$ 24,621
Accommodation and food services	12.00%	\$ 20,599
Other services, exc. Public admin.	3.20%	\$ 31,971
Public administration	2.80%	\$ 51,527
Other includes (private, management of business, and unallocated)	8.00%	N/A

Source: 2021 Comprehensive Economic Development Strategy, Networks Northwest



LEPC

Location: 400 Boardman, Trng Rm

Date: 12/16/2021

Time: 0800

	Name	Email	Agency Representing
1	Gregg Bird	gbird@gtcounty.mi.gov	GT Em
2	Jennifer Neal	jennifer.neal@networksnorthwest.org	Networks Northwest
3	Brad Jewett	bjewett@gtcounty.mi.gov	GT BOC
4	Chris Cosse	ccosse@gtsheriff.org	GTSO
5	Dale Hunt	djh@huntecharter.net	Platinum
6	Errett Behrer	errett@traversescity.mi.gov	TZPD
7	Mike Leman	mleman@eastbayamb.htm.org	East Bay
8	Frank D'Urso		CITY OF TC
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

MINUTES

Grand Traverse County Hazard Mitigation Plan Stakeholder Meeting

Tuesday, January 11, 2022 - 10:00-11:30 am

Government Center, 400 Boardman Ave, 2nd Floor Commission Chambers

Attendees:

Networks Northwest (Stephanie Loria and Zach Vega)
Gregg Bird, GT County E.M.
Bill Parker, Blair Twp Fire Dept. (serving Blair, Paradise, Grant, Mayfield and part of Union Twps)
John Bolde, Munson Healthcare
Travis House, Michigan State Police
Krista Tharp, Traverse Health Clinic
Leslie Bibley, Traverse City, Planning Assistant
Jim Tuller, Traverse City Fire Dept.
Jim Baker, Grand Traverse County Equalization Dept.
Josh Green, Grand Traverse County Equalization Dept.

Stephanie Loria and Zach Vega, Community Planners with Networks Northwest, introduced themselves and gave a brief background on the purpose of updating the Natural Hazards Mitigation Plan for Grand Traverse County. The purpose of today's meeting was to get more insight into the natural hazards and resulting issues of most concern in the county. An online survey link was emailed out on 12/30/21 to all LEPC/LPT members as well as pertinent local government officials/employees and other stakeholders (i.e., Grand Traverse County Watershed Center, GT County Conservation District). The survey link is currently available on the Grand Traverse County E.M. website.

The meeting attendees were provided a list of potential natural hazards in the County and asked to pick their top 5 events of concern, and write each on the provided 5 sticky notes. A summary of the discussion points stemming from those results is as follows:

- Dams – only two on the map report annually to the county – the Union St. Dam in TC and a privately owned dam in Whitewater Township (Bissell Pond Dam owned by Angela Kirby). The Union St. Dam is an earthen dam that is failing. City hired a consultant to monitor it. Dam replacement per FishPass project is held up by litigation challenging that it is public parkland. The City also hired a consultant to work on reinforcing the failing riverwall nearby (100-200 blocks).
- It was also noted that three of the dams on the Boardman River indicated on the county map provided by NN to the meeting are no longer existing; will note on the map.

- Historic major rainfall on the west side of the County/city, near Meijer. Glacial moraine forms streams that overflow during historic major rainfall events, causing flooding of basements/1st story buildings, Munson Healthcare Center, etc. into TC. Around the streets of Madison, Jefferson and Monroe, road reconstruction is planned in next few years and storm water retention/reconstruction will be evaluated as part of that project. Shawn Winter – City TC Planner – involved.
- Also there is a deteriorating wastewater main that overflows into the Boardman River – can contaminate the river and bay.
- Gregg's top concerns:
 - 1: Straight-line winds from Derecho/Severe T-Storm¹ happens every year or every other year. Affect major portions of the county or the entire county at one time – power outage. Leads to flash flooding, erosion, road closures, downed trees, power outages, property damage. Have had to close down major ingress/egress routes into the city; Has contributed to sewer overflows.
 - 2: Winter Storms with high winds = electrical failure. Endangers people left without power in cold temperatures. Also warmer temps in the winter = heavier snow loads, leading to roof collapse (happened in 2012).
- Infrastructure failure – (power, water, sewer, phone, internet, transportation, etc.) can occur from many different types of events, but can severely impact the whole region at a time. Of particular importance is Munson Healthcare Center as it is a Level 2 Trauma Facility. It has been affected by localized flooding from Kid's Creek overflow.

