Kalkaska County, Michigan
Natural Hazard Mitigation Plan

2023

Amended 3/25/2024 with corrected and additional information pertainin to land use/land cover description on pages 16 and 17.

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

FEMA

June 4, 2024

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

Dear Mr. Schnepp:

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

Kalkaska County *(approved 1/23/24)*
Village of Kalkaska
Bear Lake Township
Blue Lake Township
Boardman Township
Clearwater Township
Coldsprings Township
Excelsior Township
Garfield Township
Kalkaska Township
Oliver Township
Orange Township
Rapid River Township
Springfield Township

All participating jurisdictions have provided adoption resolutions. The expiration date of the Kalkaska County Natural Hazard Mitigation Plan is January 22nd, 2029.

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

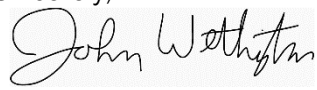
- Hazard Mitigation Grant Program (HMGP)
- HMGP Post-Fire
- Building Resilient Infrastructure and Communities
- Flood Mitigation Assistance

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

To avoid a lapsed plan, the next plan update must be approved before the end of the approval period, including adoption by the participating jurisdiction(s). Before the end of the approval period, please allow sufficient time to secure funding for the update, including the review and approval process. Please include time for any revisions, if needed, and for your jurisdiction to formally adopt the plan after the review, if not adopted prior to submission. This will enable you to remain eligible to apply for and receive funding from FEMA's mitigation grant programs with a mitigation plan requirement. Local governments, including special districts, with a plan status of "Approvable Pending Adoption" are not eligible for FEMA's mitigation grant programs with a mitigation plan requirement.

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

Sincerely,



John Wethington
Chief, Risk Analysis Branch
Mitigation Division

KALKASKA COUNTY BOARD OF COMMISSIONERS
Resolution #2024-08

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

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

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

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

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

Now, therefore, be it resolved that:

1. The 2023 Kalkaska County Hazard Mitigation Plan 5 Year Update is hereby adopted as an official plan of Kalkaska County.

2. The Kalkaska County Local Emergency Planning Committee/Local Planning Team will serve as the Natural Hazards Task Force. The duties shall be as outlined in the 2023 Kalkaska County Natural Hazard Mitigation Plan 5 Year Update.

3. The Kalkaska County Emergency Management Coordinator is charged with supervising the implementation of the Plan's recommendations within the funding limitations as provided by the County or other funding sources.

4. The Kalkaska County Emergency Management Coordinator shall convene the Natural Hazards Task Force annually. The Coordinator's responsibilities will include monitoring the implementation of the plan and shall submit a written progress report to the Task Force in accordance with the following format:
    a. A review of the original plan.
    b. A review of any disasters or emergencies that occurred during the previous calendar year.
    c. A review of the actions taken, including what was accomplished during the previous year.
    d. A discussion of any implementation problems.
    e. Recommendations for new projects or revised action items. Such

recommendations shall be subject to approval by the Kalkaska County Board of Commissioners.

At a Regular Meeting of the Kalkaska County Board of Commissioners, held 1-17-2024, at 5:00 PM, 605 N Birch Street, Kalkaska, Michigan:

Motion by Sweet to adopt Resolution 2024-08. Supported by Comai.

Roll call vote:
Yeas: Sweet, Comai, Baldwin, Bicum, Sieting, Fisher
Nays: None
Absent: Matley
Abstain: None

RESOLUTION DECLARED ADOPTED.

Kohn Fisher
Chairman of Kalkaska Co Board of Commissioners

CERTIFICATION

I, the undersigned, the Clerk of the County of Kalkaska, Michigan, do hereby certify that the foregoing is a true and correct copy of a resolution adopted at a Regular Meeting of the Board of Commissioners of said County held on January 17, 2024, the original of which resolution is on file in my office. I further certify that notice of said meeting was given more than 18 hours in advance in accordance with Act 267, Public Acts of Michigan, 1976, as amended.

Dated: January 17, 2024

Deborah Hill
Clerk, County of Kalkaska

ACKNOWLEDGEMENTS

The Kalkaska County Natural Hazard Mitigation Plan is prepared for Kalkaska County, Michigan and all the jurisdictions within it. This plan is the culmination of an interdisciplinary and interagency planning effort that required the participation, technical assistance and expertise of individuals within the agencies and organizations listed below. Each jurisdiction is invited to be a continuing participant in future regular review and updates of the Plan. Refer to Appendix F for a complete table of how and when individuals contributed to the development of the plan.

Participating Entity	Representative	Title
Kalkaska County Board of Commissioners	Truman Bicum	District 1 Commissioner (Coldwater Township)
	Bob Baldwin	District 2 Commissioner (Coldsprings Township and Rapid River Township)
	Kohn Fisher	District 3 Commissioner (Bear Lake Township, Blue Lake Township, Excelsior Township, Oliver Township and a portion of Orange Township)
	James Sweet	District 4 Commissioner (Garfield and Springfield Townships)
	Dave Comai	District 5 Commissioner (Boardman Township and a portion of Orange Township)
	Craig Crambell	District 6 Commissioner (Kalkaska Township)
	Jeff Sieting	District 7 Commissioner (Village of Kalkaska & a portion of Kalkaska Township)
Kalkaska County Planning Commission	Stuart McKinnon	Chairman, Rapid River Township Planning Commission Chair and Zoning Board of Appeals Chair
	Robert A. Mickevicius	Commissioner
	John West	Commissioner
	Eric Hendricks	Commissioner; Orange Township Clerk
Kalkaska County	Douglas Pratt	Director of Office of Emergency Management
	Mike Thompson	Assistant Director of Office of Emergency Management
	Patrick Whiteford	Sheriff
	Dave Wagner	Undersheriff
	Sgt. Scott Griffith	Sheriff's Department
	Dean Farrier	County Surveyor
	Christy Matley	Chief Deputy County Clerk
	Deborah Hill	County Clerk/Administrator
	Laura Hendricks	County Zoning/Planning Commission Secretary
	Seth Phillips	Drain Commissioner
	Jodi Magee	Director, Commission on Aging
	Lisa Anderson	Support Specialist, Commission on Aging
Bear Lake Township	George (Bud) Banker	Supervisor
	Bob Dixon	Trustee
	Delanna David	Clerk (former)
	Sam Rahaim	Bear Lake Association President

Participating Entity	Representative	Title
Blue Lake Township	Christine Almose	Treasurer
	Blair Shearer	Supervisor
	Greg Brierley	Fire Chief
Boardman Township	Paul Erickson	Supervisor; County Road Commission; Hospital Board
	John Miltenberger	Fire and Rescue
	Dave Witek	Trustee
Clearwater Township	Jim Leffew	Planning Commissioner
	Margret Spann	Deputy Clerk
	Greg Bradley	Fire and Rescue #5
Coldsprings Township	Rick Delaney	Trustee
	Raymond Hoffman	Supervisor
	Eugene Headley	Fire Chief
	Gayenell Gentelia	Clerk
Excelsior Township	Annie Wallace	Clerk
	Richard VanBeek	Supervisor
	Norman Groner	Trustee
	Eugene Headley	Fire Chief
Garfield Township	Todd Jones	Supervisor
	Kim Jones	Fire Chief, Station #3
Kalkaska Township	Michael Winter	Supervisor
	David E. Wolfe Jr.	Trustee
	Derek Hogerheide	Fire Chief
	Ryan Brewer	Fire
Oliver Township	Mike Cox	Trustee
	Sonja Dunham	Clerk (former)
	Deborah Bishop	Treasurer
	Alexa Szymchack	Trustee (former)
Orange Township	Eric Hendricks	Clerk
Rapid River Township	Terry Williams	Supervisor
	Valerie Hansen	Clerk
	Matthew Brenner	Trustee
	Robert Hall	Planning & Zoning Administrator
	David McKinnon	Trustee (former)
Springfield Township	Thomas Gonyer	Supervisor
	Scott Tinker	Fire
	Jessica Marvin	Treasurer
Village of Kalkaska	Lt. Aaron Popa	Village Manager/Chief of Police
Antrim County	Leslie Meyers	Emergency Manager (former)
Crawford County	Doug Pratt	Emergency Manager
Kalkaska Conservation District	Mark Randolph	District Manager
Kalkaska County EMS	Mike Berendsohn	Director
Kalkaska Memorial Health Center	Teresa Smith	Medical Staff Services
	Connie Farrier	Service Line Director, Support Svc.
	Mike Fitch	
	Mike Tinkle	Medical Staff Services

Participating Entity	Representative	Title
Kalkaska County Road Commission	John S. Rogers	Manager
	Mike Cox	Road Commission Chair; serves on COA and Hospital boards
Kalkaska Public Transit Authority	Tracy Fisher	Director
	Harry Shipp	
Kalkaska Public Schools	John Rogers	Vice President (former)
	Rick Heitmeyer	Superintendent
American Red Cross	Meghan Powers	Disaster Program Manager
District Health Department #10	Bret Haner	Emergency Preparedness Coordinator
Charlevoix Antrim Kalkaska Emmet-Cooperative Invasive Species Management Area	Lindsey Bona-Eggeman	Program Coordinator
Michigan Department of Health and Human Services	Donna Wednieski	
Michigan Department of Natural Resources		Forest Fire Supervisor
Michigan State Police – Department. of Emergency Management & Homeland Security	F/Lt Mike DeCastro	District 7 District Coordinator
	F/Lt Travis House	MSP Cadillac Post Commander
	Mike Sobocinski	Hazard Planning Analyst
Michigan Township Association	Sharon A Schultz	District 6 Director

Prepared by Kalkaska County Office of Emergency Management
with assistance from:

Networks Northwest
Talent / Business / Community

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

TABLE OF CONTENTS

I. INTRODUCTION

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

Mitigation allows repairs and reconstruction to be completed after an incident occurs in such a way that does not just restore the damaged property as quickly as possible to pre-disaster conditions. It also ensures that such cycles are broken, that post-disaster repairs and reconstruction take place after damages are analyzed, and that sounder, less vulnerable conditions are produced. Through a combination of regulatory, administrative, and engineering approaches, losses can be limited by reducing susceptibility to damage. When successful, hazard mitigation will lessen the impact of a disaster on people, property, the environment and economy, and continuity of services through the coordination of available resources, programs, initiatives, and authorities.

A *hazard*, in the context of this plan, is an event or physical condition that has potential to cause fatalities; injuries; damage to personal property, infrastructure, or the environment; agricultural product loss; or interruption of business or civic life. The Kalkaska County Natural Hazard Mitigation Plan focuses primarily on *natural* hazards such as extreme heat/cold, drought, wildfires, tornadoes, thunderstorm with wind, high winds, hail, extreme winter weather, hydrologic hazards such as flooding and dam failure, invasive species, and space weather. An exception is that it will also consider these technological and human-related hazards: public illness outbreak and fixed site and transportation related hazardous material incidents. The following natural hazards were not included in the analysis for this Hazard Mitigation Plan: Great Lakes shoreline hazards, dense fog, earthquakes and subsidence. According to information presented about these hazards in Michigan State Police's 2019 *Michigan Hazard Analysis*, there is zero to minimal risk of these events occurring in the Northwest Michigan area.

The main objective of the Kalkaska 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 the county to protect the health, safety, and economic interests of the residents and businesses through planning, awareness, and implementation.

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

Since the 2016 Plan's adoption period, the county and municipalities have achieved the following key endeavors to address their previously identified mitigation strategies. Refer to Appendix C for the details of mitigation strategies included in the 2016 plan and their current status.

- Progress working with utility companies to bury power lines to reduce the likelihood of power outages
- Continued efforts by the County Building Department to enforce the Building Code and promote safety for mobile homes
- County Planning Commission incorporates water conservation practices into new development
- Continued acquisition of fire suppression equipment for wildfire management
- Coordination with state departments and local fire departments to manage prescribed burns

Section VII of this plan provides a list of hazard mitigation strategies for each hazard identified. Mitigation strategies were developed based on discussions with local officials and a review of FEMA/MSP best practices for hazard mitigation. (Refer to Appendix D for a list of Alternative Strategies that were considered.) Strategies are grouped according to their purpose: Preparation & Awareness, Shelters, Buildings & Infrastructure, Utilities & Technology, and Environment & Natural Resources. The strategies table also includes: a description of each strategy; what hazards it addresses; where the strategy applies; who is responsible for implementing the strategy; how the strategy will be implemented (what resources are available to apply the strategy); the estimated timeframe for completion; the level of priority; and what type of strategy it is. Most strategies are intended to be action items completed during the 5-year timeframe in which the plan is active. Some long-term strategies extend beyond the 5-year timeframe due to feasibility or level of difficulty.

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

Natural Hazards Mitigation Planning Goals

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

II. PLANNING PROCESS

The Stafford Act, as amended by the Disaster Mitigation Act of 2000, shifted the Federal Emergency Management Agency's (FEMA) scope of work to promoting and supporting prevention, or what is referred to as hazard mitigation planning. FEMA requires government entities to have a natural hazards mitigation plan in place and updated on a 5-year cycle as a condition for applying for grant funding related to natural hazard mitigation and remediation. Kalkaska County has a history of mitigation planning and adopted past Natural Hazard Mitigation Plans in 2007 and 2016. The adoption of the 2023 plan will reaffirm the eligibility of the county, as well as those local municipalities who participated in the planning process and adopted the county's plan, for federal funding.

The update of the County's plan was led by the Natural Hazards Task Force comprised of the County's Local Emergency Planning Committee (LEPC). Team members consist of first responders and local, regional, and state public entities that ensure the readiness of County entities by recommending equipment purchases, training and exercises, and public education on preparedness issues. Networks Northwest staff assisted with the creation of the updated plan by providing meeting facilitation, conducting an online survey, and writing the plan. The Task Force generally met on a quarterly basis, in-person and via Zoom, at the Kalkaska County Annex Building located at 890 Island Lake Road. All meetings were open to the public. The public was notified by posting at the County Building, Michigan Department of Transportation office, and the Kalkaska County Annex Building.

Representatives of the following types of stakeholders were invited to participate in the planning process via email invitation, phone calls, meeting attendance/presentation, or mailed letters: local and regional agencies involved in hazard mitigation activities; agencies that have the authority to regulate development; neighboring communities; representatives of businesses, academia, and other private organizations; and representatives of nonprofit organizations, including community-based organizations that work directly with and/or provide support to underserved communities and socially vulnerable populations (such as the Kalkaska Commission on Aging). Please refer to the Acknowledgements section in the beginning of this plan for a list of participants; Appendix F for a detailed table showing how and when representatives participated in the planning process; and Appendix G for meeting documentation. All jurisdictions in Kalkaska County remain as continuing participants in the 2023 Hazard Mitigation Plan (since the 2016 plan was completed).

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

- An online public survey was available from November 8, 2021 to February 20, 2022 to obtain input on community experience, concerns and priorities regarding natural hazard mitigation in Kalkaska County. The following table indicates the organizations who participated in the survey. The survey results are included as Appendix B.

Table 1: Community Survey Participation

Survey Participants	
American Red Cross	Kalkaska Conservation District
Antrim County Emergency Manager	Kalkaska County Board of Commissioners
Bear Lake Township	Kalkaska County Clerk/Administrator
Blue Lake Township	Kalkaska County Office of Emergency Management
Boardman Township	Kalkaska County Public Transportation
Clearwater Township	Kalkaska County Road Commission
Coldsprings Township	Kalkaska County Sheriff's Office
District Health Dept. #10	Kalkaska Township
Excelsior Township	MDNR Forest Fire Supervisor
Garfield Township	Michigan State Police
Kalkaska Commission on Aging	Rapid River Township
Kalkaska County EMS	Village of Kalkaska

- LEPC meetings where the Natural Hazard Mitigation Plan update work was discussed:
  - 2021: 5/25, 7/1, 8/24, 11/22
  - 2022: 2/22, 8/23, 11/22
  - 2023: 03/16

- Networks Northwest staff also participated in the following community meetings to explain the Hazard Mitigation Plan update process and request public input:
    - March 16, 2022 – Kalkaska County Fire Chief's Meeting (in person at the Village of Kalkaska Fire Dept.)
    - April 18, 2022 – Kalkaska County Michigan Township Association (MTA) quarterly meeting (in person at the Kalkaska Commission on Aging building).
    - April 26, 2022 - Public Input Session via Zoom with local officials to obtain input for the hazard analysis portion of the plan
    - January 25, 2023 - Kalkaska County Planning Commission
    - March 21, 2023 - Kalkaska County Planning Commission

- Local government officials were notified through a direct mailing, and a public notice was placed in the *Kalkaska Review* on March 23, 2023 about the opportunity to provide feedback at the public hearing on April 19, 2023 at a special meeting of the Kalkaska County Board of Commissioners. No public comment was received. Following the public hearing, the Board of Commissioners recommended the draft plan be submitted to Michigan State Police and FEMA for review and approval.