¹ When most people think about winds associated with a thunderstorm, they think tornadoes; however, most years there are far more damage reports from thunderstorm straight line winds than from tornadoes. **Straight line winds** are thunderstorm winds that have no rotation, i.e. not a tornado.

Downbursts are a common cause of wind damage from a thunderstorm. They can reach over 100 mph and are caused by air being dragged down by precipitation. When the air reaches the ground, it spreads outward across the surface of the land it encounters in a straight line.

A Derecho is a very long lived and damaging thunderstorm. A storm is classified as a derecho if wind damage swath extends more than 240 miles and has wind gusts of at least 58 mph or greater along most of the length of the storm's path.

<https://www.weather.gov/safety/wind-thunderstorms-derecho>

Antrim • Benzie • Charlevoix • Emmet • Grand Traverse • Kalkaska • Leelanau • Manistee • Missaukee • Wexford
PO Box 506 • Traverse City, MI 49685-0506 • Phone (231) 929-5000 • Fax (231) 929-5012 networksnorthwest.org

- Kid's Creek Area storm water improvement planning has just begun – (this was not in Gregg's last draft plan) but would be a pre-disaster mitigation project that should be included in this plan. At the cross roads of where the city limits are and Garfield Twp. A good example of City/County government collaboration. Shawn Winter (TC Planning Director) and Marty Colburn (City Manager) are working collaboratively with the County on this. Project will prevent localized flooding running into the NW part of the city and causing localized flooding (like in Munson Hospital).
- Extreme temps can lead to high lake levels and shoreline erosion. Keep in mind that this ebbs and flows over periods of time (levels have been declining in past year).
- High Water levels in 2019-20 affected the City and Peninsula Township the most. A section of Bluff Road failed in Peninsula Twp., adjoining the bay. Currently about 5 residents have to drive around the area to get to their homes. No homes where the road failure occurred. Sidewalks, Clinch Park, waterfront rec areas affected the most in the city. Some lower levels of buildings along East Front Street were affected with water intrusion; had to be [temporarily] abandoned.
- As indicated in the last draft plan, the City has shovel ready BRIC grant projects to address storm water runoff and sewer overflow issues.
- City of TC just submitted their draft 6 year CIP for council approval (*get a copy*)
- Gregg noted it's beneficial to place parkland where there are flood-prone areas to prevent loss of life/personal property damage.
- Tree Trimming/Removal: The RC does not have the equipment (or possibly the staff time) to do this, so they contract with Elmer's as needed. A potential HM project might be to buy tree debris removal/tree trimming equipment.
- TCPLP is currently looking into the possibility of installing underground power in the road R.O.W, which is beneficial to preventing power outages during storms.
- Also, the City Parks Dept. has just completed a Tree Canopy Assessment, which proposes options (?) to get tree trimming done when able to.
- Impacts to local agriculture products (cherries/ apples/ grapes) and agri-tourism industry is also a big concern. In 2015, a hailstorm resulted in the loss of almost all the fall's Honeycrisp apples. Extreme temp changes (false spring, return of winter) can also negatively affect the crops.

- Power Grid Concerns:
 - The county recently tried to obtain data on power grid assets from all 4 power companies serving the county (Cherryland Electric, Consumer's Energy, TLP and Great Lakes Energy) but only got sparse data from Consumer's (30% correct) on infrastructure assets). Difficult to make progress with upgrading the grid as many of the providers are private companies. A potential example HM Grant Project?
- Invasive Species – not really considered a concern by the group present
- Drought and Wildfire:
 - Drought is a bigger hazard than a wildfire – kills agricultural crops (economic impact) more than wildfire.
 - Biggest agricultural centers in the county are in Acme Twp, Peninsula Twp., and in the southern portions of the county.
 - Fire danger area would be in the part of county generally south of the Boardman River and in the E. parts of the county. This is approximately 2/3 of the County. Lots of State land there and agricultural fields (often wheat fields dried in place and not harvested due to state/fed subsidies, possible fire danger?) Adjoining the county in these areas is continued Federal/State forest lands.
 - Concern with safety of who build their homes deep in the woods regarding potential fire evacuation/fire safety; there is increasing commercial/residential development in those areas.
 - Gas wells/power substations for main distribution come into the County from the south (fire prone area) from Wolverine Power Cooperative.
 - USDA does an evaluation every year – County always gets a drought qualification designation
 - Last major fire in the county was on the east side of the county in the early 1990's; a 3-day fire.
- Public Health Emergency:
 - Munson Hospital representative indicated the following top issues of the COVID epidemic:
 - Staffing crisis – have to import staff
 - Mixed actions of the public on vaccination/masking
 - There is a transportation issue with EMS staffing availability
 - The county is surviving a 10-20% workforce reduction; but they have not had to cut any life-saving services
 - Consider that other infrastructure improvement projects “on the books” have been delayed

- Consider schools being open or closed at various times – changes local staff levels if they don't have childcare
- Potential HM Project? – Improve Internet Connectivity Access - this goal could tie in with goals in other existing plans!
- Potential HM Project? – Enable Emergency Services personnel to have access to basic PPE to better protect themselves from a future pandemic. Have an appropriate 30-60 day supply of general multipurpose items so that local first responders don't have to wait for State/Federal supplies to come in when the emergency starts. This would result in a nimbler and quicker process to address the emergency situation and minimize impact to services.
- Potential HM Project? – Improving Communication Systems Gaps With Alert Systems Could use the County General Messaging Alert Systems in a better way with other agencies? Need one consistent message system "One Voice, One Message".

There are many potential natural hazard events that can impact daily life and societal functions within Grand Traverse County. Please indicate the top five hazards from the list below that are that are most relevant to you and write each one on the provided five sticky notes.

- Drought
- Extreme temperatures (*heat/cold*)
- Flooding
- High lake water levels
- Infrastructure failure (*i.e., road washout, bridge/dam failure, power outage*)
- Invasive species (*can cause damage to forests, crops, native species, etc.*)
- Public health emergency (*i.e., pandemic; contaminated water supply*)
- Severe winds/Straight-line winds/Derecho¹
- Severe thunderstorms (*Can produce hail, lightning, high winds, flooding*)
- Subsidence² or Shoreline erosion
- Tornado
- Wildfire
- Winter Storm (*can produce ice, sleet, heavy snowfall, high winds, etc.*)

¹ Derechos are usually large-scale storm systems that travel hundreds of miles and are many counties wide. They can happen any time of the year, but are most common in Michigan during the warmer half of the year. Wind speeds in derechos can exceed 100 mph at times and often result in damage that is more widespread than most other storms and tornadoes in Michigan.

² Subsidence is the lowering or collapse of a land surface, due to the loss of subsurface support.

Natural Hazard Mitigation Plan meeting

Location: Commission Chambers

Date: 1/11/2022

Time: 1000

	Name	Email	Agency Representing
1	Gregg Bird	gbird@gtcountymi.gov	G+Co. Emerg. mgmt.
2	Bill Parker	fire@blair-Township.org	Blair & Paradise
3	John Boldt	jboldt@mhc.net	Munson HEALTHCARE
4	Travis House	house@Michigan.gov	Mich. State Police
5	Kristin Tharp	ktharp@traverselhc.org	Traverse Health Clinic
6	Leslie Bilkey	l.bilkey@traversecitymi.gov	City of TC
7	Jim Tuller	j.tuller@tcfire.org	TRAVERSE City Fire Department
8	Jim Baker	j.baker@gtcountymi.gov	GTC Equalization
9	Josh Green	j.green@gtcountymi.gov	GTC Equalization
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

RE: Natural Hazard Mitigation Meeting

Gregg Bird <gbird@gtcountymi.gov>

Tue, Jan 11, 2022 at 1:04 PM

To: Jennifer Neal <jennifer.neal@networksnorthwest.org>, Stephanie Loria <stephanie.loria@networksnorthwest.org>

The meeting notice was sent to the following:

Jennifer Neal - Networks Northwest

Andy Down Chief, Long Lake Township Fire & Rescue

Bagby, Joe - MDHHS

Bill Parker - Blair Twp Fire & EMS (also representing Grant, Union, Paradise, and Mayfield)

Bob Siekman – GT Pavilions

Brad Jewett – GT Commissioner (Public Safety Committees)

Brad Kluczynski – GT Co. Roads Commission

Brandon Flynn – Whitewater Twp

Brian Belcher – GT Metro Emergency Services (Fire Marshall for Garfield, East Bay, & Acme Twps)

Bruce Remai – GT Soil & Erosion

Chris Barsheff – GTSO Jail Warden

Chris Clark – GTSO Patrol Capt.

Chris Oosse – GTSO Patrol Lt.

Grant Johnson – Blair Twp EMS Director (also Grant, Union, Paradise, & Mayfield)

Dan Sal – TVC

Daryl Case – Green Lake Fire & EMS

Dave Grattopp- Long Lake Twp EMS Director

Dee Wilkington – NW MI Area Agency on Aging

Eric Send- WTCM – Northern MI Emergency Alert System chair

Erica Dense – Lighthouse Rehab Center

Erich Bohrer – TCPD Lt

Fairchild, Amy – Mobil Medical Response

Frank Dituri- Traverse City Public Services

Garrett Fairchild- Grand Traverse Band of Ottawa & Chippewa Indians

Glen Johnson- Grand Traverse Amateur Radio Association

1/LT Travis House – MSP Cadillac

James Baker – GT Co. Equalization

Jason Torrey – Grand Traverse 911

Jeff Pataky – BATA

Jim Tuller – TCFD

Jim White- NMC

Joe McCarthy – Interlochen Arts Academy

Joe Slonecki- GT Co. Roads Commission

John Bolde- Munson Medical Center

John S. Rogers – GT Roads Commission

Justin Roy- Traverse City Waste Water

Karen Griggs- Traverse City Health Clinic

Kasey Mahony -DNR

Kevin Klein – TVC

LISA A. DOUGLAS- Consumers Energy

Mark Bak-TCAPS

Mark Thompson- Mobil Medical Response

Marty Colburn-City Manager, Traverse City

Mary Vollink- Salvation Army

Matt McCaul – MSP Cadillac

Matthew Winters- Salvation Army

Meghan Powers- American Red Cross

Michael de Castro- MSP Emerg. Mgmt

Michael Lahey- GT Health Dept

Michelle Hunt- Traverse City Parks

Mike Harbin- USCG Air Station Traverse City

Nick Lemcool- East Bay EMS

Owens, Paul- Mobil Medical Response

Pat Parker – GT Metro Chief (Garfield, East Bay, Acme Twps)

Penny Hill- City of Traverse City Dept. City Manager

Ralph Dollhopf – US EPA, Traverse City office

Robert Hentschel – Chair, GT Co. Board of Commissioners

Robert Hipp - Traverse City Light & Power

Ruth Blick – Salvation Army

Ryan Hannon – Goodwill Industries (Homeless Outreach)

Scott Tinker – Fife Lake Twp Fire

Sheri Pilate - DHS

Stark, Christopher- DNR

Tom Youker- Grand Traverse Resort

Wendy Hirschenberger – GT Health Dept

Also sent to all Township Supervisors and Clerks

Regards,

Gregg

Gregg Bird PEM, NEMP

Emergency Management Coordinator

Office: (231) 995-6059

Cell: (231) 590-2373

Email: gbird@gtcountymi.gov

www.grandtraverse.org/EM

www.Fb.com/GTCemergency



[Enroll for CodeRED here](#)

[Quoted text hidden]



A G E N D A
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, February 17, 2022 - 8:30 am
Government Center, 400 Boardman Ave, 2nd Floor Training Room