Additionally, county and regional agencies that share borders with Kalkaska County were invited to participate in the planning meetings and were able to view and comment on the draft plan copy of the plan. Those agency staff members are:

- Matthew Adamek, Antrim County Emergency Operations Director (current)
- Leslie Meyers, Antrim County Emergency Operations Director (former)
- Doug Pratt, Crawford County Emergency Manager
- Jon Deming, Otsego County Emergency Management Director
- Vanessa Varner, Roscommon County Emergency Management Director
- Linda Hartshorne-Shafer, Missaukee County Planning and Emergency Management Director
- Randy Boike, Wexford County Emergency Management Coordinator (current)
- Travis Baker, Wexford County Emergency Management Coordinator (former)
- Gregg Bird, Grand Traverse County Emergency Management Coordinator
- Robert Carson, Regional Director of Community Development, Networks Northwest

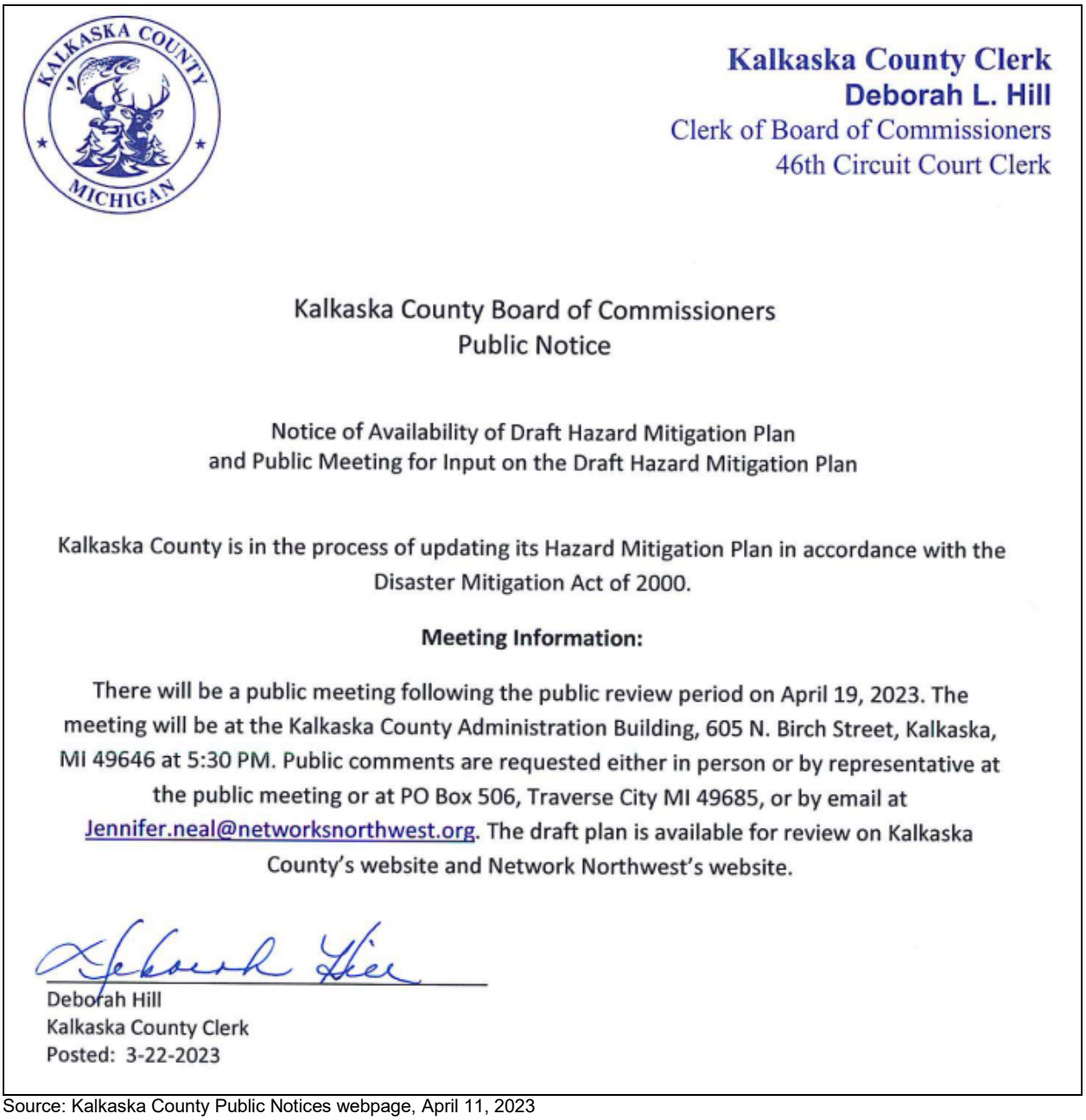
During the development of the plan, all Kalkaska County municipalities were provided the opportunity to participate in the online community survey as well as comment on plan drafts and other related materials. The draft plan was published openly on the Kalkaska County Emergency Management webpage, as well as the project page on Networks Northwest's website. The public was encouraged to review the draft plan and invited to submit suggestions and ideas for updates, changes to be considered during updates. No formal written comments were received during the public comment period.

All meetings where the plan was discussed were openly published for public and other jurisdiction/municipality participation. Additionally, County and Networks Northwest staff received feedback on the plan 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. The Emergency Manager also communicated with the Kalkaska County Drain Commissioner regarding specific flood prone locations. This information was provided and used in development of the plan, including the hazard analysis and strategies.

The following organizations that serve vulnerable populations (such as the elderly, disabled, or lower income residents) participated in the development of the plan: Kalkaska Public Schools, the Kalkaska Commission on Aging, Kalkaska Public Transit Authority, District Health Department #10, and Michigan Department of Health and Human Services.

Below are images of the websites for the available draft plan and a copy of the published notice to the public.

Figures 1 and 2: Website Images



Kalkaska County Clerk
Deborah L. Hill
Clerk of Board of Commissioners
46th Circuit Court Clerk

Kalkaska County Board of Commissioners
Public Notice

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

Kalkaska County is in the process of updating its Hazard Mitigation Plan in accordance with the Disaster Mitigation Act of 2000.

Meeting Information:

There will be a public meeting following the public review period on April 19, 2023. The meeting will be at the Kalkaska County Administration Building, 605 N. Birch Street, Kalkaska, MI 49646 at 5:30 PM. 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 Kalkaska County's website and Network Northwest's website.

Deborah Hill
Kalkaska County Clerk
Posted: 3-22-2023

Source: Kalkaska County Public Notices webpage, April 11, 2023

KALKASKA COUNTY

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

A public hearing for the plan will be held on April 19, 2023 at 5:30 PM prior to the Kalkaska County Board of Commissioners Meeting. The meeting location is in the Kalkaska County Administration Building, Board of Commissioners Room at 605 North Birch Street, Kalkaska, MI. Upon review of the plan, the Board of Commissioners shall recommend it be sent to Michigan State Police Homeland Security Division for review and then on to FEMA for their review and approval. Once FEMA has approved the plan, it will be brought before all local government boards for adoption.

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.

2023 Kalkaska County Hazard Mitigation Plan Current Drafts for Review:

Draft Plan

Strategies Table

Full Size Hazard Maps (Appx. A of the plan)

- **Environmental Features**
- **Infrastructure**
- **Hazard Areas**
- **Vulnerable Populations and Hazard Areas**
- **Critical Infrastructure**
- **Critical Infrastructure and Hazard Areas**

Source: Networks Northwest webpage, April 11, 2023

III. COMMUNITY PROFILE

Land Use/ Land Cover

Kalkaska County is located in Northwest Lower Michigan, and is bordered by Antrim County to the north, Otsego County to the northeast, Crawford County to the east, Roscommon County to the southeast, Missaukee County to the south, Wexford County to the southwest, and Grand Traverse County to the west. Major transportation routes through Kalkaska County include US-131, traversing the northwest section of the County; M-66, running north and south; and M-72 running east and west. Refer to Appendix A for a map of the county's main roads, water bodies and jurisdictions.

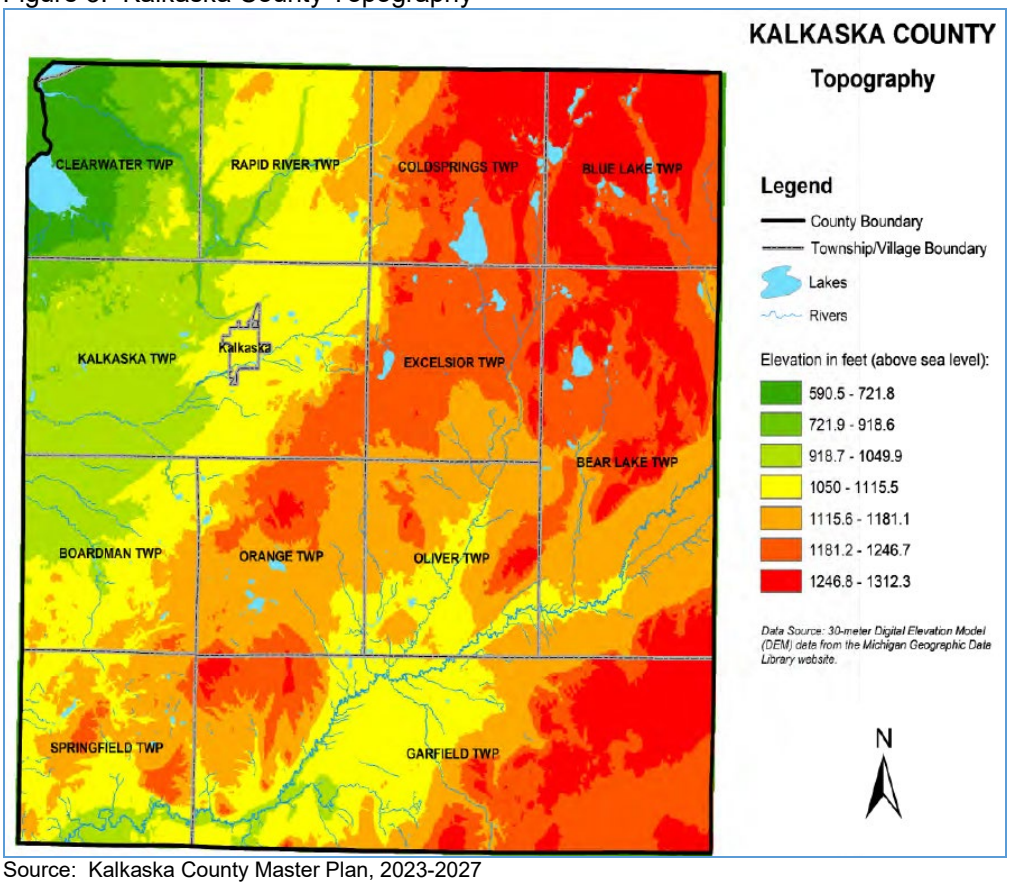
Kalkaska County consists of 570.3 square miles of land area and is the 54th largest county in Michigan.[1] The county is divided into twelve townships and the Village of Kalkaska. The largest concentration of people and businesses in the county are in the communities of the Village of Kalkaska and surrounding Kalkaska Township, and along the highway corridors of M-66, M-72 and US-131. The Camp Grayling Joint Maneuver Training Center is located in the eastern half of Kalkaska County. It is the largest National Guard training facility in the United States.

Located over a geological formation known as the Salina-Niagaran Reef, Kalkaska County sits 7,000 feet above one of the most successful oil producing basins in the state. Kalkaska County is generally classified as hill-land, plains and upland plains. Level to gently rolling hills and slopes cover the mid-section of the County. Hills and ridges run through the east half and northwest section with elevations from 1,000 to 1,400 feet above sea level.

Kalkaska County is a prime recreational area within the State, as reflected in its over 273 miles of rivers and streams and more than 86 lakes. Totaling over 6,000 acres, or two percent of the County, several of the State's most recognizable rivers flow through its borders, including the Manistee, Boardman, Rapid, and Torch Rivers. Accompanying the rivers and lakes are 49,732 acres of wetland areas (Table 3), which provide habitat for diverse plant and animal species.

A watershed is an area of land where all rivers, streams, and precipitation drain into a single body of water. A plateau in Kalkaska County's topography divides the County into portions of two area watersheds: the Big Manistee River watershed in the northeastern, eastern and southern portions of the county, and the Grand Traverse Bay watershed in the western and northwestern portions of the county (Figure 3).

Figure 3. Kalkaska County Topography



Source: Kalkaska County Master Plan, 2023-2027

[1] US Census Bureau, https://data.census.gov/cedsci/profile?g=0500000US26079

The majority of the County is part of the Big Manistee River watershed, which includes the Manistee River, Manistee Lake, Twin Lake, Bear Lake, Grass Lake, and other smaller lakes. The remainder (37%) of Kalkaska County lies within the Grand Traverse Bay watershed, and includes the Boardman River, Rapid River and Torch River. Additionally, there are two subwatersheds within the Grand Traverse Bay watershed: the Elk River Chain of Lakes (ERCOL) subwatershed and the Boardman River subwatershed.

The ERCOL subwatershed is a unique series of 14 interconnected lakes and rivers in Antrim and Kalkaska counties. This 'Chain of Lakes' empties into East Grand Traverse Bay through the Elk River in Elk Rapids. The ERCOL watershed area has more than 200 streams, with 138 miles as designated trout streams. From the uppermost lake in the chain, the waters flow 55 miles and drop 40 feet in elevation on their way to Grand Traverse Bay.

The Boardman River subwatershed is in Grand Traverse and Kalkaska Counties and includes 180 miles of river and tributary streams. The Boardman River flows west to empty in the Grand Traverse Bay at the City of Traverse City in Grand Traverse County. The Boardman River begins in the Mahan Swamp in north central Kalkaska County as the North Branch, and flows in a southwesterly direction for 40 miles, then turns north for another nine miles and empties into Grand Traverse Bay in Traverse City.

Table 2 lists the jurisdictions in Kalkaska County that contain portions of the Grand Traverse Bay subwatersheds.

Table 2. Grand Traverse Bay Subwatersheds in Kalkaska County

Township or Municipality	Grand Traverse Bay Subwatershed	Total Area (mi^2)	Total Area in Watershed (mi^2)	% of Municipality in Watershed
Boardman	Boardman River	36.22	35.35	97.6%
Clearwater	Chain of Lakes	33.79	33.79	100.0%
Coldsprings	Boardman River Chain of Lakes	36.31	16.82	46.3%
Excelsior	Boardman River	36.21	7.90	21.8%
Garfield	Boardman River	106.73	0.37	0.3%
Kalkaska	Boardman River Chain of Lakes	69.56	65.95	94.8%
Orange	Boardman River	34.79	8.08	23.2%
Rapid River	Boardman River Chain of Lakes	35.24	35.24	100.0%
Springfield	Boardman River	35.56	7.41	20.8%
Village of Kalkaska	Boardman River, Chain of Lakes	1.66	1.66	100.0%

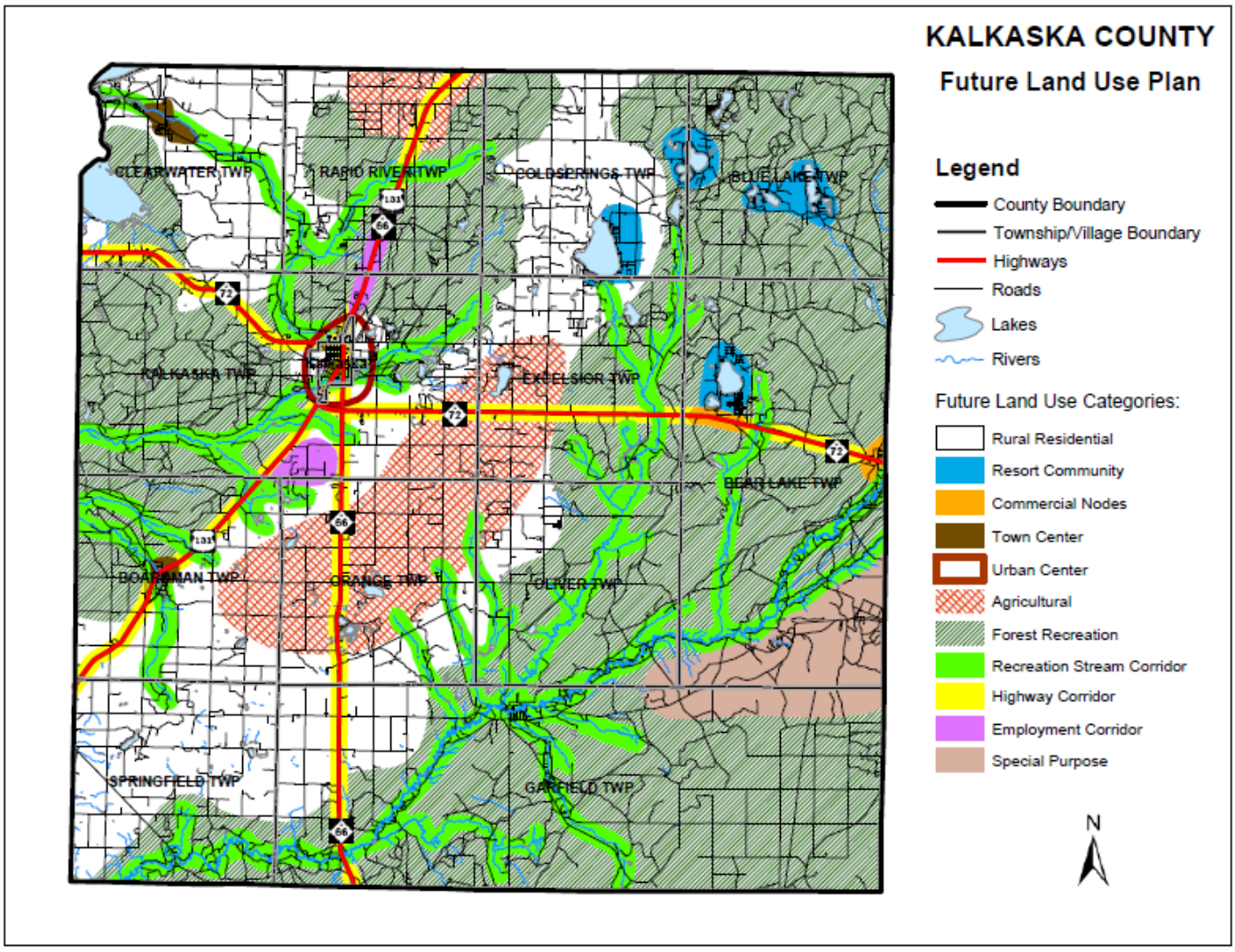
Source: Coastal Grand Traverse Bay Watershed Plan, May 2021

Foremost among the lakes are Log, Bear, Starvation, Twin, Crawford, Manistee, Skegemog, and Torch. Highly popular with permanent and seasonal residents alike, much of the County's residential activity has occurred along their edges and borders. These areas are under heavy growth pressure as new homes are being built near these areas and/or seasonal homes become year-round homes. Therefore special attention to building placement and allowed uses is critical.

Forestland in Kalkaska County is bountiful. Originally, the County was covered with heavy timber, primarily maple. Logging in the late nineteenth century cleared most of the timberland, leaving infertile soils and the landscape bare from clear-cutting. Much of the forest-covered land is protected by the State as part of the State Forest system.

In 2017, the Kalkaska County Planning Commission prepared the *2016-2021 Kalkaska County Master Plan.* In 2022, the Kalkaska County Planning Commission began working on the 5-year Master Plan update, 2023-2027. The Plan is a policy guide for decision-making for future land use, infrastructure, and public service decisions within Kalkaska County. Figure 4 provides the Future Land Use Plan for the county, indicating the location of desired land uses in the next 20 years. The "Special Purpose" land use category indicates land owned by the Federal Government, for military use of Camp Grayling (which continues into westerly adjoining Crawford County). Forested areas are concentrated in Blue Lake Township, Bear Lake Township, Garfield Township, and Kalkaska Township. These areas are intended to stay forested areas.

Figure 4: Future Land Use Plan Map



Map showing desired land uses in 20 years.

Source: *2016-2021 Kalkaska County Master Plan*

According to the 2017 USDA Census of Agriculture, the county had 27,137 acres of land in farms, with a total of 225 farms that had an average size of 121 acres. Compared to the 2012 Agriculture Census, there were 224 farms and 25,819 acres of land in farms. This represents a 5% increase in the acreage and average size of farms since the 2012 USDA Census of Agriculture. About 92% of the market value of agricultural products sold in the county is from crops, with a 2017 market value of $7,683,000. Forage (hay/hayage), harvested vegetables, potatoes, wheat for grain, and cultivated Christmas trees comprised the top five crops in acreage in the county. Kalkaska County ranks 55 out of 83 counties in the State of Michigan for the sale of agricultural crops.