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Nick Lemcool, East Bay EMS

- 1. Call Meeting to Order**
- 2. Approval of Agenda**
- 3. Approval of Minutes of January 20, 2022**
- 4. Agency Presentations & Schedule**
Munson Medical Center - John Bolde
- 5. Committee & Team Reports**
 - a. Hazmat Team Report/Sara Title II & III)
 1. Tier II status 2022 update (if any)
 2. Recent HAZMAT incident(s) review (if any)
 - b. School Drill Schedule and Report
 - c. Emergency Manager/Planning Team
 - d. TBARG / RACES
- 6. Drills/Exercises and Training/Education**
 - a. Michigan Hazmat Responder Conference – Crystal Mountain, April 11 – 13, 2022
 - b. Great Lakes Homeland Security Conference - Grand Rapids, May 9 – 12, 2022
If you are a school employee and interested in the School Track, please register using course MI-
Tran
ID 1102329.
- 7. Old Business**
 - a. Natural Hazard Mitigation Plan updates – Jenni Neal, Networks Northwest
- 8. New Business**
- 9. Open Discussion**
- 10. Future Meetings**
March 17, 2022 - Open
- 11. Adjournment**



MINUTES
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, February 17, 2022 - 8:30 am
Government Center, 400 Boardman Ave, 2nd Floor Training Room

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Nick Lemcool, East Bay EMS

- 1. Call Meeting to Order** – 08:31 by Vice Chair Chief Tuller. Chair Chief P. Parker absent and excused.
- 2. Approval of Agenda** – Removed Munson update due to staff not being available today, placed Networks Northwest into agency presentations. Motion by Brad Jewett Seconded by Chief B. Parker
- 3. Approval of Minutes of January 20, 2022** – Motion by Brad Jewett – Chief B. Parker
- 4. Agency Presentations & Schedule**
 - Natural Hazard Mitigation Plan updates – Jenni Neal, Networks Northwest
 - Presentation updating on community survey results.
 - o Discussion on Infrastructure failure not being a natural hazard, also public health.
 - o Discussion on dam locations
- 5. Committee & Team Reports**
 - a. Hazmat Team Report/Sara Title II & III
 - 1. Tier II status 2022 update (if any)
 - No report
 - 2. Recent HAZMAT incident(s) review (if any)
 - None currently
 - b. School Drill Schedule and Report
 - Halfway through K9 Searches for the year.
 - Drills going well per K. O'Brian.
 - TCAPS excited to be part of new school safety committee.
 - c. Emergency Manager/Planning Team
 - Continuing to work with Networks Northwest.
 - d. TBARG / RACES
 - Email from Glen.
 - Received grant from Cherryland Electric to fund Starlink.
- 6. Drills/Exercises and Training/Education**
 - a. Michigan Hazmat Responder Conference – Crystal Mountain, April 11 – 13, 2022
 - Region 7 funding 7 personal to this conference.
 - b. Great Lakes Homeland Security Conference - Grand Rapids, May 9 – 12, 2022
 - Schools have separate track.
 - c. North American Active Assailant Conference – Troy, MI – August 16 – 19, 2022
- 7. Old Business – None.**



8. New Business – None.

9. Open Discussion – None

10. Future Meetings

March 17, 2022 – MABAS report from Chief B. Parker.

11. Adjournment – 09:30.

58

Location: 400 Boardman Ave

Date: 2/17/2022 Time: 0830

Name _____

Agency Representing
Email

2 Creek Bird
3 Branham Fawn

5 4 3 2 1
Barrett Fairbairn
Brad Jaett

Sbirde & Gtcom mi. - you
firechile & whitener from
Gandy. Fairchild & Gtch -
Gandy & Gtcom mi. - you

676
G730c

July 11 1921

8
Cone: yellow
Spur: pink
Bark: grey

John Baker
1234 Elm Street

1 Mrs. Dose

Matthew Winters
N. Union



Natural Hazard Mitigation Plan community meetings

The Grand Traverse County Emergency Management Department invites you to a meeting of local municipality officials to discuss natural hazards and mitigation strategies. Local participation is crucial to the planning process and a requirement of FEMA, the approval agency.