The predominant land cover type is “Forested” followed by “Herbaceous/Grassland” and “Wetlands” (Table 3). Wetlands are primarily located along the Boardman River, Manistee River, and the Rapid River. Wetlands contribute significantly to water quality by acting as filters of storm water in addition to sustaining forest growth and providing habitat for wildlife. These areas generally are not suitable for development, but provide open space and recreational value as well as vital habitat for culturally significant animal and plant species.

Developed land cover is found predominantly in and around the Village of Kalkaska and along US-131, M-66 and US-131. While development in the county has remained fairly steady in the past decade, it has been noted that the type of new development is changing. Commercial development has slowed, but residential development remains in high demand. Housing of all types and prices is needed, but market studies indicate a need for smaller units and building types known as “missing middle housing”. 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.

Table 3: Kalkaska County Land Cover by Type

Classification[2]	Acres	Percent
Agriculture (cultivated crops, hay/pasture)	17,754.94	4.87%
Barren Land	581.50	0.16%
Developed (High Intensity)	234.72	0.06%
Developed (Low Intensity)	4,677.39	1.28%
Developed (Med. Intensity)	821.23	0.23%
Developed (Open Space)	17,514.85	4.81%
Forested	187,994.62	51.61%
Herbaceous/Grassland	56,492.15	15.51%
Open Water	5,141.37	1.41%
Shrub/Scrub	23,337.11	6.41%
Wetlands	49,732.22	13.65%
TOTAL	**364,282.10**	**100.00%**

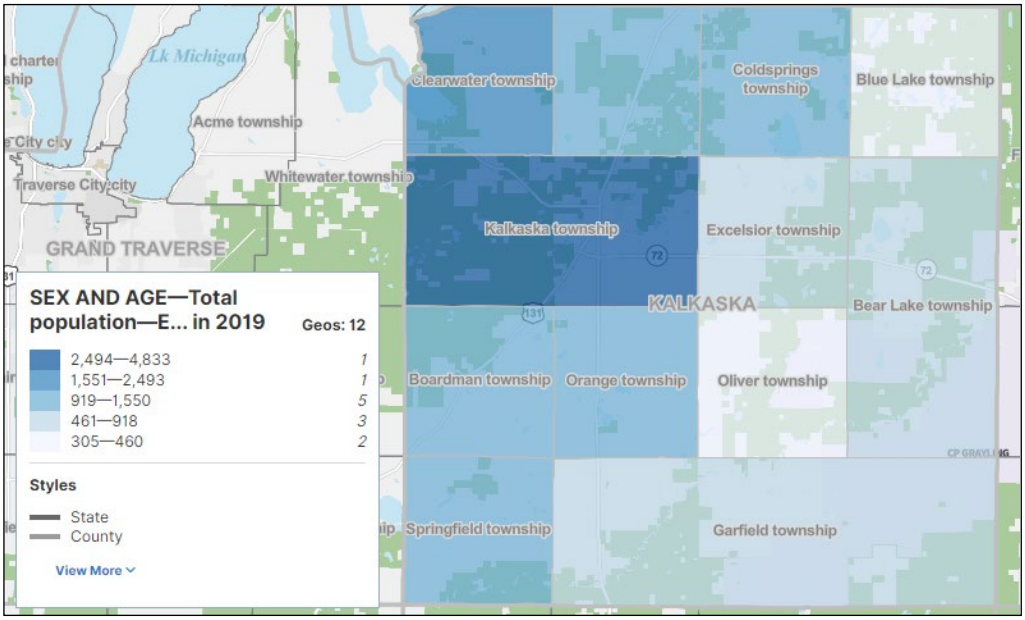
Source: Networks Northwest

Population

Kalkaska County is the 9th most populated county in the ten county region of Northwest Lower Michigan (Table 4) and is the ranked 65 out of 83 counties in the state for population.[3] The 2019 American Community Survey (ACS) estimated the county population to be 17,585 persons. A comparison of the 2010 and 2019 ACS data indicates a 1.1% increase in county population from 2010, when the population was an estimated 17,400 persons (Table 5). The estimated 2019 population per square mile (out of a total 570.3 square miles) is approximately 30.8 persons.

Kalkaska County is comprised of twelve townships, and the Village of Kalkaska. Between 2010 and 2019, the county gained an estimated 185 persons, resulting in a 1.1% increase in population. All of the townships (except for Bear Lake, Clearwater and Springfield Townships) saw increases in population (Table 5). Kalkaska Township, located in the central/northwest portion of the county and containing the Village of Kalkaska, is the most populated community with an estimated 4,833 persons representing 27.5% of the county's population. Note that the population estimates for the village are shown separately for informational purposes; however, those population count estimates are incorporated into the totals presented for Kalkaska Township, in which the Village is located. The second most populated community is Boardman Township at an estimated 1,550 persons. The third most populated community is Coldsprings Township, at 1,475 persons. The concentrations of population are illustrated in Figure 5.

Figure 5: Population by Municipality, 2019



Source: US Census, 2019 5-Year ACS Estimates

[2] https://cfpub.epa.gov/roe/definitions.cfm?i=49 Definitions of Land Cover Categories
[3] https://www.michigan-demographics.com/counties_by_population

Table 4: 2019 Estimated Regional Population by County, State

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

Source: US Census, 2019 ACS 5-Year Estimates

Table 5: Population Change by Municipality, 2010 & 2019

Municipality	2010 Estimated Population	2019 Estimated Population	Numeric Change	Percent Change	% of Est. 2019 County Population	Jurisdiction Status*
Village of Kalkaska	2,200	2,076	124	-5.6%	11.8%	P
Blue Lake Township	375	460	85	22.7%	2.6%	P
Orange Township	1,175	1,395	220	18.7%	7.9%	P
Rapid River Township	1,172	1,370	198	16.9%	7.8%	P
Oliver Township	273	305	32	11.7%	1.7%	P
Boardman Township	1,432	1,550	118	8.2%	8.8%	P
Coldsprings Township	1,386	1,475	89	6.4%	8.4%	P
Garfield Township	694	721	27	3.9%	4.1%	P
Excelsior Township	894	918	24	2.7%	5.2%	P
Kalkaska Township	4,830	4,833	3	0.1%	27.5%	P
Bear Lake Township	671	623	-48	-7.2%	3.5%	P
Clearwater Township	2,746	2,493	-253	-9.2%	14.2%	P
Springfield Township	1,752	1,442	-310	-17.7%	8.2%	P
Kalkaska County	**17,400**	**17,585**	**185**	**1.1%**		P
State of Michigan	**9,952,687**	**9,965,265**	**12,578**	**0.13%**		

Source: US Census, 2010 and 2019 5-Year ACS Estimates

* 2023 Hazard Mitigation Plan Participation Status: P. A continuing participant or N. A non-participant

Like many northwest Michigan communities, Kalkaska County experiences an influx of seasonal residents and tourists during the summer months. However, the decennial Census and the American Community Survey only consistently and comprehensively track the permanent population. The 2022 *Seasonal Population Study for Northwest Lower Michigan*, analyzed the 2020 seasonal population for ten counties in northwest Michigan. The study collected data for permanent and part-time residents and overnight visitors in accommodations and short-term rentals by County. Northwest Lower Michigan's permanent base population is 310,802 and expands to its largest seasonal population of 676,052 in July, 118% increase. Kalkaska County increases by as much as 139% in July (17,939 to 42,795) (Table 6). On average, the population grows by 73% or 13,050 people throughout the year. All ten counties in the Networks Northwest service area were included in the study: Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, Manistee, Missaukee, and Wexford.

Table 6: Seasonal Population by Month

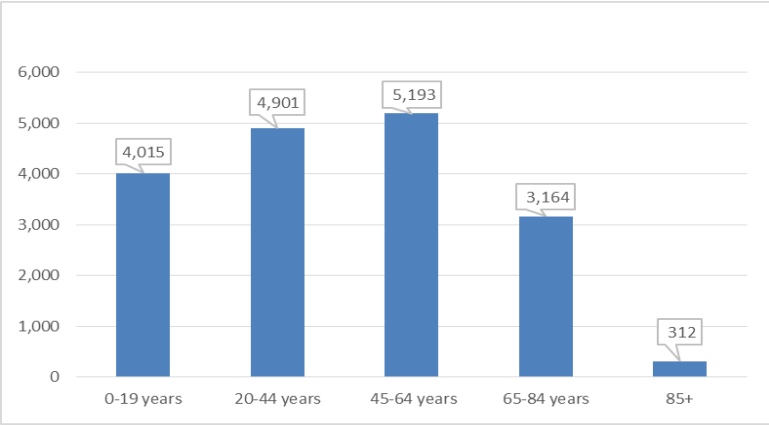
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	County Avg.	Regional Avg.
Permanent Population	17,939	17,939	17,939	17,939	17,939	17,939	17,939	17,939	17,939	17,939	17,939	17,939		310,802
Combined Population	22,183	22,061	22,333	30,614	34,873	40,450	42,795	42,781	36,052	33,179	22,947	21,601	30,989	676,052
Difference	4,244	4,122	4,394	12,675	16,934	22,511	24,856	24,842	18,113	15,240	5,008	3,662	13,050	365,250
Percent Change	**24%**	**23%**	**24%**	**71%**	**94%**	**125%**	**139%**	**138%**	**101%**	**85%**	**28%**	**20%**	**73%**	**118%**

Source: Networks Northwest 2022 *Seasonal Population Study for Northwest Lower Michigan*

Age, Race & Disability

Understanding the age distribution and median age of Kalkaska County can help identify social, economic, and public service needs in the community. The county's total estimated 2019 population is broken into age cohorts (analyzing which proportions of a municipality's population are in which stages of life). This gives a nuanced view of the makeup of a community. Figure 6 indicates the cohort group with the largest population is the 45 to 64 year old group, followed by those in 20-44 year old group and then by the 0-19 year old group. As shown in Figure 7, the median age (the midpoint where half the population is younger and half the population is older) of Kalkaska County is older (44.4 years) than the State (39.7 years). The county, like the State, is aging, but at a faster rate. The youngest community in the county is Orange Township with a median age of 34 years, followed closely by Excelsior Twp. at 35.3 years. The oldest community in the county is Blue Lake Township with a median age of 63.8 years (Figure 8).

Figure 6: Population by Age Cohort, 2019



Source: US Census, 2019 5-Year ACS Estimates

Figure 7: Median Age Trends - 2000, 2010, and 2019

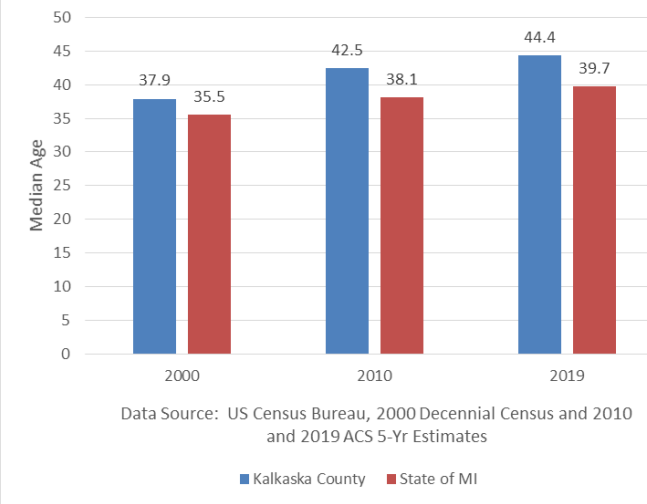
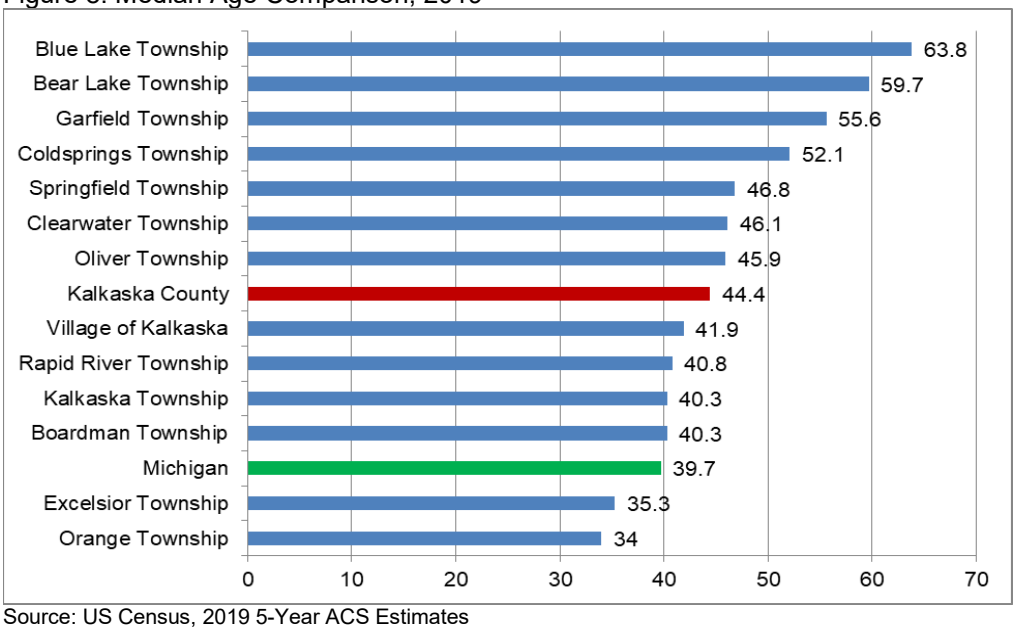


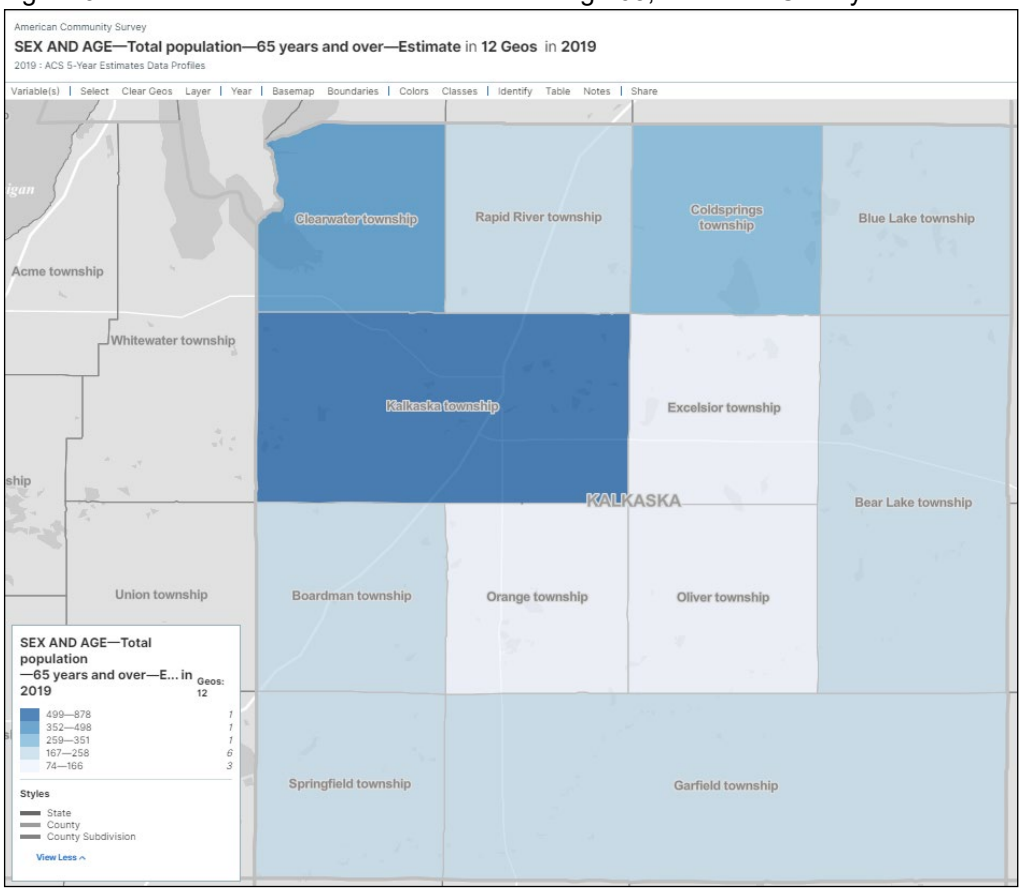
Figure 8: Median Age Comparison, 2019



Source: US Census, 2019 5-Year ACS Estimates

Persons over the age of 65 are considered a socially vulnerable population group. An estimated 35.2% of persons aged 65 years or older in Kalkaska County has one or more type of disability (Table 9). Figure 9 indicates that the greatest concentrations of this cohort are located in Kalkaska Township/Village of Kalkaska, Clearwater Township and Coldsprings Township. These communities represent areas where a greater focus on services may be needed for senior citizens pertaining to enduring natural hazard events such as extreme temperatures, severe winter weather, high winds, and resulting power outages from these events. Table 7 provides the community estimates of persons over age 65, in order from most to least number of persons.

Figure 9. Estimated Number of Residents over Age 65, Kalkaska County



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

Table 7. Estimated Population over Age 65 by Jurisdiction

Kalkaska County Jurisdiction	Est. Population Age 65+
Kalkaska Township	878
Clearwater Township	498
Coldsprings Township	351
Boardman Township	258
Springfield Township	248
Rapid River Township	224
Blue Lake Township	217
Bear Lake Township	216
Garfield Township	211
Orange Township	166
Excelsior Township	135
Oliver Township	74

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

The racial makeup of Kalkaska County is predominantly white (94.1%) (Table 8). 2.0% of the population identifies as Hispanic or Latino. 1.6% of the population identifies as being of two or more races. 0.9% identifies as American Indian or Alaskan Native alone; 0.8% of the population as Black alone; 0.5% as Asian alone. There are no population estimates for the County representing those of "Native Hawaiian or Other Pacific Islander Alone" or "Some Other Race Alone".

The racial composition estimates of each jurisdiction in the County are also shown in Table 8, and are listed in order of percentage of the population from least to most according to those identifying as "White alone". Kalkaska Township (which contains the Village of Kalkaska) has the greatest estimated percentage of minority populations (an estimated 10.4%) in comparison to the other communities. Also of note is Boardman Township having an estimated 3.7% of its population identifying as Black or African American alone, and Springfield Township as having 2.7% identifying as American Indian and Alaska Native alone. There are varying percentages of those identifying as Hispanic or Latino (of any race) in each community; an estimated 4.7% of the population in Kalkaska Township identifies as this ethnicity, followed by 2.8% in Rapid River Township.

These communities represent areas that contain small concentrations of minority populations, which are also considered socially vulnerable populations in a natural hazard event scenario. There may be an increased need for public assistance in these communities as these population groups may have limited social and financial resources to withstand or recover from a hazard event.