We request that at least one representative from each community attend the meeting. We look forward to seeing you on

Wednesday March 23, 2022 at 10am-12pm at the Kingsley Village Council Room, 207 S. Brownson Ave, Kingsley, MI 49649

01

Thursday, March 24, 2022 at 10am-12pm at the Government Center Commission Chambers, 400 Boardman Ave, Traverse City, MI 49684

The County's Natural Hazard Mitigation Plan will identify natural disaster risks and vulnerabilities to the community, develop long-term strategies for protecting people and property from similar events, and establish a coordinated process to implement the plan. Feel free to contact Gregg Bird, Emergency Management Coordinator, at gbird@countymi.gov or Jennifer Neal, Community Planner at jennifer.neal@networksnorthwest.org.

Regards,

Gregg

Gregg Bird PEM, NEMP

Emergency Management Coordinator

Office: (231) 995-6059

Cell: (231) 590-2373

Email: gbird@gtcountymi.gov

www.grandtraverse.org/EM

www.Fb.com/GTCemergency



[Enroll for CodeRED here](#)

MINUTES

Grand Traverse County Hazard Mitigation Plan Community Meeting
Wednesday, March 23, 2022 – 10:00 AM – 12:00 PM
Village of Kingsley Council Room, 207 S. Brownson Ave. Kingsley MI 49649

Attendees:

Networks Northwest (Jennifer Neal and Zach Vega)
Gregg Bird, GT County E.M.
Dan Hawkins, Village Manager
Deb Nickerson, Treasurer
Terry Almquist, Supervisor, Department of Public Works
Todd Weaver, Department of Public Works
Norm Fenton, Department of Public Works
Jim Tuller, Fire Chief, City of Traverse City, formerly a resident of Mayfield Township

Planner Neal opened with a slide presentation to the group. Ms. Neal answered questions from the group and Mr. Bird provided additional background about the project scope and requirements.

Following the presentation, meeting participants were asked to group around the large maps provided to identify vulnerable population areas such as mobile home parks and isolated neighborhoods. They were also asked to identify potential hazards in the area. Meeting participants marked the maps provided. The group discussed flooding potential, damage from thunderstorms and wind causing power outages, and other issues specific to the Village of Kingsley. Planner Neal encourage the group to provide input on any potential hazard to ensure it is covered in the plan. The Village mentioned a good relationship with the Grand Traverse County Road Commission and will continue to work with them on infrastructure concerns and repairs. Planner Neal will incorporate the feedback received into the plan.

MINUTES

Grand Traverse County Hazard Mitigation Plan Community Meeting
Thursday, March 24, 2022 – 10:00 AM – 12:00 PM
Government Center, 400 Boardman Ave, 2nd Floor Commission Chambers

Attendees:

Networks Northwest (Jennifer Neal, Zach Vega, and Hannah Yurk)
Gregg Bird, Emergency Management Coordinator, Grand Traverse County
Matthew Winters, Lieutenant, Salvation Army
Fred Gilstorff, Peninsula Township Fire Department
Jolanda Murphy, Grand Traverse Band Public Safety Department
Lori Savaso, Grand Traverse Band Risk Management Department
Amy Fairchild, Paramedic Supervisor, Mobile Medical Response
Dee Wilkinson, Housing/EMT, Area Agency on Aging of Northwest Michigan
John Sych, Planning Director, Garfield Township
Stephen Hannon, Deputy Planning Director, Garfield Township
Beth Friend, East Bay Township
Art Krueger, Utility Director, City of Traverse City
Frank Dituri, Public Services Director, City of Traverse City
Andy Smits, Drain Commissioner, Grand Traverse County

Planner Neal opened with a slide presentation to the group. Ms. Neal answered questions from the group and Mr. Bird provided additional background about the project scope and requirements.

Following the presentation, meeting participants were asked to group around the large maps provided to identify vulnerable population areas such as mobile home parks and isolated neighborhoods. They were also asked to identify potential hazards in the area. Meeting participants marked the maps provided. Networks Northwest Community Planners listened to the input from the representatives of the participating organizations and made notes on the maps. Common topics that were brought up included common flooding areas, damage from thunderstorms and wind causing power outages, locations of critical infrastructure, and other issues specific to the organizations represented. Planner Neal will incorporate the feedback received into the plan.