Table 8: Racial and Ethnic Composition in the State of MI, Kalkaska County, and Jurisdictions

	Total Est. Population	White alone	Black or African American alone	American Indian and Alaska Native alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Some other race alone	Two or more races	Hispanic or Latino (of any race)
State of Michigan	9,965,265	78.4%	13.8%	0.5%	3.1%	0.0%	1.2%	2.9%	5.1%
Kalkaska County	17,585	94.1%	0.8%	0.9%	0.5%	0.0%	0.0%	1.6%	2.0%
Kalkaska Township	4,833	89.6%	0.5%	1.1%	1.2%	0.0%	0.0%	2.9%	4.7%
Boardman Township	1,550	92.4%	3.7%	1.2%	0.3%	0.0%	0.0%	2.2%	0.2%
Kalkaska Village*	2,076	93.2%	0.8%	0.8%	0.6%	0.0%	0.0%	3.4%	1.2%
Clearwater Township	2,493	94.1%	1.9%	1.0%	0.2%	0.0%	0.0%	1.4%	1.4%
Rapid River Township	1,370	94.4%	0.0%	0.0%	1.4%	0.0%	0.0%	1.4%	2.8%
Springfield Township	1,442	96.1%	0.3%	2.7%	0.3%	0.0%	0.0%	0.3%	0.3%
Coldsprings Township	1,475	97.0%	0.7%	0.6%	0.0%	0.0%	0.0%	0.9%	0.7%
Orange Township	1,395	97.6%	0.2%	0.4%	0.0%	0.0%	0.0%	0.9%	0.9%
Bear Lake Township	623	97.6%	0.0%	0.6%	0.0%	0.0%	0.0%	1.3%	0.5%
Blue Lake Township	460	98.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%
Garfield Township	721	98.3%	0.0%	0.0%	0.4%	0.0%	0.0%	0.3%	1.0%
Excelsior Township	918	98.5%	0.0%	0.3%	0.0%	0.0%	0.0%	1.2%	0.0%
Oliver Township	305	99.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.7%	0.0%

Source: US Census, 2019 5-Year ACS Estimates *Estimates for the Village of Kalkaska are incorporated into those for Kalkaska Township.

Table 9 represents the number of persons with one or more disability and also those with a disability by age group. The count includes the civilian population excluding persons residing in institutions which consist primarily of nursing homes, prisons, jails, mental hospitals, and juvenile correctional facilities. According to Census.gov, "In an attempt to capture a variety of characteristics that encompass the definition of disability, the ACS identifies serious difficulty with four basic areas of functioning – hearing, vision, cognition, and ambulation. These functional limitations are supplemented by questions about difficulties with selected activities from the Katz Activities of Daily Living (ADL) and Lawton Instrumental Activities of Daily Living (IADL) scales, namely difficulty bathing and dressing, and difficulty performing errands such as shopping. Overall, the ACS attempts to capture six aspects of disability: (hearing, vision, cognitive, ambulatory, self-care, and independent living); which can be used together to create an overall disability measure, or independently to identify populations with specific disability types.[4]"

An estimated 3,200 (18.3%) of Kalkaska County residents have one or more type of disability. An estimated 35.2% of persons aged 65 years or older has with one or more type of disability.

[4] U.S. Census Bureau. *Disability Status*. Retrieved April 11, 2023, from Quick Facts: https://www.census.gov/quickfacts/fact/note/US/DIS010221

Table 9: Persons with a Disability in Kalkaska County, 2019

Total Civilian Noninstitutionalized Population	17,528 persons
With one or more disability	3,200 (18.3%)
Age 0-17 with a disability	217 (7.8% of that age group)
18 to 64 years with a disability	1,758 (16.7% of that age group)
65 years and over with a disability	1,225 (35.2% of that age group)

Source: US Census, 2019 ACS 5-yr Estimates

Housing Characteristics and Development Trends

The average household size for Kalkaska County residents is 2.44 persons, which is slightly lower than the State's average of 2.46. Kalkaska County has an estimated 7,145 total households and 12,370 housing units (Table 10). The Census defines a household as all the people who occupy a single housing unit, regardless of their relationship to one another. Kalkaska Township has the largest percentage of housing units of all municipalities in the county (20.3%), followed by Coldsprings Township (11.9%) and Clearwater Township (11.8%).

Table 10: Housing Unit Estimates by Municipality, 2016 and 2019

Municipality	2016 Housing Units	2019 Housing Units	2019 % of Total	2016 to 2019 Unit Change
Bear Lake Township	1,089	1,116	9.00%	27
Blue Lake Township	797	775	6.30%	-22
Boardman Township	721	797	6.40%	76
Clearwater Township	1,508	1,464	11.80%	-44
Coldsprings Township	1,441	1,471	11.90%	30
Excelsior Township	661	639	5.20%	-22
Garfield Township	849	928	7.50%	79
Kalkaska Township	2,468	2,514	20.30%	46
Oliver Township	294	295	2.40%	1
Orange Township	750	687	5.60%	-63
Rapid River Township	665	759	6.10%	94
Springfield Township	882	925	7.50%	43
Village of Kalkaska*	1,075	1,093	8.80%	18
Kalkaska County	**12,125**	**12,370**		**245**

Source: US Census, 2016 & 2019 ACS 5-Yr Estimates

* The number of housing units for the village is incorporated into the totals for the respective township in which it is located.

Since the completion of the 2016 Kalkaska County Natural Hazard Mitigation Plan, there has been a small amount of housing unit growth (an estimated 245 units, or a 2% increase) overall in the county. Rapid River Township, Garfield Township and Boardman Township added the most units. Data on specific locations associated with building permits issued is not available. Residential development is scattered throughout much of the county and homes are typically sited on large acre lots along county roads, within areas of suitable soils and slopes. Therefore, there does not appear to be a significant amount of new developed areas that are located within a specific hazard area (refer to hazard maps in Appendix A).

About 52.2% of residential units in the county are estimated to be built before 1980 (Table 11). Unless recently renovated, these homes likely do not meet modern building code requirements that ensure the structure is properly constructed to withstand impacts from natural hazard events, such as heavy snow, ice, riverine flooding, and high winds. The 2019 ACS also estimates that over 78% of the county's household units are 1-unit, detached structures (commonly referred to as single-family homes), and 17.2% are mobile homes. Mobile homes are considered to be vulnerable to impacts from high winds, tornadoes, hail, heavy snow and flooding due to their light construction frame and lack of a traditional foundation to anchor the structure to the ground. Areas of mobile homes are located within the townships of Clearwater, Coldsprings, Kalkaska, and Boardman, as well as within the Village of Kalkaska. These locations are shown on the Hazard Areas and Vulnerable Populations map provided in Appendix A.

Table 11: Year Structure Built, 2019

Housing Units	Number	% of Total
Built 2010 or later	354	2.86%
Built 2000-2009	1,551	12.54%
Built 1980-1999	4,012	32.43%
Built 1960-1979	4,073	32.93%
Built 1940-1959	1,389	11.23%
Built 1939 or earlier	991	8.01%
Total Housing Units	**12,370**	**100%**

Source: US Census, 2019 ACS 5-Year Estimates

Housing Tenure, Table 12, summarizes the status of housing units, whether occupied or vacant, as well as the median housing value of owner-occupied units ($115,900) and the median gross rent ($702). Of the 12,370 total housing units, (57.8%) are occupied (indicating physically occupied, principal residence housing units).

Table 12: Housing Tenure, 2019

Total housing units	12,370	%
Occupied housing units	7,150	57.8%
Owner-occupied	5,096	82.6%
Median Value of owner-occ. units	$115,900	
Renter-occupied	1,244	17.4%
Median Gross Monthly Rent	$702	
Vacant housing units	5,220	42.2%

Source: US Census, 2019 ACS 5-year Estimates

Economic Profile

The *2021 Comprehensive Economic Development Strategy (CEDS)* prepared by Networks Northwest is the product of a locally-based, regionally-driven economic development planning process to identify strategies for economic prosperity. The plan was prepared for the ten county region of northwest Lower Michigan. Table 13 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 at $50,971, followed by Grand Traverse County at $44,562. As their southern neighbor, it is not unexpected to have residents of Antrim County travel to Kalkaska County for work.

Table 13: Average Annual Wage by County, 2018

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

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

The Economic Profile of Kalkaska County is further described in Table 14. 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 "Other (Includes private, utilities, management of business, and unallocated)" at 29.8%, followed by "Administrative, Waste Services" at 11.5% of jobs, and then followed by and "Construction" at 10.5%. The known annual average wages in these categories are $52,014 and $81,432, respectively.

The industries with the highest annual average wages are "Mining" at $100,370, followed by "Construction" at $81,432 and "Information" at $80,476. 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.

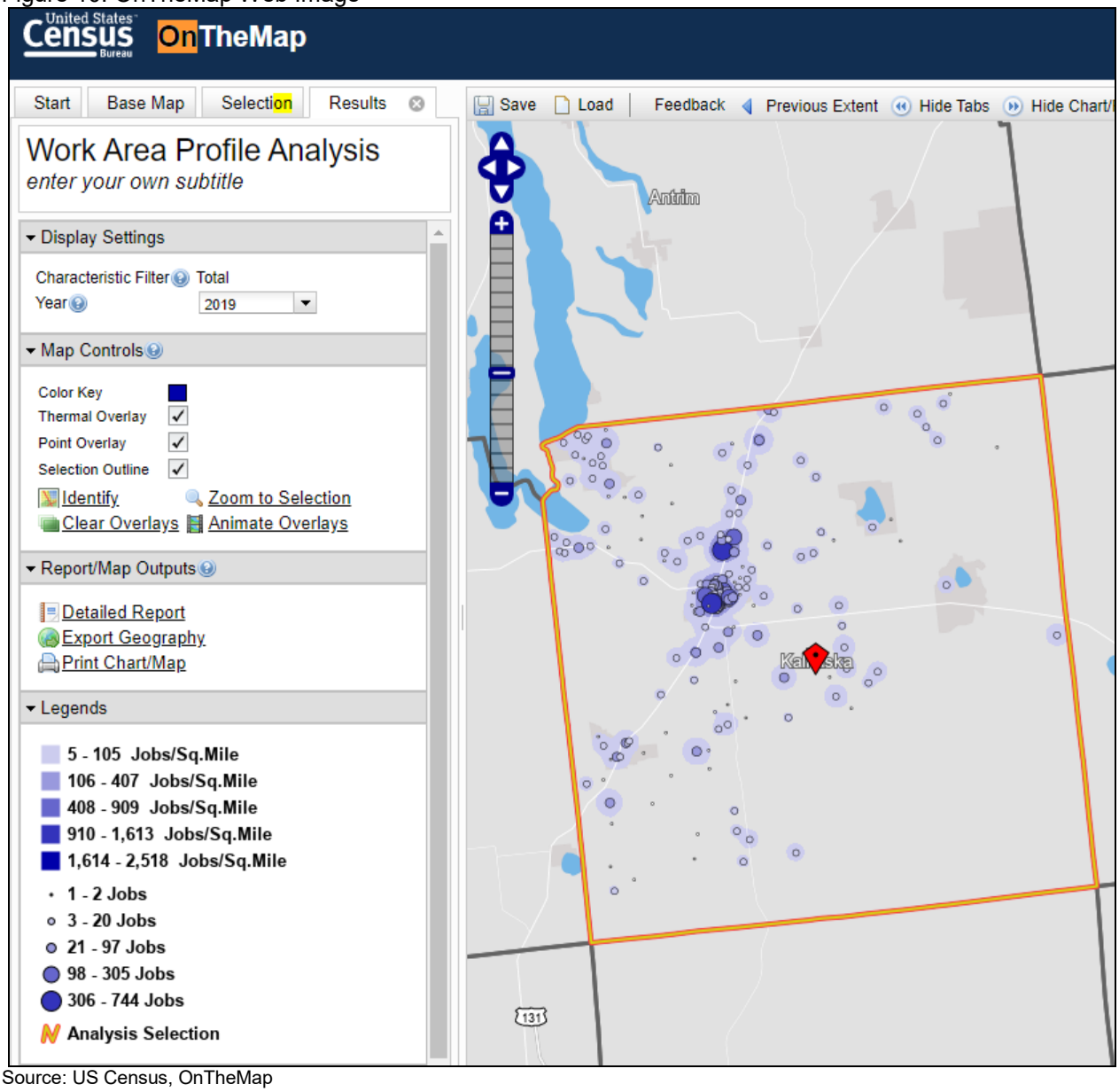
Table 14: Economic Distribution by Industry, 2018

Industry	Establishments	Jobs	% Distribution of Jobs	Annual Average Wage
Total Covered Employment	313	4,181	100%	$50,971
Agri., forestry, hunting	6	65	1.6%	$24,798
Mining	22	373	8.9%	$100,370
Construction	42	440	10.5%	$81,432
Manufacturing	12	357	8.5%	$43,242
Wholesale trade	12	140	3.3%	$79,224
Retail trade	46	419	10.0%	$28,539
Transportation, warehousing	12	24	0.6%	$49,326
Utilities	3	D	D	D
Information	6	21	0.5%	$80,476
Finance and Insurance	6	37	0.9%	$48,106
Real Estate, rental, leasing	7	80	1.9%	$57,781
Professional, technical services	21	54	1.3%	$43,363
Administrative, waste services	16	482	11.5%	$52,014
Educational services	2	D	D	D
Health care, social assistance	22	114	2.7%	$39,414
Arts, entertainment, recreation	3	D	D	D
Accommodation and food services	21	D	D	D
Other services (except for Public admin.)	36	135	3.2%	$28,349
Public administration	15	201	4.8%	$26,419
Other Includes (private, utilities, management of business, and unallocated)	3	1,239	29.8%	N/A

Source: 2021 Comprehensive Economic Development Strategy, Networks Northwest
**D means limited industries of a sector that would disclose confidential information*

Additionally, OnTheMap, an online interactive tool available from the US Census Bureau, allows for viewing of estimated job density within the county. This website is useful for emergency preparedness planning as related to response and potential impact to local economic activity areas. It appears the greatest density of jobs are located within the Village of Kalkaska and Kalkaska Township (Figure 10). Below are screenshots of the interactive map when completing an area profile analysis for all workers in all jobs in the county in 2019.

Figure 10: OnTheMap Web Image

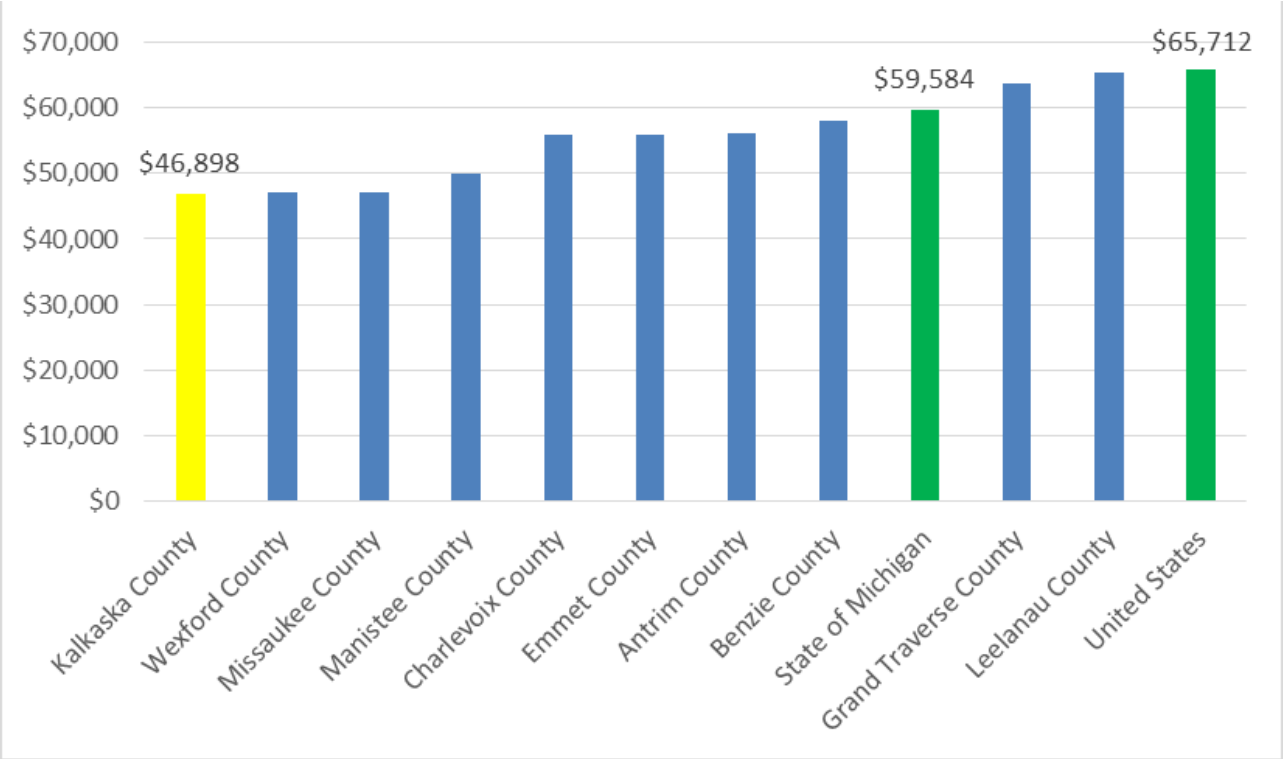


Source: US Census, OnTheMap

Figures 11 and 12 present a comparison of the median household income (MHI) across the ten county region, the State of Michigan, and local jurisdictions. Kalkaska County has a median household income of $46,898, the lowest in the region. Of Kalkaska County jurisdictions, Excelsior Township has the highest median household income at $54,167 (Figure 10). Garfield Township has the lowest Median Household Income at $39,250. The county's economic profile can be further described by considering the cost of housing, transportation, and other goods and services. The budgeting rule of thumb has been that a household should spend no more than 30 percent of its income on housing costs. Considering the MHI of Kalkaska County over twelve months, a household is earning $3,908 per month. The US Census 2019 5-year ACS estimates that the median gross monthly rent is $702 in Kalkaska County, which equates to about 18% of the median household income.

However, according to the 2019 Northwest Michigan Target Market Analysis[5] (conducted by LandUseUSA on behalf of Housing North and Networks Northwest), rents are far higher in Kalkaska County than what many renters can afford. While the affordable rent for a renter earning the mean wage in the county is $725, the affordable rent for a full-time minimum wage worker earning $9.45 an hour is $491. And anecdotally, the demand for housing 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.