HAZARD MITIGATION SIGN-IN 3/24

<u>NAME</u>	<u>ROLE/ORGANIZATION</u>
Matthew Winters	Lieutenant / The Salvation Army
Fred Gilstorff	Chief Peninsula Twp. Fire
Jolanda Murphy	GTB Public Safety Dept.
Lori SARASO	GTB Risk Management Dept.
Amy Fairchild	MMR Paramedic Supervisor
Dee Wilkinson	Housing/EMT - Area Agency on Aging NW MI
John Sych	Garfield Twp. Planning Director
Stephen Hannon	Garfield Twp. Deputy Planning Dir
Beth Friend	East Bay Township
Art Krueger	city of TC - utility Director
Andy Smits	GRAND TRAVERSE Co. DRAIN Commissioner



A G E N D A
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, April 21, 2022 - 8:30 am
Government Center, 400 Boardman Ave, Commission Chambers

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Nick Lemcool, East Bay EMS

1. Call Meeting to Order

2. Approval of Agenda

3. Approval of Minutes of March 17, 2022

4. Agency Presentations & Schedule

Networks Northwest – Jennifer Neal – DRAFT Natural Hazard Mitigation Plan

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

1. Tier II status 2022 update (if any)
2. Recent HAZMAT incident(s) review (if any)

b. School Drill Schedule and Report

c. Emergency Manager/Planning Team

d. TBARG / RACES

6. Drills/Exercises and Training/Education

- a. Michigan Hazmat Responder Conference – Crystal Mountain, April 11 – 13, 2022 – Report out
- b. Great Lakes Homeland Security Conference - Grand Rapids, May 9 – 12, 2022
If you are a school employee and interested in the School Track, please register using course MI-Tran ID 1102329.
- c. Full Scale Exercise – Cherry Capital Airport, Emergency Management, Grand Traverse Schools – August 10, 2022
- d. North American Active Assailant Conference – Troy – August 16 – 19, 2022 Postponed until spring 2023

7. Old Business

8. New Business

9. Open Discussion

10. Future Meetings –

SPECIAL Meeting for Natural Hazard Mitigation Plan – Thursday, May 26, 10am Commission Chambers
LEPC – August 18, 2022

11. Adjournment



M I N I U T E S
Grand Traverse County
Local Emergency Planning Committee (LEPC)
Thursday, April 21, 2022 - 8:30 am
Government Center, 400 Boardman Ave, Commission Chambers

Chairman: Chief Pat Parker, Grand Traverse Metro Emergency Services
Vice Chairman: Chief Jim Tuller, Traverse City Fire Dept
Secretary: Nick Lemcool, East Bay EMS

- 1. Call Meeting to Order** – 08:32 by Vice Chair Chief J. Tuller
- 2. Approval of Agenda** – Motion by Commissioner B. Jewett, Second by Lt. C. Oosse – All Aye.
- 3. Approval of Minutes of March 17, 2022** – Motion by Chief B. Parker, Second by Commissioner B. Jewett – All Aye.

4. Agency Presentations & Schedule

Networks Northwest – Jennifer Neal – DRAFT Natural Hazard Mitigation Plan
Presentation of draft plan. Discussion of data and sources. Questions posed.

5. Committee & Team Reports

a. Hazmat Team Report/Sara Title II & III)

1. Tier II status 2022 update – 15% not up to date yet. No other updates.
2. Recent HAZMAT incident(s) review - None reported.

b. School Drill Schedule and Report

-TCAPS - Lull with lockdowns. Finishing up drills in May. Some K9 Searches. Working out exterior number plan to identify rooms from an exterior point. Discussion to create county wide plan for numbering rooms creating consistency.

-PAO meeting with TCAPS Marketing departments to promote that threats to a school will equal a 20-year felony.

c. Emergency Manager/Planning Team

-April 9 – Potential of private DAM breach on Williams Road, Blair Township. Affecting three properties, however, does not appear to affect homes or structures.

d. TBARG / RACES

-Report on Starlink.

6. Drills/Exercises and Training/Education

- a. Michigan Hazmat Responder Conference – Crystal Mountain, April 11 – 13, 2022 – Report out - 150 participants, targeted to Hazmat and WMD response. Good Conference.
- b. Great Lakes Homeland Security Conference - Grand Rapids, May 9 – 12, 2022
If you are a school employee and interested in the School Track, please register using course MI-Tran ID 1102329.
- c. Full Scale Exercise – Cherry Capital Airport, Emergency Management, Grand Traverse Schools – August 10, 2022 – *All school districts locally will be participating with Family Unification center drill portion.
- d. North American Active Assailant Conference – Troy – August 16 – 19, 2022 Postponed until spring 2023



7. Old Business

8. New Business

9. Open Discussion

10. Future Meetings –

No May, June or July meetings scheduled.