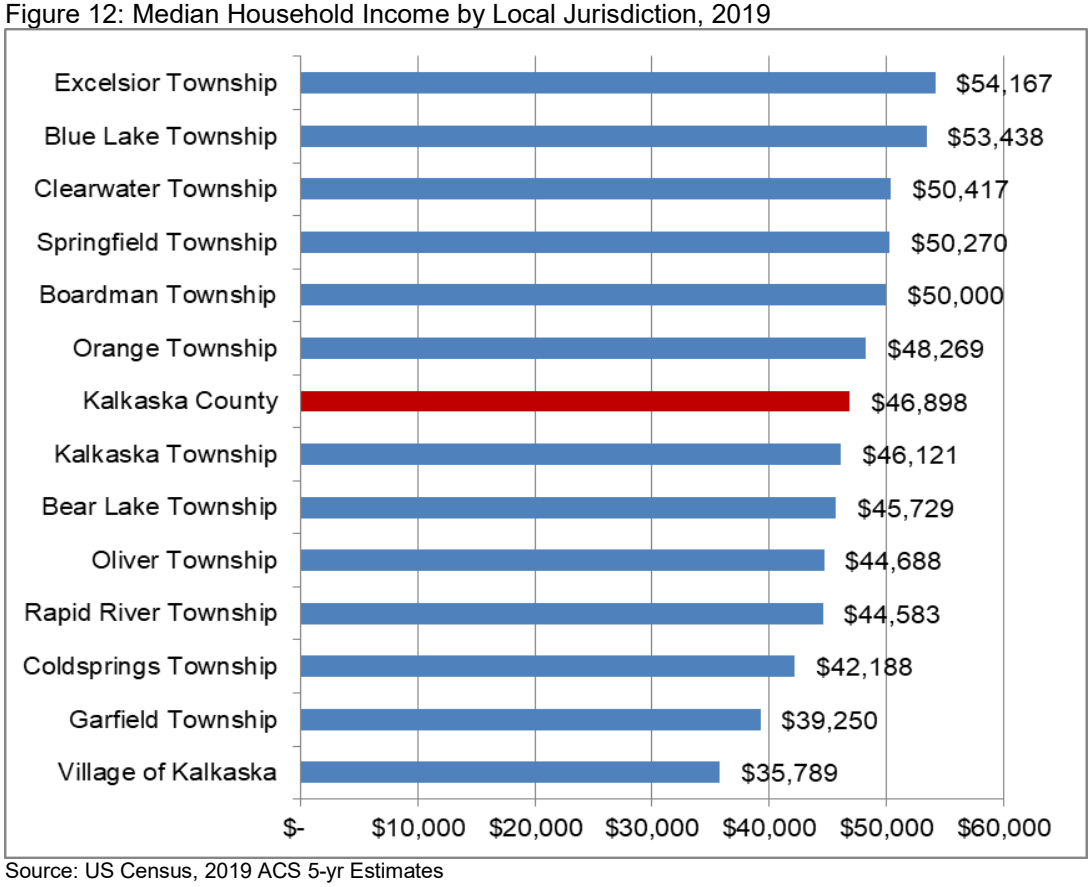
Figure 11: NW Michigan Median Household Income by County, 2019



Source: US Census, 2019 ACS 5-yr Estimate

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

Figure 12: Median Household Income by Local Jurisdiction, 2019



Source: US Census, 2019 ACS 5-yr Estimates

The following tables describe the population with the lowest incomes. It is estimated, in 2019, that 12.5% of all people in the county lived at or below the poverty level (Table 16). The Census describes poverty thresholds differently based on the size of the family and the number of related children living together, as illustrated in Table 15 below.

Table 15: 2019 Federal Poverty Level Guidelines

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

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

Table 16: Poverty Estimates, 2019

Poverty	Statistics
All families living below the poverty level	605 (12.5%)
Families with related children under age 18, in poverty	335 (17.5%)
All persons living below the poverty level	2,905 (16.7%)

Source: US Census, 2019 ACS Estimates

MI School Data, Michigan's official education data source, provides a count of economically disadvantaged students for each school year. During the 2021-2022 school year, there were 1,361 counted students in Kalkaska Public Schools. 848 or 62.31% were considered economically disadvantaged. During the 2011-2012 school year, a decade earlier, there were 1,648 students and 1,068 students or 64.81% were economically disadvantaged. Economically disadvantaged students include those who have been determined to be eligible for free or reduced-price meals via locally gathered and approved family applications under the National School Lunch program, are in households receiving food (Supplemental Nutrition Assistance Program) or cash (Temporary Assistance to Needy Families) assistance, are homeless, are migrant, are in foster care, or, beginning in 2017-18, certain Medicaid eligible children. When any of these conditions are present, a student is considered economically disadvantaged.

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

Table 17: United Ways of Michigan ALICE Report Findings, 2019[6]

Jurisdiction	Total Households	% of all HH that are in Poverty and ALICE
Oliver Township	127	39.4%
Blue Lake Township	226	32.7%
Bear Lake Township	303	44.6%
Excelsior Township	344	39.2%
Boardman Township	556	30.4%
Garfield Township	345	50.4%
Orange Township	482	41.9%
Springfield Township	584	37.2%
Rapid River Township	558	47.7%
Coldsprings Township	639	42.9%
Clearwater Township	985	39.8%
Kalkaska Township	1,996	45.6%
KALKASKA COUNTY	**7,145**	**41% (State Avg. is 25%)**

[6] Michigan Association of United Ways. *ALICE in Michigan: A Financial Hardship Study*. 2021. https://www.unitedforalice.org/county-profiles/michigan

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 may include the economically disadvantaged, elderly, homeless, and persons with a disability. Those that live unsheltered or in homeless encampments, older mobile home parks, and visitors to campgrounds are more susceptible to hazardous events. Kalkaska County does not have a designated homeless shelter and much of the homeless population lives in outdoor encampments. Additionally, the county has an influx of seasonal visitors that often frequent campgrounds throughout the county. Vulnerable populations are represented on the *Vulnerable Populations and Hazard Areas Map* in Appendix A. Those locations included on the map were specifically discussed during public input sessions. There may be additional locations of vulnerable populations that are not listed.

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. Kalkaska County is home to abundant forest lands, inland lakes and streams, and all of the wildlife within that are integral to the identity of the community. While natural resources are abundant they are vulnerable to all types of hazards. Northwest Lower Michigan is also home to many sensitive wildlife populations that require specific climates and habitats to survive. Damaged, destroyed, or changing natural environments may decrease the chances for certain species' survival.

Additionally, countywide critical infrastructure is represented on the *Critical Infrastructure* Map, shown in Appendix A. The Emergency Manager and Task Force members identified the critical facilities and infrastructure on the base map and provided updated GIS shapefiles for mapping purposes. Table 18 is a summary of critical infrastructure points in Kalkaska County.

Table 18: Critical Facilities and Infrastructure

Total # of Facilities	Facility Type
13	**Commercial** • Banking • Campgrounds • Hotels/motels/resort • Food Retail – 2 supermarkets
12	**Communications** • Communications towers • Wireless infrastructure
14	**Emergency Services** • Emergency Management • Emergency Medical Services (EMS) • Fire and Emergency Services • Law Enforcement
14	**Energy** • Natural gas provider pumping, distribution and storage • Power supply lines and substations
25	**Government Facilities** • Flood Damage Reduction System – Rugg Pond Dam • Government Facilities – DPW, Road Commission, MDOT, Kaliseum Rec Complex • Personnel-Oriented Government Facilities • Service-Oriented Government Facilities – USPS Service Center, Village and Township Halls, County Administration/Courthouse • Treated Water and Wastewater Facilities
6	**Healthcare** • Kalkaska Memorial Assisted Living • Healthcare and Public Health Facilities • Munson Kalkaska Memorial Hospital
8	**Industry** • Chemical storage
7	**School** • K-12 School Facilities
16	**Transportation** • Aviation (3 airports/landing strips) • Bridges • Railroad • Major roads and highways

Source: Kalkaska County Emergency Services

Historical Analysis

The Historical Analysis of Kalkaska 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. Additionally, there have been five (5) federal-or state-declared disaster incidents that have involved Kalkaska County (Table 19). These are included in the hazard analysis for individual event types.

Table 19: Presidential and Governor Declared Disasters/Emergencies for Kalkaska County

Date of Declaration	Type of Incident	Affected Area	Type of Declaration/ Fed ID#
March 2020	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
9/4/2005 and 9/7/2005	Hurricane (Katrina) Evacuation	Statewide (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.)	Governor Declared Disaster and Presidential Declared Emergency (3225)
1/26-27/1978	Blizzard, Snowstorm	Statewide	Presidential Declared Emergency (3057); Governor Declared Disaster
3/2/1977	Drought	Kalkaska and 43 other counties	Presidential Declared Emergency (3035)

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

Hazard Descriptions

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

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

Data for natural hazard events in Kalkaska 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:

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

- NOAA Storm Events Database https://www.ncdc.noaa.gov/stormevents/ - Data available to search beginning in 1950 to within approximately 3 months prior to present day; however, information on record for various types of events is limited and non-contiguous. The database provides local storm reports, damage reports, and recorded event descriptions. The event types[7] researched for Kalkaska County include: Drought (Drought); Flooding (Flash Flood, 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); and Wildfire (Wildfire).

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

The 2019 *Michigan Hazard Analysis* report by the Michigan Department of State Police was referenced to obtain data on wildfires that occurred on State of Michigan owned land between 1981 and 2018.

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

MI-EGLE's online Environmental Mapper was utilized to obtain information about a Part 201 Site of Environmental Contamination (a hazardous material fixed site incident).

[7] Names of events as presented in the Storm Event Database are shown in parentheses.

The NOAA NCEI Storm Events Database is updated on a rolling basis, and thus the database is always being added to. The most up to date information was added to Table 20, but as events occur the database will change. Thus, additional events will be added in subsequent years. The database was searched for any events in Kalkaska County between 01/01/1950 and 7/31/2022 (26,510 days), which returned the following results: 221 reported events; 202 days with an event; 1 day with event and death; 3 days with an event and death and injury; 34 days with event and property damage; and 0 days with event and crop damage. It is important to note when viewing the data that most of the events were recorded after the mid-1990's, even though the search range went back to 1950.

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 20: Number of Events by Type, Location

Type of Event	# of Events	Event Location	Years Event Recorded
Extreme Winter Weather	137	Statewide; Region	1978*, 1997-2013, 2015, 2016, 2018-2022
Thunderstorms and High Winds	50	County and Region	1981, 1985, 1995, 1998, 1999, 2001-2003, 2005-2008, 2010, 2012, 2014, 2015, 2018 -2021
Hail	16	Countywide	1963, 1981, 1989, 1996, 2000, 2001, 2004, 2006, 2008, 2013, 2015, 2016
Tornadoes	8	Countywide	1974, 1976, 1976, 1994, 1998, 1998, 2007, 2014
Extreme Temperatures (Heat Cold)	2 / 4	Region; Statewide	2001, 2007, 2014, 2015, 2018, 2019*
Drought	2	Countywide and Region	1977*, 2001
Flash Flood	2	Countywide and Region	2001, 2006
Lightning	2	County/Region	2000, 2005
Wildfire	1	Bear Lake Township	2010
Wildfire (Public Lands)	627	MDNR Lands	1981-2018
Invasive Species	-	County/Region	Ongoing
Space Weather	-	County/Region	Ongoing
Public Health Emergency (COVID-19 Pandemic)	1	Statewide/National	2020*
Hazardous Materials: Fixed Site Incidents	1	Garfield Township	1973
Hazardous Materials: Transportation Incidents	-	Active rail line though Boardman, Kalkaska and Rapid River Townships, and the Village of Kalkaska	Ongoing potential

Sources: NOAA National Centers for Environmental Information Storm Events Database; Michigan State Police-Dept. of Homeland Security 2020 MI Hazard Analysis; FEMA Disaster Declarations for States and Counties; EGLE Environmental Mapper
Note: * indicates a state or federal event designation

Economic Impact Analysis

The estimated economic impact of the previously described Kalkaska County natural hazard events that were *reported* to NOAA is $2,502,500 in property damages and $0 in crop damages (Table 21). It should be noted that many events likely cause numerous small amounts in property damage, such as hailstorms, but this often goes unreported. The total reported Damaging Events' Costs recorded with NOAA for Kalkaska County are as follows:

Table 21: Damage Estimates by Event Type

Event	Property Damage Estimate	Directly Related Death	Directly Related Injury/Illness
Winter Weather	$290,000	-	-
T-Storm with Wind	$755,000	-	-
Hail	$0	-	-
Tornado	$1,312,500	1	6
Extreme Temperatures	$0	-	-
Drought	$0	-	-
Flood/Flash Flood	$20,000	-	-
Lightning	$0	-	1
Wildfire	$125,000	-	-
Space Weather	N/A	0	0
Public Health Emergency (COVID-19)	N/A	68*	4,353*
Invasive Species	N/A	0	0
Hazardous Materials: Fixed Site or Transportation Incidents	N/A	0	0
TOTAL	**$2,502,500**	**1**	**7**

Source: NOAA's National Centers for Environmental Information; *State of Michigan, results as of November 29, 2022.

Table 22 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). The SEV is equal to half of the True Value of the property. Population data is collected from the US Census, 2019 ACS data. According to the 2022 *Seasonal Population Study for Northwest Lower Michigan*, apply a 139% increase to account for the highest estimated annual seasonal population within the county (which occurs in July).

Table 22: Geographic Economic Impact by Event

Potential Hazard Event	Geography	Population Estimates	State Equalized Value
Extreme Winter Weather, Thunderstorm, Wind, Hail, Lightning, Tornado, Extreme Temperatures, Drought, Public Health Emergency	Kalkaska County	17,585	$1,083,252,100.00
Flooding	Kalkaska County	17,585	$121,022,431.40
Wildfire	Pine Forest Areas (White, Red, and Jack Pine): Countywide	17,585	$214,405,758.80
Wildfire	Historic Fire Prone Areas: Bear Lake Township	623	$2,814,633.79

Sources: 2019 ACS Estimates from the U.S. Census Bureau; Kalkaska County Equalization

Extreme Winter Weather

National Weather Service defines extreme winter weather 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, the 29 counties of the Northern Lower Peninsula of Michigan have an annual average of 79 snowstorm events, with 0 average annual deaths or injuries, $6.53 million in average annual property damage and $20 million in crop damage. Michigan experiences large differences in snowfall over short distances due to the Great Lakes. The average annual snowfall accumulation ranges from 30 to 200 inches with the highest accumulations in the northern and western parts of the Upper Peninsula. In Lower Michigan, the highest snowfall accumulations occur near Lake Michigan and in the higher elevations of northern Lower Michigan. For example, the average snowfall ranges from 141 inches in the Gaylord area to 101 inches in Traverse City.

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

According to the 2019 Michigan Hazard Analysis, the 29 counties of the Northern Lower Peninsula of Michigan have an annual average of 3 ice and sleet storm events with 0 average annual deaths or injuries, $1.765 million in average annual property damage and $10,000 in average annual 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 Kalkaska 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.

Extent
Snowstorms can be measured based on snowfall accumulations or damages. January is the snowiest month with a normal total of 38.3 inches of snow. Annually, Kalkaska receives 132.1 inches of snow. Extreme winter weather events in Kalkaska County caused $290,000 in property damages between 1996 and 2022 (Table 23). Heavy snow is the most costly type of event with $250,000 in property damages.

Previous Occurrences
Since 1996, there have been 136 extreme winter weather events in addition to the Presidential Emergency Declaration in 1978 for a blizzard snowstorm. The category extreme winter weather includes heavy snowstorms, ice storms, frost/freeze, blizzards, winter weather, and winter storms reported in Kalkaska County. Winter storm events with moderate snowfall of 5-10 inches are the most common event type in Kalkaska County. Heavy snow and blizzards have been less common, and there were no frost freeze events. Heavy snow is the most costly extreme winter weather event.

The March 2, 2012 event narrative is as follows:
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. This event accounted for $250,000 in property damages.

Table 23: Kalkaska County Historic Extreme Winter Weather Events

Event Type	Total Events	Property Damage	Crop Damage	Event Years
Winter Storm	51	$40,000	-	1997-2001, 2003-2013, 2015-2016, 2018-2022
Heavy Snow	55	$250,000	-	1996-2018
Ice Storm	4	-	-	2001, 2002, 2005, 2008
Lake-Effect Snow	20	-	-	2006-2013, 2016, 2019
Blizzard	6	-	-	1978*, 1997, 1998, 1999, 2002, 2019
Winter Weather	1	-		2006
TOTAL	**137**	**$290,000**	**$0**	**-**

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment

Since 1996, Kalkaska County has had 136 extreme winter weather events. This averages to about to about 5 events every year. The probability of an extreme winter weather 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. Northwest Michigan was hit by a killing freeze in April 2012. While this event did not occur in Kalkaska County, an event of this type could in the future. Areas where this did occur reported millions of dollars in crop damages. If this event occurred in Kalkaska County, the agriculture economy would be devastated.

During the winter months, the population is largely made up of the base permanent residents. However, there is increasing demand from seasonal residents to purchase property and retire or work remotely in northern Michigan. New residents, especially those locating in remote areas, increase the chance of risk to life and property during severe weather events. All people rely on their network of family, friends, and neighbors to lend a hand when it's needed. Residents who rely on assistance are more vulnerable.

Winter-related events cause difficult driving conditions and in the event of an emergency, can make travel increasingly difficult for emergency personnel who may be more frequently dispatched to rural areas. The Kalkaska County population, like much of northern Michigan, is spread throughout remote, rural areas. Townships located in northern and eastern portions of the county are sparsely populated, but older and also remote from major services in the western portion of the county. Blue Lake Township, Bear Lake Township, and Garfield Township are also, respectively, the oldest (Blue Lake Township is the oldest) communities in Kalkaska County. Elderly residents are the most likely persons to have a disability, and therefore, are the most vulnerable to extreme winter weather events.

Thunderstorms and Severe Winds

Severe thunderstorms are weather systems accompanied by strong winds (at least 50 knots, or 58 mph), 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 spring and summer months from May through September.

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

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

Extent
Thunderstorms can be measured based on wind speed or damages. The average wind speed for events in Kalkaska is 53 knots. Kalkaska County has had $755,000 in property damage from thunderstorm/wind events since 1981 (Table 24).

Previous Occurrences
Since 1981, there have been a total of 50 thunderstorm/wind and high wind events reported in Kalkaska County. This is the second-most frequently occurring type of severe weather event in the county.

The most significant event occurred on August 2, 2015. The storm measured a magnitude of 60 knots and caused $540,000 in damages. The event was reported in Rapid City. The Kalkaska County Road Commission report of damages from the event identified $12,545.64 in labor costs and $20,163.01 in equipment and materials costs for cleanup and repairs. The event narrative is as follows: *An 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. A swath of widespread wind damage continued across northern Kalkaska County. Hundreds of trees were downed, damaging vehicles and structures as they fell. Between 40 and 50 structures were believed damaged to some extent in Kalkaska County.*

Table 24: Kalkaska County Historic Thunderstorm and Wind Events

Event Type	Number of Events	Property Damage	Crop Damage	Event Year(s)
Thunderstorm Wind	46	$ 735,000	$ -	1981, 1985, 1995, 1998, 1999, 2001-2003, 2005-2008, 2012, 2014, 2015, 2018-2021
High Wind	4	$ 20,000	$ -	1998, 2005, 2010, 2021
TOTAL	**50**	**$755,000**	**$ -**	

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment
Since 1981, Kalkaska County has had 50 thunderstorm/wind and high wind events. This averages to 1.2 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 base population expands by an estimated 139% to include both the seasonal short-term population. Residents and visitors are attracted to both rural areas and the village center. Older mobile home parks, campgrounds, institutions (schools, places of worship, etc.), and other annual events and outdoor recreation areas that draw a large number of visitors 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 Analysis*, the 29 counties of the Northern Lower Peninsula have an annual average of 28 hail storms, an annual average property loss of $37.71 million, an annual average crop loss of $5.23 million, and 1 injury due to hail 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 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.

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

Extent
Hailstorms are categorized using the TORRO Hailstorm Intensity Scale, which ranges from H0 (Hard Hail) to H10 (Super Hailstorms) (Table 25). According to the NOAA National Centers for Environmental Information, the approximate size of hail is described below. If a thunderstorm produces hail that is 1 inch in diameter (quarter size) or larger, it is considered to be a severe thunderstorm.

Table 25: 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 size of hail reported in Kalkaska County has been 1.75 inches. According to the scale, hailstones of this size are slightly larger than a golf ball.

Previous Occurrences
Since 1963, Kalkaska County had 16 hailstorms reported to NOAA (Table 26). Five of the 16 events were reported to have the largest hail size recorded, 1.75 inches. There are no reported property/crop damages, injuries or deaths attributed to hail.

Table 26: Kalkaska County Hail Events

Begin Location	Begin Date	Magnitude
Kalkaska County	10/28/1963	1.75
Kalkaska County	7/17/1981	1
Kalkaska County	10/15/1989	1.5
Boardman Township	7/8/1996	1.75
Boardman Township	6/9/2000	1
Village of Kalkaska	5/15/2001	0.75
Village of Kalkaska	9/11/2004	0.75
Orange Township	6/3/2006	0.88
Garfield Township	6/28/2006	0.88
Oliver Township	6/14/2008	0.75
Boardman/Springfield Townships	6/15/2008	1.75
Kalkaska Township	5/20/2013	1.75
Garfield Township	8/2/2015	1
Clearwater Township	7/8/2016	1
Blue Lake Township	7/8/2016	1.75
Excelsior Township	7/8/2016	1.5

Source: NOAA: National Centers for Environmental Information

The most recent events on July 8, 2016 occurred in several locations including Blue Lake, Clearwater, and Excelsior Townships. This event caused hail from 1 inch to 1.75 inches in size. The event narrative is as follows:

Powerful thunderstorms developed over Lake Michigan late in morning of the 8th, ahead of an incoming cold front. These storms produced very large hail, and some damaging winds, as they swept across northern Michigan. Approximately 60 percent of the cherry crop in northwest lower Michigan was damaged by the severe thunderstorms.

Probability of Future Events and Vulnerability Assessment
With 16 events reported in the past 60 years, Kalkaska County has a 27% chance of experiencing 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. Older manufactured homes and campground populations 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

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

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

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

According to the National Inventory of Dams, there are two dams located in Kalkaska County that are regulated by the Michigan Department of Environment, Great Lakes, and Energy (EGLE): Rugg Pond Dam and Youngs Dam (Table 27). Both dams are utilized for recreation purposes. The Rugg Pond Dam, located in Rapid River Township (Figure 13), is classified with “high” hazard potential rating. This means that if the dam were to fail, loss of human life would be probable, along with economic losses, environmental damages and impacts to lifeline interests. An Emergency Action Plan (EAP) is required for this dam.

The second major dam in Kalkaska County is the Youngs Dam on the Boardman River in Boardman Township (Figure 13). This dam is classified with a “low” hazard potential rating. This means that if the dam were to fail, no loss of human life would be expected, nor would lifeline interests be impacted. Economic losses and environmental damages would be low and generally limited to the dam owner. An EAP is not required for this dam.

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.

Location

Kalkaska County is likely to be impacted by both fluvial and pluvial flooding. Fluvial flooding may be due in part to Lake Skegemog and other smaller lakes, in addition to the Manistee, Boardman, Rapid, and Torch Rivers, and Portage Creek traversing the county. The Manistee River starts in Antrim County to the northwest, travels through Otsego County, Crawford County, Kalkaska County, Missaukee County, Wexford County, and enters Manistee County. The Boardman (Ottaway) River, starts in Kalkaska County and travels west through Grand Traverse County and the City of Traverse City to reach the Grand Traverse Bay. All Kalkaska townships and the Village of Kalkaska are located near a major body of water such as a river or lake and may experience flooding. Riverine flooding has occurred when spring snowmelt coincides with prolonged, intense rains. Nearby property and infrastructure such as roads, bridges, and culverts are often flooded.

Pluvial flooding may occur from excessive rainfall in developed areas in western portions of the county near the Village of Kalkaska, Clearwater Township, and Kalkaska Township. 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.

On August 13, 2019, the EGLE Dam Safety Unit issued a Dam Safety Inspection Report for the Rugg Pond Dam. The dam is located in Rapid River Township and owned/operated by the Kalkaska Conservation District and Kalkaska County. The report states that the dam is in "Fair" condition overall, and there were no apparent structural deficiencies that may lead to the dam's immediate failure. However, several of the identified deficiencies have persisted for the past several rounds of inspections. EGLE provided several recommended actions, in order of priority:

1. Flatten the downstream slope with granular fill to a slope of 2 horizontal to 1 vertical (2H:1V) or flatter. Seed and mulch all exposed bare soil when the fill is complete. This recommendation has been made in previous reports and remains valid. Additionally, as the impoundment continues to fill with sediment, the need for this improvement increases. Flattening the slope would be a beneficial improvement that would increase the overall stability of the dam and improve the ability to perform maintenance and inspections. This activity will require a permit from the EGLE and should be completed as funding allows.

2. Continue to perform excellent maintenance practices by keeping the embankment clear of trees and brush.

3. Repair deteriorated concrete on the inlet box section of the steel pipe spillway as soon as practical. A permit from EGLE will be required for this activity.

4. Repair erosion on downstream slope in the location of the pipe spillway. A permit from EGLE will be required for this activity.

5. The Rugg Pond Dam is a high hazard potential dam, therefore an Emergency Action Plan (EAP) is required under Part 315. There is not a current EAP on file. The EAP should be reviewed and updated at least every three years, and a copy provided to the Dam Safety Program. *(Note: The EAP was updated by the Kalkaska County Emergency Management Coordinator in 2021.)*

As of August 2022, the Kalkaska County Board of Commissioners tasked an engineering firm to evaluate whether it would be more beneficial to remove the dam entirely, or repair and maintain it. There is a very large amount of sediment built up behind the dam, which would be costly to dredge, as well as the costs to address all other structural issues. The MDNR requires that the County know what course of action they want to take (repair or remove the dam) before they can assist with dredging the sediment. Additionally an environmental assessment must be conducted if the dam will be removed. In 2023, the County will review the findings report, evaluate improvement alternatives, and pursue mitigation action and available funding sources.

On January 12, 2022, the EGLE Dam Safety Unit issued a Dam Safety Inspection Report for the Youngs Dam in Boardman Township to evaluate the structural condition and hydraulic capacity of the dam, as required by Part 315 of the NREPA. The report found that the Youngs Dam is in "Poor" condition. This means that there are recognized dam safety deficiencies that requires action to resolve the problem. The embankment is in danger of a piping failure; due to the deterioration of the steel outlet pipe. A "Poor" rating may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency: further investigations and studies are necessary. EGLE provided several recommendations for monitoring and repair of deficiencies that do not currently pose an immediate threat to the safety of the dam, but should be completed within the timeframes indicated in the report.

1. Immediately begin planning and budgeting for replacement or repair of the steel outlet pipe and should be completed within five years. This work will require a permit from this office.

2. Trees and woody vegetation should be removed 10 feet past the toe of the embankment by December 31, 2022. Vegetation within riprap should be removed by trimming or chemical application.

3. Monitor water levels in impoundment for potential overflow at each abutment. These areas should be raised to contain the flood stage during the 100-year event or armored for anticipated overtopping during lesser events. Provide a plan to the Dam Safety Program by December 31, 2022 detailing the anticipated direction to remedy the deficiency.

4. A significant footpath has eroded on the downstream slope in the vicinity of the outlet pipe. The erosion should be repaired by December 31, 2022.

5. Monitor cracking on spillway concrete for further growth.

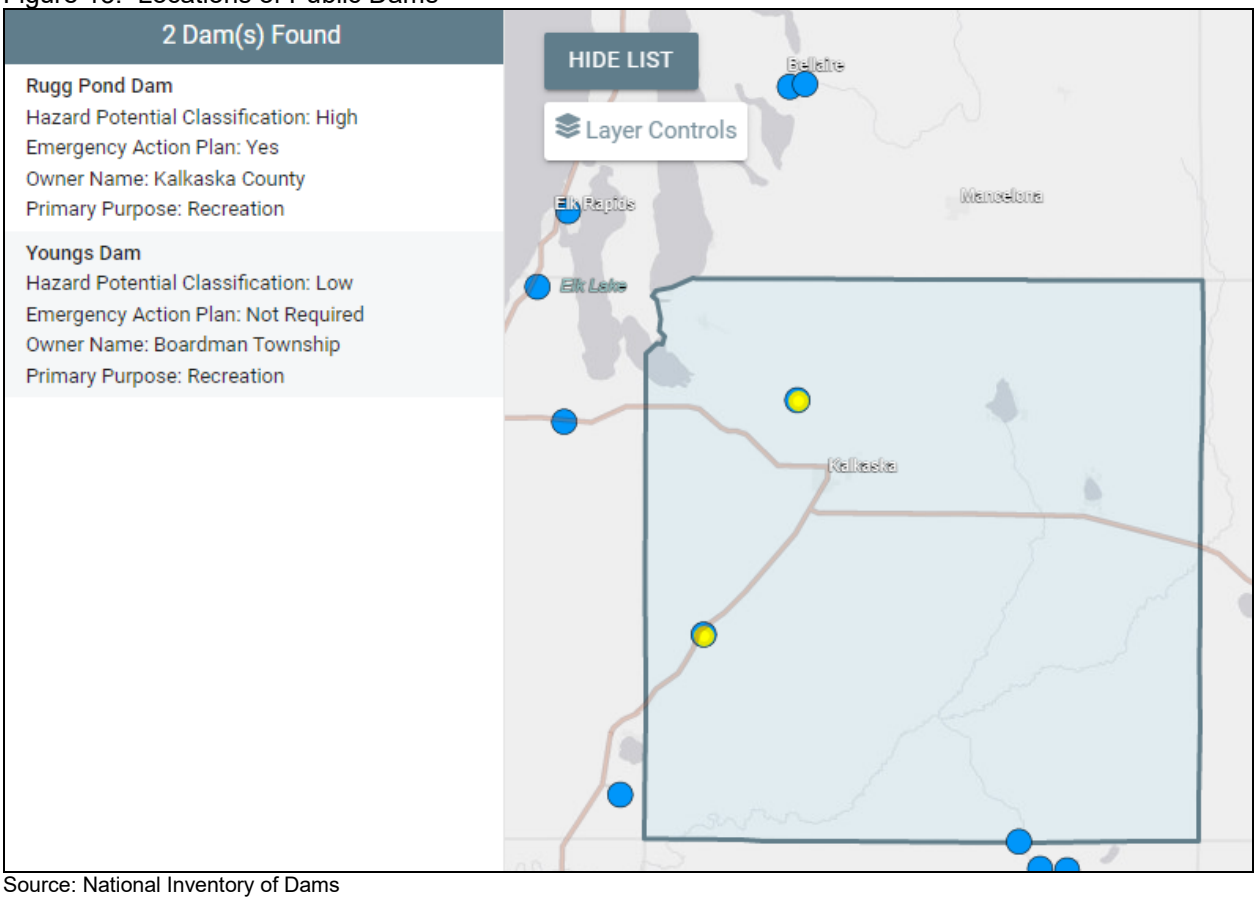
The inspection report indicated that the “low hazard potential” rating for the dam is still appropriate, and therefore an Emergency Action Plan is not required. EGLE also indicated in the inspection report that a written Operation and Maintenance Plan for the dam should be prepared and kept on file with Boardman Township, the owner/operator of the dam. Boardman Township officials continue to evaluate improvement alternatives and pursue mitigation action and available funding sources.

Table 27: State-Regulated Public Dams in Kalkaska County

Name	Height (ft.)	Storage (acre-feet)	Location	Village/ Township	Owner	Year Completed	Hazard Potential
Rugg Pond Dam	24	160	Rapid River	Rapid City	Kalkaska County	1904	High
Youngs Dam	17	54	South Branch Boardman River	South Boardman	Boardman Township	1888	Low

Source: EGLE Michigan Dam Inventory

Figure 13: Locations of Public Dams



Source: National Inventory of Dams

Extent

Flood extent can be measured by the amount of property damage and accumulation of rainfall. In total, flood and flash flood events have caused $20,000 in property damages, no crop damages, and no deaths or injuries. Since 1950, the average annual precipitation is 32.62 inches. September is historically the wettest month with an average of 3.87 inches.

As previously mentioned, the Rugg Pond Dam has a high hazard potential classification, meaning that if the dam were to fail, loss of human life would be probable, along with economic losses, environmental damages and impacts to lifeline interests. Youngs Dam has a low hazard potential classification, if the dam were to fail, no loss of human life would be expected, nor would lifeline interests be impacted. Economic losses and environmental damages would be low and generally limited to the dam owner.

Previous Occurrences
Table 28 below indicates Kalkaska County has experienced two (2) major flood events.

Table 28: Fluvial and Pluvial Flood Events

LOCATION	DATE	EVENT TYPE	PROPERTY DAMAGE	CROP DAMAGE
Countywide/Region	4/12/2001	Flash Flood of Road	-	-
Countywide/Region	6/7/2006	Flooding	$20,000	-
TOTAL			**$20,000**	**$0**

Source: NOAA: National Centers for Environmental Information

The first occurrence on April 12, 2001 was caused by *a combination of runoff from snowmelt and rainfall resulted in minor flooding primarily along the Pine River in the Upper Peninsula. Heavy rainfall was responsible for high water on the Manistee, Au Sable, Boardman, and Thunder Bay Rivers. No damage was reported though flood waters did rise onto some private property. Primarily, the water rose into yards and did not damage any structures.*

The event narrative for the second occurrence on June 7, 2006 is as follows:

Nearly stationary thunderstorms developed in the pre-dawn hours, directly underneath a slow-moving upper level low pressure system. Radar estimated that around 4 inches of rain fell in a portion of the Rapid River basin, just north of Kalkaska. Flooding was enhanced by the failure of a beaver dam on a small creek. Part of Wood Road was washed out by the high water, and Smith and Holly Roads were also impacted. Traffic on US-131 at the Rapid River Bridge was reduced to one lane for a time, as waters raged close to underside of the bridge.

Probability of Future Events and Vulnerability Assessment
Between 2022 and 1996, Kalkaska County has had two major flooding events. Based on that information, the probability of a major annual flood event occurring is 7.7%.

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.

Specific flood hazard areas were identified during public input meetings and are identified on the Hazard Areas Map provided in Appendix A. Additional, flood hazard information may be obtained from the Flood Insurance Rate Maps (FIRM) available for Boardman Township.

NFIP Participation Status
The National Flood Insurance Program (NFIP) is a program that makes federally-backed flood insurance available in those states and communities that agree to adopt and enforce flood-plain management ordinances to reduce future flood damage. Boardman Township is the only Kalkaska County community that is an NFIP participant, and is in the "Emergency Program" (details shown in Table 29). FEMA defines the "Emergency Program" as the initial phase of a community's participation in the NFIP if no flood hazard information is available or the community has a Flood Hazard Boundary Map (FHBM), but no Flood Insurance Rate Map (FIRM). A limited amount of flood insurance coverage at less than actuarial rates is available for all residents of the community. The community is required to adopt minimum floodplain management standards to control future use of its floodplains. Communities can then be converted to the Regular Program upon completion of a Flood Insurance Study and issuance of a FIRM or a determination that the community has no special flood areas (NSFHA). Under the Regular Program, more comprehensive floodplain management requirements are required of the community and higher amounts of flood insurance coverage are provided.

A copy of the current Flood Hazard Boundary Map for Boardman Township, obtained from FEMA's online Flood Map Service Center, is included in Appendix A – Maps.

Table 29. NFIP Requirement Information for Boardman Township

1	**Floodplain Management Adoption***	Y
2	**FIRM Map Adoption**	No FIRM Map Available
3	**Current Effective Map Date**	8/5/1977
4	**Reg-Emerg Date****	3/23/93 (Entry into the Emergency Program)
6	**Community ID #**	260430#
7	**Implementation Method*****	Local Zoning Ordinance and State Building Code enforced by Kalkaska County Building Dept.
8	**Appointed Designee********	Local Zoning Administrator and Kalkaska County Building Official
9	**Implementation of Damage Provisions*********	Implemented by the County Emergency Manager and County Building Department; this has not been needed/implemented to-date.

Source of Data in Rows 1-6: FEMA Community Status Book Report, accessed 5/19/2023

Notes:

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

** The date the community first joined the NFIP.

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

**** The primary designee or agency that is appointed to implement the addressed commitments and requirements of the NFIP. Note elevation measurements are required for new building permits; elevation for a proposed building is confirmed when a final Certificate of Occupancy is issued by the Building Department.

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

FEMA defines a "repetitive loss property" as any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period since 1978 (the year at which consistent claims data collection began). Zero claims have been paid since 1978 (Table 30). County officials and EGLE's Water Management Resources Division staff have not identified any properties that are defined by the National Flood Insurance Program as having suffered repetitive flood losses in Kalkaska County.

The *2019 Michigan Hazard Analysis*, completed by the Michigan State Police, provides the following National Flood Insurance statistics for Kalkaska County:

Table 30: National Flood Insurance Statistics for Kalkaska County

Total Premium	Policies	A-Zone Policies	Total Coverage	Claims since 1978	Total Paid Since 1978
$3,057	6	5	$255,200	0	$0

Source: MSP 2019 *Michigan Hazard Analysis*

In light of changing flood potential in surrounding counties and Kalkaska County, the Kalkaska County Drain Commissioner has been in contact with FEMA to review existing flood concerns in the county. Future community input and coordination with EGLE and FEMA will determine the extent, if any, of future mapped flood areas.

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

Extent
Two lightning events have been reported to NOAA for Kalkaska County since the year 2000. In total, lightning has caused one injury and no property damages.