SPECIAL Meeting for Natural Hazard Mitigation Plan – Thursday, May 26, 10am Commission Chambers
LEPC – August 18, 2022

11. Adjournment – 09:45 by Chair.

LEPC

Location: 2nd Floor Training Rm

Date: 4/21/2022 Time: 0830

Name	Email	Agency Representing
1 Greg Bird	gbird@grtcountymi.gov	Emergency Mgmt
2 Brad Jewett	bjewett@grtcountymi.gov	GT BOC
3 Mike Bie	baking@fcpa.net	TCFES
4 Casey L Green	casey.l.green@grtcountymi.gov	911
5 Dan Johnson	67skywarn@gmail.com	GTFRG
6 Krista Thorpe	thorpe@traversehc.org	Traverse Health Clinic
7 Mike Lenczuk	mlenczuk@eastbayansw.com	East Bayansw
8 DAN SK	dan.sale@airport.com	Airport
9 Tom Peters	traverseemergencymgmt@rci.com	EMERGENCY MGMT
10 Jason Oravina	clarlingj2@Michigan.gov	MSP
11 Bill Parker	fireblazertownshipmi.gov	BLAZER/Parker
12 Josh Green	jgreen@grtcountymi.gov	County Equalization/LES
13 Brandon Flynn	firechief@waukeshabush.org	Waukesha Fire
14 Rick Wantfield	rwantfield@lear.com	Lear Corp TC
15 Tony Marten	amartel06@lear.com	Lear Corp
16 Jim Tuller	j.tuller@fire.org	TRaverse City FD
17 Brandon Brinks	brinks@sheriff.org	Grand Traverse Co
18		
19		
20		

Notice of Availability of Draft Hazard Mitigation Plan and Public Meeting for Input on the Draft Hazard Mitigation Plan.

Grand Traverse County is in the process of updating its Hazard Mitigation Plan in accordance with the Disaster Mitigation Act of 2000. There will be a public meeting following the public review period on May 26, 2022. The meeting will be at Grand Traverse County Government Center Commission Chambers, 400 Boardman Ave. Traverse City MI 49684 at 10:00 AM. Public comments are requested either in person or by representative at the public meeting or at PO Box 506, Traverse City MI 49685, or by email at Jennifer.neal@networksnorthwest.org. The draft plan is available for review on the Grand Traverse County's website and Network Northwest's website.

LEPC
Sign in
May 26, 2022

Grand Traverse County
Sheet

Name

Title

Organization

Pat Parker
Steve Hannon

FIRE CHIEF
Deputy Planning Director,
Granfield Township

GR TRAV METRO FD

MINUTES

Grand Traverse County Hazard Mitigation Plan Public Meeting

Thursday, May 26, 2022 - 10:00-11:30 am

Government Center, 400 Boardman Ave, 2nd Floor Commission Chambers

Attendees:

Chair, Pat Parker, Fire Chief, Grand Traverse Metro Fire Dept. (serving Acme, East Bay, and Garfield Twp)
Networks Northwest (Jennifer Neal)
Steve Hannon, Deputy Planning Director, Garfield Township

Chief Pat Parker opened the meeting at 10:00 AM. Open discussion followed. Chief Parker discussed the recent tornado event in Antrim County and Otsego County. He and Planner Neal discussed emergency notification systems, including the availability of tornado sirens.

Deputy Planning Director Hannon arrived and Planner Neal reviewed the draft plan with Mr. Hannon. Garfield Township is most concerned with the designated flood areas, potential mitigation strategies, and potential projects in these areas. Deputy Planning Director Hannon identified strategies Garfield Township was currently including in their normal day-to-day operations, but there were opportunities to include additional strategies. Planner Neal listened to comments and will incorporate those suggestions into the plan.

No other comments were received.