Previous Occurrences
There have been two lightning events reported to NOAA for Kalkaska County since 2000 (Table 31). There was one injury that occurred on June 27, 2005 associated with this event. Scattered thunderstorms developed during a warm, muggy afternoon in northern Lower Michigan. Some of these storms produced large hail and damaging winds. Mancelona and Petoskey were the hardest-hit communities. A woman was briefly hospitalized after a lightning strike at her home.

Table 31: Lightning Events

LOCATION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE
Countywide/Region	9/1/2000	0	0	-
Countywide/Region	6/27/2005	0	1	-
TOTAL		**0**	**1**	**$0**

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment
Since there have been two lightning events reported in the last 23 years, there is an 8.7% chance that an impactful lightning event would occur every year. However, not all lightning events been reported to NOAA, since events with injuries, deaths, and extensive damages/disruptions 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

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

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

Between 1996 and 2017, Michigan has had 382 reported tornado events. Approximately 67% of all Michigan tornadoes have been weak tornadoes (EF0 or EF1 intensity), while 29% have been strong tornadoes (EF2 or EF3 intensity) and 4% have been classified as violent tornadoes (EF4 or EF5 intensity). However, those few violent tornadoes have been responsible for 88% of Michigan's tornado-related deaths. Strong tornadoes (EF2 or EF3 intensity) have accounted for approximately 11% of the deaths, while weak tornadoes (EF0 or EF1 intensity) have caused only 1% of all tornado-related deaths.

In Michigan, tornados are most likely to occur 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 Kalkaska County is at risk to the occurrence and impacts from tornadoes. It is impossible to predict where and with what magnitude a tornado will touch down.

Extent
The Fujita Scale (Table 32) 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, Kalkaska County's strongest tornadoes occurred in 1976 and 2007 with winds ranging from 110-137 mph.

Table 32: Fujita and Enhanced Fujita Scale Comparison

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

Source: FEMA

Previous Occurrences
Since 1974, Kalkaska County has had eight (8) reported tornadoes touch down, causing one death, six injuries, and $1,312,500 in property damage (Table 33). The most destructive tornado occurred October 18, 2007; it was a category EF2, causing one death and one injury, and $1,100,000 in property damage. The remaining six tornadoes ranged from category EF-0 to EF-2 tornados. The tornado on July 23, 1976 caused 5 injuries.

Table 33: Tornado Events, 1974-2021

Location	Date	Event	Magnitude	Deaths	Injuries	Property Damage
Village of Kalkaska, Kalkaska Township, Excelsior Township	7/3/1974	Tornado	F1	0	0	$ 2,500.00
Springfield Township	6/15/1976	Tornado	F1	0	0	$ 25,000.00
Springfield Township, Garfield Township	7/23/1976	Tornado	F2	0	5	$ 25,000.00
Boardman Township	7/17/1994	Tornado	F0	0	0	$ -
Kalkaska Township, Coldsprings Township, Rapid River Township	5/31/1998	Tornado	F1	0	0	$ -
Kalkaska Township	6/25/1998	Tornado	F0	0	0	$ -
Boardman Township, Kalkaska Township, Village of Kalkaska	10/18/2007	Tornado	EF2	1	1	$ 1,100,000.00
Coldsprings Township	9/1/2014	Tornado	EF1	0	0	$ 160,000.00
TOTAL				**1**	**6**	**$ 1,312,500.00**

Source: NOAA: National Centers for Environmental Information

The event narrative for the October 18, 2007 tornado is as follows:

The Kalkaska tornado was the first killer tornado in Northern Lower Michigan in over 30 years. It touched down just south of Crofton, and tracked north-northeast, lifting just after crossing the Kalkaska County Airport. A home was damaged in a subdivision just south of Crofton. The most substantial damage, as well as the fatality, occurred near the intersection of US-131 and Crofton Road. A large metal warehouse was damaged, a single wide mobile home was destroyed, and several stick-built homes received moderate to severe damage. The fatality and injury occurred inside the mobile home. A 29 year old man was pulled from the mobile home, but passed away at a nearby hospital. Numerous large trees were also uprooted. The damage became more sporadic to the northeast, until another pocket of concentrated damage at the Kalkaska County Airport. Several hangars and small planes were damaged, as were several homes in the area. Sheet metal from one of the hangars was deposited near the Kalkaska Middle School. Winds were estimated at 120 mph, making it an EF2.

Probability of Future Events and Vulnerability Assessment
Since there have been eight tornadoes events reported in the last 49 years, there is a 16.3% chance a tornado would occur in a given year. While the chance for a tornado is low, if an event occurs, there is potential for a high magnitude tornado to touch down. Many of the reported historic events have caused property damage.

There are no operable tornado sirens in Kalkaska County. There is one former tornado warning siren in the Village of Kalkaska, but has only been used as a fire siren for over the past 30 years. Tornado sirens are not considered effective warning systems for tornadoes because of their limited audible range. Kalkaska County currently utilizes the mass emergency notification system “RAVE”, which will provide notifications to cellular and landline phones in the area.

Similar to thunderstorms and severe wind events, populations without access to permanent, sturdy shelter are most vulnerable to tornado events. This includes mobile home parks, campgrounds, recreation areas, and large outdoor gatherings. Persons with a disability or elderly persons could be more vulnerable. Tornados can occur suddenly with very little warning, and it may be difficult for these populations to find adequate shelter in a hurry. Maps in Appendix A show the locations of some of the vulnerable populations (campgrounds and mobile home neighborhoods) in Kalkaska County.

Kalkaska County Emergency Management Office maintains contracts with ten local township halls and other facilities in the county so that they may be utilized as temporary shelters in the event of an emergency. A full list of temporary shelter locations is included in the Mitigation Strategies section of this plan. Additionally, the American Red Cross can set up temporary shelters within 12-24 hours after an emergency event occurs; usually this is done within an existing structure. Private and religious facilities, as well as local libraries, have been utilized during regular hours for temporary shelters to be used during the day. There are no homeless shelters located within Kalkaska County.

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 has an effect on the entire population. Subsequently, the more vulnerable may be more greatly affected.

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.

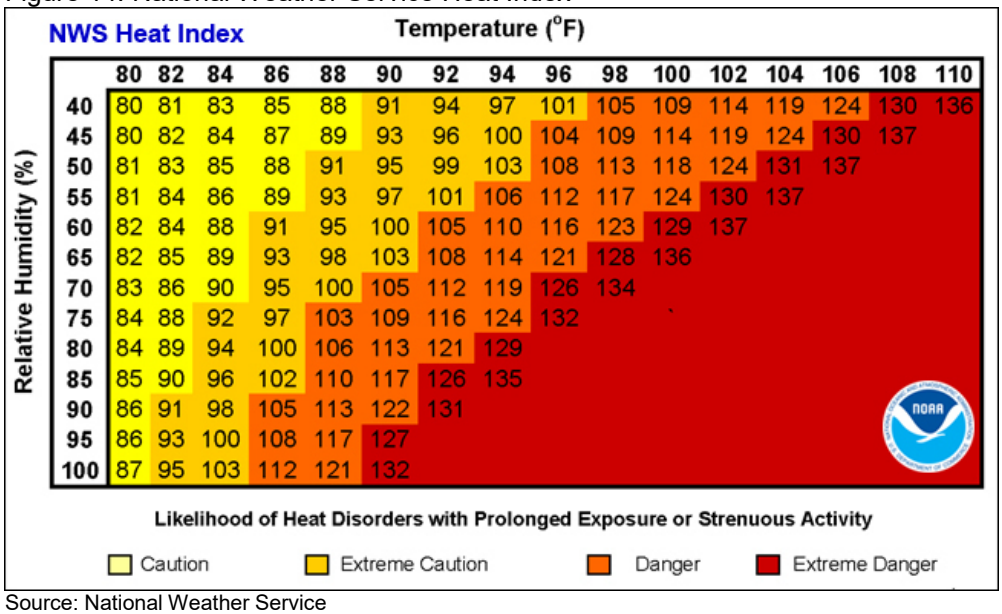
According to the 2019 Michigan Hazard Mitigation Plan, Michigan has 11 average annual extreme heat events with 0.4 average annual deaths and 41 average annual injuries.

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.

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 Kalkaska County is at risk to the occurrence and impacts from extreme temperatures.

Extreme heat is measured with the National Weather Service's Heat Index Chart (Figure 14). 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.

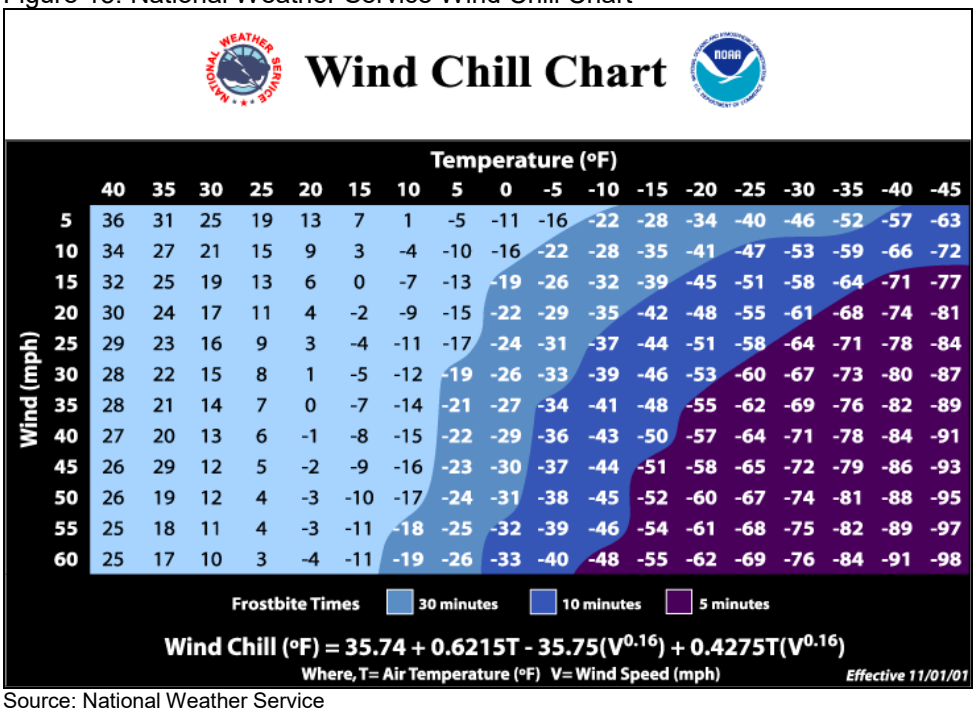
Figure 14: National Weather Service Heat Index



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

Figure 15: National Weather Service Wind Chill Chart



Wind Chill Chart

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

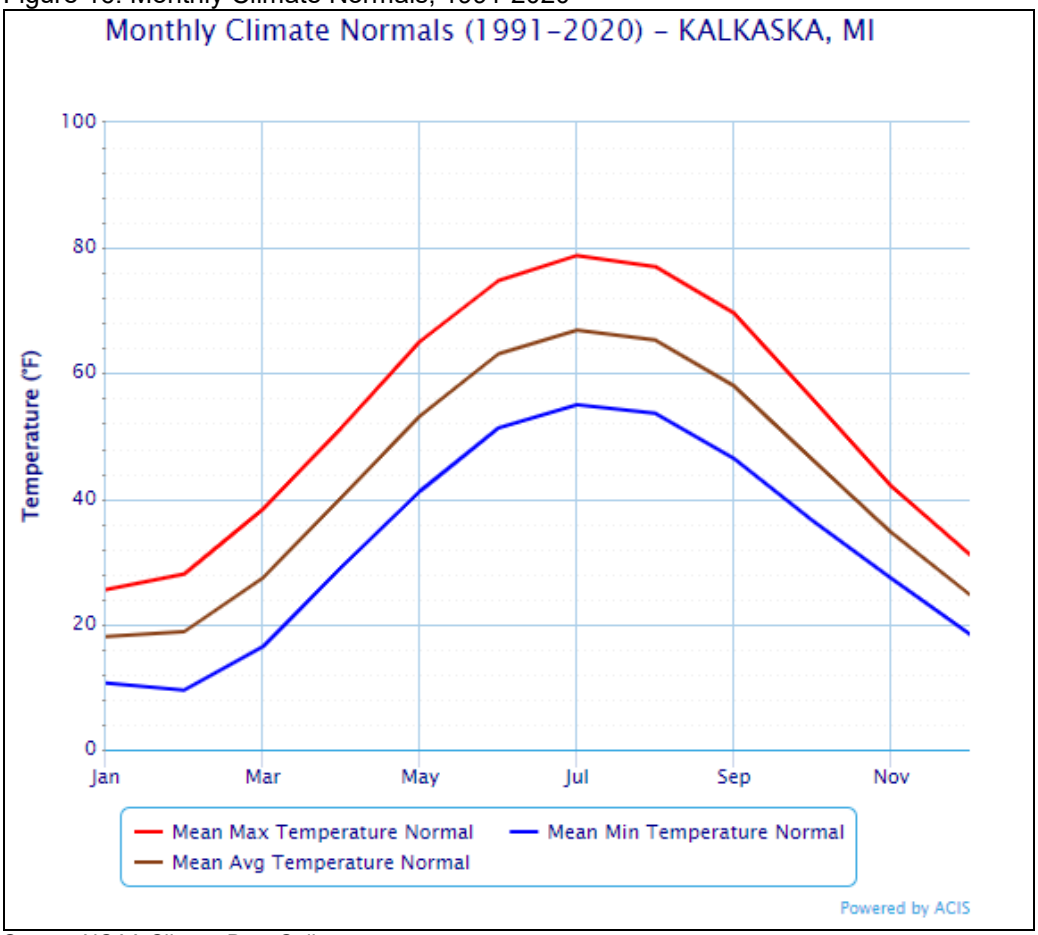
Frostbite Times — 30 minutes — 10 minutes — 5 minutes

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

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

Source: National Weather Service

Figure 16: Monthly Climate Normals, 1991-2020



Source: NOAA Climate Data Online

Previous Occurrences
There have been two reported events of extreme heat and four reported events of extreme cold/wind chill (Table 34). One of the extreme cold events was also a Governor Declared Disaster on January 29, 2019. No direct harm has occurred to human life and no damages to property or crops have been reported.

Table 34: Extreme Heat and Cold Related Events

LOCATION	DATE	EVENT	DEATHS	INJURIES	PROPERTY DAMAGES	CROP DAMAGES
KALKASKA (ZONE)	8/1/2001	Heat	0	0	0	0
KALKASKA (ZONE)	6/30/2018	Excessive Heat	0	0	0	0
KALKASKA (ZONE)	2/4/2007	Extreme Cold/Wind Chill	0	0	0	0
KALKASKA (ZONE)	1/6/2014	Extreme Cold/Wind Chill	0	0	0	0
KALKASKA (ZONE)	2/19/2015	Extreme Cold/Wind Chill	0	0	0	0
KALKASKA (ZONE)	1/29/2019	Extreme Cold/Wind Chill	0	0	0	0
TOTAL			**0**	**0**	**$0.00**	**$0.00**

Sources: NOAA: National Centers for Environmental Information; MSP 2019 Michigan Hazard Mitigation Plan

The Governor Declared Disaster on January 29, 2019 event narrative is as follows:

Another blast of arctic air impacted northern Michigan, behind a departing area of low pressure. Lake effect snow, gusty winds, blowing and drifting snow, and very low wind chills, combined to produce an abundance of winter weather hazards in northern Michigan. Wind chills bottomed out at 25 to 35 below zero in most of northern Michigan. Snowfall amounts of 5 to 7 inches were reported from Good Hart, Brethren, Boyne City, and Indian River.

Probability of Future Events and Vulnerability Assessment
Given that there have been two heat/excessive heat events affecting Kalkaska County in the past 22 years, there is a 9.1% chance an extreme heat event would occur in a given year. Similarly, given that there have been four extreme cold/wind chill events since 2007, there is a 25% chance an extreme cold event would occur in a given year.

Extreme heat and cold events are more likely to impact unsheltered populations, persons living alone, and persons with a disability.

Most townships located in Kalkaska County are sparsely populated. Blue Lake Township, Bear Lake Township, and Garfield Township are also, respectively, the oldest populations of communities in the county (Blue Lake Township is the oldest) communities in Kalkaska County. Elderly residents are the most likely persons to have a disability, and therefore, could be the most vulnerable to extreme temperature events.

Drought

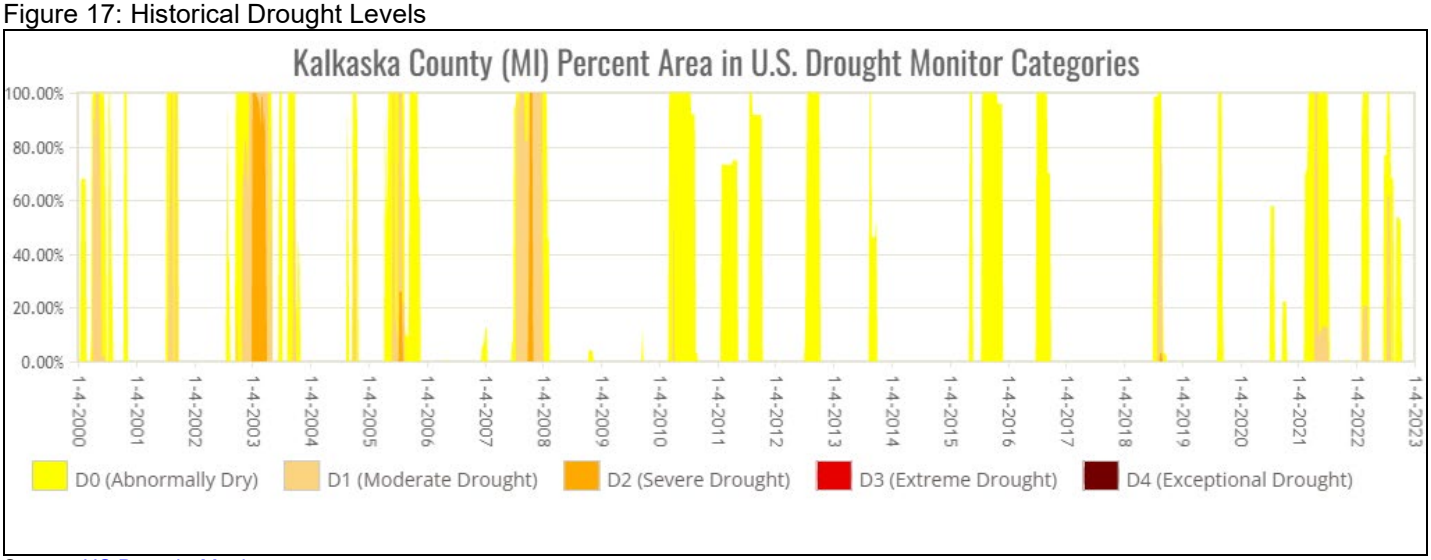
Drought is a normal part of the climate cycle. It is a slow-moving hazard, which causes people to underestimate the damage it can do, but losses from drought are as substantial as those from hurricanes, tornadoes and other faster-moving disasters. Drought causes losses to agriculture; affects domestic 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 Kalkaska 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 17) 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 18).

Figure 17: Historical Drought Levels



Source: US Drought Monitor

Figure 18: U.S. Drought Categories and Historically Observed Impacts

Michigan

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

Source: US Drought Monitor

Previous Occurrences

There have been two recorded incidents of drought in Kalkaska County. The first occurred in March 1977; there was a Presidential Declared Emergency for drought problems plaguing counties in the Upper Peninsula and Northern Lower Peninsula, which included Kalkaska County. This event was part of the 1976-77 drought in the Great Plains, Upper Midwest, and West of the United State. At a statewide level, the drought lasted for 11 consecutive months, from September 1976 to July 1977, and reached a low point in January 1977, with a Palmer Index value of -5.29 (within the D4 exceptional drought classification).[8]

The second occurrence of drought occurred on August 1, 2001 and ended August 9, 2001. There were no deaths, injuries, property damages, or crop damages associated with this event. The episode narrative is as follows: *After a cool beginning, the last half of July 2001 was characterized by warmer than normal and drier than normal weather. Less than an inch of rainfall was recorded in some areas for the month of July. 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

Since there have been two recorded drought incidents affecting Kalkaska County in the past 46 years, this indicates a 4.3% annual chance for a drought event in Kalkaska 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. Additionally, drought directly increases the threat of wildfire. Southern and eastern portions of Kalkaska County are heavily forested and are therefore highly vulnerable to drought-related wildfire threats. The threat to water sources, including those dependent on well water, 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 all people. Lastly, D1, Moderate Drought events cause stress for crops and vegetation; farmed Christmas trees are stressed. Levels of D1 drought would impact crop sales which estimated $7,683,000 in 2017.

[8] MSP *2019 Michigan Hazard Analysis*

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 in Michigan, an average of 145,000 acres per year. By comparison, it was reported that between 1950 and 1996, the MDNR and U.S. Forest Service were involved in suppressing over 46,100 wildfires that burned 390,000 acres of forest, which averages only 8,300 acres burned per year. This drastic reduction in the acres of timber burned was largely the result of increased use of specialized equipment to suppress the fires, and 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, and wildlife; and injury or loss of life of persons who live in or 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 211,888.3 acres or 52% of Kalkaska County is forested. Jack Pine forests make up 28,081.48 acres of forested land; Red Pine forests make up 60,105.27 acres, and Eastern White Pine make up 137.25 acres. As shown on the Environmental Features Map in Appendix A, pine forests are located throughout Kalkaska County, but more heavily centered in Kalkaska Township, Boardman Township, Garfield Township, Oliver Township, Bear Lake Township, Blue Lake Township, and Rapid River Township.

Extent
Extent can be measured by the number of acres burned and the cost of property damage. Since 1968 there has been three large wildfires reported in Kalkaska County. These resulted in $125,000 in property damages and untold costs in timber losses. Between 1981 and 2018 there were 627 reported fires on lands under MDNR jurisdiction. This resulted in 3,200.4 acres burned and 84.2 acres burned per year. Most of these were smaller wildfires. No property damages were recorded.

Previous Occurrences
On May 8, 1968 Kalkaska and Crawford Counties experienced the "Fletcher Road Fire." The event narrative as written in the 2019 MSP Hazard Analysis is provided below:

The "Fletcher Road Fire" was started at approximately 2:45pm on May 8, 1968, by a pipeline welding crew whose company later paid out more than $90,000 in damages for timber losses. Tree mortality was almost total within an area of 4,216 acres across Kalkaska and Crawford Counties, and the fire crowned (reached the tree tops) in over 75% of that area. Crown fires like this allow the fire to advance and spread rapidly. The fire was able to "jump" across Fletcher Road and burned at a rate of approximately 2 miles per hour, which is considered to be a fast-moving fire. Smoke could be seen

from as far as 20 miles away. A million-dollar gas refinement facility was placed at-risk by the fire, but protected by responder efforts.

In May of 2010, Kalkaska and neighboring Crawford Counties experienced two significant wildfire burns. To note, the "Range 9 Fire" actually occurred in Bear Lake Township, rather than in Blue Lake Township as reported in the NOAA Storm Events Database and 2019 MSP Hazard Analysis. Houses that sustained damages by the fire were located near Portage Creek Road. The event narrative as written in the 2019 MSP Hazard Analysis states:

A debris fire expanded out of control and resulted in the "Meridian Boundary Fire" by about 1:30pm on May 18. A total of 8,800 acres were eventually burned by this fire, which took until May 26 to reach 95% containment. Twelve residences were destroyed, six were damaged, and 36 outbuildings were either destroyed or damaged, resulting in total property damages of about $825,000. Also on May 18, in adjacent Kalkaska County, the "Range 9 Fire" started when a controlled burn on an artillery range became uncontrolled as winds increased through the area. The Range 9 Fire burned 1,100 acres of mostly grassy areas on the Camp Grayling grounds, but also crossed over the boundary line at one point and destroyed 4 seasonal homes in Blue Lake Township, resulting in an estimated $125,000 in property damage. By late evening on the same date, that smaller fire was under control.

A third major wildfire occurred in Kalkaska County on July 20, 2018. The event narrative as written in the 2019 MSP Hazard Analysis is provided below:

A nearly 50-acre wildfire ignited in rural Kalkaska County and kept firefighters occupied for several hours before they contained the blaze. The MDNR led the fire response, with assistance from multiple local fire departments and a military fire engine from Camp Grayling. Fortunately, there were no injuries.

Probability of Future Events and Vulnerability Assessment
Since 1968, there have been three major fires in Kalkaska County. This indicates that there is a 5.5% annual chance there will be a large wildfire in Kalkaska County. Between 1981 and 2018 there were 627 reported fires (typically smaller fires) on lands under MDNR jurisdiction. Therefore, there is a 100% chance there will be a smaller wildfire on MDNR lands in Kalkaska County in a given year. Forest types (Red Pine, Eastern White Pine, and Jack Pine) and grasslands within Kalkaska County are susceptible to wildfires. Wildfire prone areas were specifically identified in Bear Lake Township. However, Christmas tree farms and forested public lands throughout the county are also vulnerable to wildfires.

Forest types (Red Pine, Eastern White Pine, and Jack Pine) and grasslands within Kalkaska County are susceptible to wildfires. Additional factors that increase fire risk include dead or dying 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, and a county with an active oil and gas extraction industry, there is an increase in the potential for loss of life and property damage. Furthermore, hiring, training, and maintaining emergency first responders for fire suppression forces to protect every structure from wildfires is becoming more and more difficult. Residential development in rural Kalkaska County is often isolated from town centers and emergency services. All townships located in Kalkaska County contain varying amounts of pine forest, making wildfire a county-wide hazard. Campgrounds and mobile home residences are identified on the Vulnerable Populations and Hazard Areas Map in Appendix A.

Electromagnetic Pulses (EMPs), Natural or Human-Induced

The following discussion is taken largely from the Michigan State Police 2019 Michigan Hazard Analysis.

Space weather is a term that describes the patterns of emissions from our Sun. Ordinary radiation emissions can be considered calm "weather," but there are periodic flare-ups and blasts of much greater energies that send charged particles that impact upon the Earth's atmosphere and magnetosphere. These solar geomagnetic storms can cause widespread failures of important satellite, electronic, communication, navigation, guidance and electric power systems—which have all formed a very important part of our modern technology and lifestyles.

An increase in ions (charged particles) that interact with the Earth's magnetosphere and then strike our upper atmosphere can cause a glow within the evening skies (which, in the northern hemisphere, includes the famous aurora borealis). Such "northern lights" become increasingly prominent, and extend farther to the south, during the most active solar storms. Government agencies actively monitor space weather, but for those who have not heard any government reports, their warning of solar storm activity may come from noticing these brighter glows in the night sky—especially in most Michigan locations where such "northern lights" are not normally seen.

Location
Space weather is not confined to geographic boundaries and is a regional event. Since space weather occurs more often during solar maximums, however, it is impossible to predict where space weather will occur and how severe it will be. All of Kalkaska County is at risk to the occurrence and impacts from solar geomagnetic storms.

Extent and Previous Occurrences
Space weather is a term that denotes the impacts of the Sun's activity upon the bodies within this heliosphere (the volume of space inside the heliopause areas), including our own Earth. As is observable with ordinary weather on Earth, there are some clear patterns that are exhibited by space weather. More turbulent space weather is produced during times when more sunspots are present (called a solar maximum), and space weather is calm during times when sunspots are rare and small (or not even detectable at all, called a solar minimum). A sunspot cycle exists, in which sunspot activity periodically shifts between a minimum and maximum level. As with our Earthly seasons, however, it cannot be known in advance exactly how turbulent or calm things will be at a given moment during the sunspot cycle—only that calmer periods regularly give way to more turbulent periods. As to the regularity of the sunspot cycle itself, although it has been found that the average amount of time between a solar minimum and a solar maximum is about 11 years, the actual length varies quite a bit within each cycle. Within the documented cycles so far, the time interval between a minimum and maximum has been as long as 14 years and as short as 8 years.

In addition, it has been observed that long periods can occur with little or no apparent sunspot activity. The "Maunder minimum," which occurred between the years 1645 and 1715, is the primary example of such long-term variation from the normal cycle, but it is not yet known what caused it, or when it might recur.

Probability of Future Events and Vulnerability Assessment
The Earth's atmosphere serves as a shield for us against many types of particles and radiation zipping across space, and Earth is also surrounded by a magnetosphere that similarly provides protection against most of the charged particles traveling through space. There are some weak spots in the Earth's magnetic field, however, that exist near its two magnetic poles and allow many ions to penetrate, where they collide with atoms in the Earth's upper atmosphere and glow to produce the beautiful auroras in the skies of the arctic regions of the north and south. In addition, the Earth is surrounded by "belts" of charged particles (called Van Allen belts) which are hazardous to spacecraft and astronauts. These are known and predictable conditions of calm space weather, however, and the actual hazard is the turbulence that is generated by large solar flares, causing problems with radio communications, damage to satellites, and even disruptions in power delivery networks on the Earth.

This hazard is considered fairly likely in the near term to cause notable disruptive effects, large economic impacts, and even some direct health risks to persons who are flying in aircraft in the far northern or southern areas of the planet, where the exposure to charged particles occurs in greater quantities.

An important type of impact involves the interference or disruption of modern electronic and communications systems, including those upon which our modern aviation networks rely. Solar flares and storms are important because of their potential impacts and possible disruption of these complex modern communication systems—satellites, television, radio, GPS, power supply networks, and the extensive human and technological infrastructure that relies upon those communication and utility networks. On the ground, disrupted power systems can result in widespread power failures, and the movement of the mass of charged particles in geomagnetic storms can cause induced currents to flow within pipelines, unless special design features have inhibited such currents.

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 Kalkaska 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 Kalkaska County, the District Health Department 10 works with local, state, and federal agencies to prepare for and respond to public health threats. It developed comprehensive emergency preparedness manuals and plans capable of responding to a variety of emergency situations with funds from the Centers for Disease Control. State of Michigan reports, as of November 29, 2022, there are 4,353 cumulative cases of COVID-19 and 68 deaths in the county. Those in the 70 year age group and older have the most deaths of any age range.

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 District Health Department 10 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 and immune and/or health-compromised are most vulnerable to public health emergencies.

Invasive Species

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

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

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

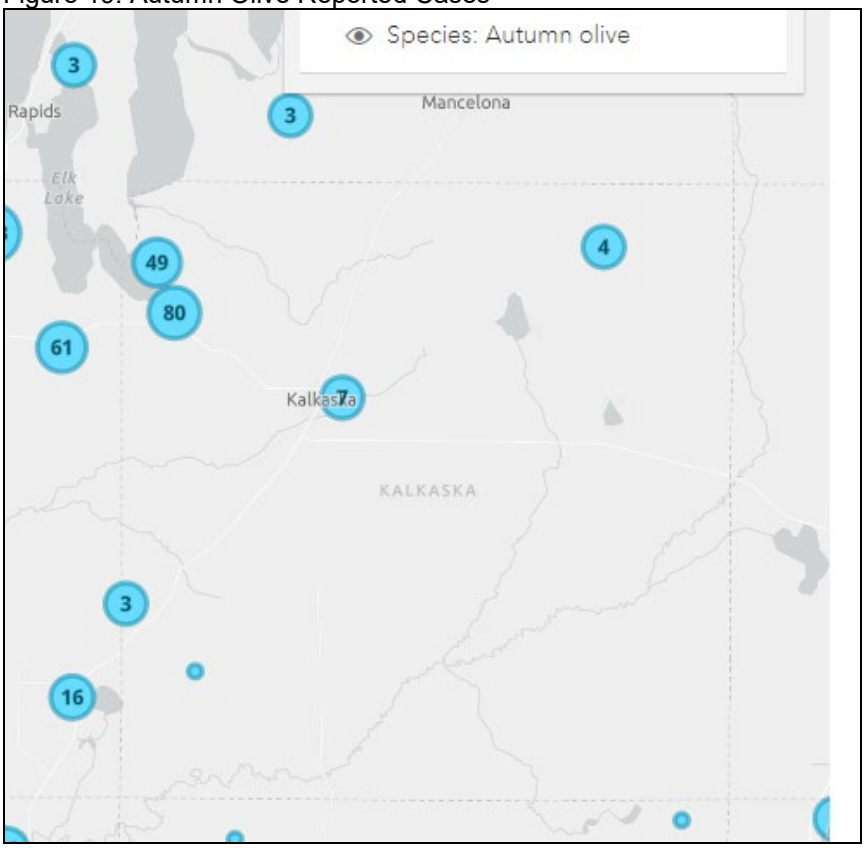
Non-native terrestrial and aquatic species are introduced to Michigan and the Great Lakes both intentionally and unintentionally. Aquatic invasive species are the result of unwanted fish and aquatic plants released from home aquariums, travelled across the ocean in ballast water carried by freighters,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

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

Location
Invasive species threaten those sensitive ecosystems and may be present in all Kalkaska County forest, wetland, farmland, grassland, aquatic, and urban environments. TIS and AIS designation generally applies, however, several upland species appear to be spreading to wetland and aquatic areas. Regular monitoring and reporting introductions detected is the only way to know where an invasive species has infested. The MISIN Species Observations shares reported detections by species name (common and scientific) and family type. Figure 19 identifies reported Autumn Olive cases throughout the county. Reported cases are in the north and northwest, especially in Clearwater Township near Lake Skegemog and Skegemog Lake Wildlife Area.

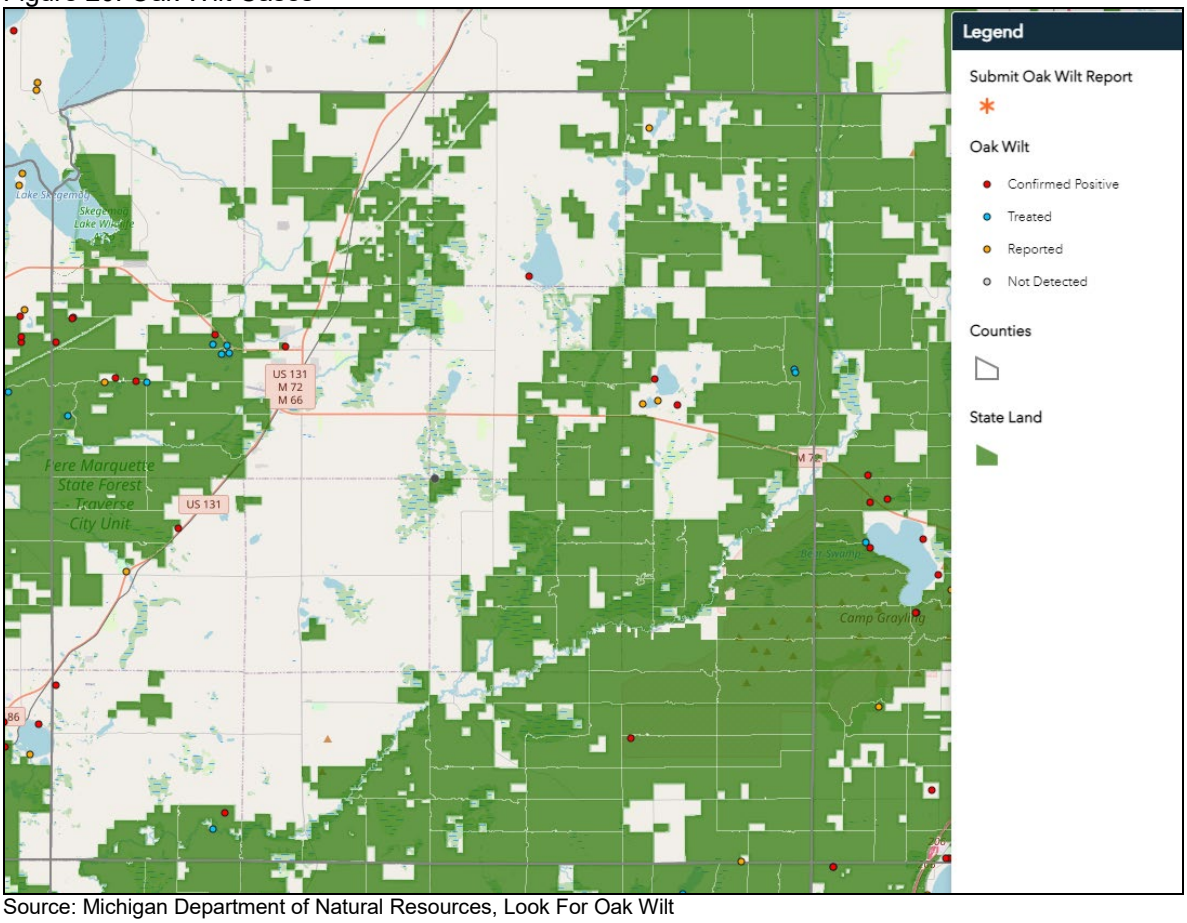
Figure 20 presents the MDNR interactive mapping resource Look For Oak Wilt, which allows users to submit and Oak Wilt Report throughout Michigan. A number of Oak Wilt cases have been reported in Kalkaska County. These include trees confirmed positive for the disease, trees that have been treated, and reported cases. The reports of Oak Wilt disease are largely found in heavily forested areas and public lands in the west-central, east, and southeast areas of the county.

Figure 19: Autumn Olive Reported Cases



Source: MISIN Species Observations

Figure 20: Oak Wilt Cases



Source: Michigan Department of Natural Resources, Look For Oak Wilt

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

- The State of Michigan estimates 42% of threatened or endangered species are considered at risk due to non-native species.
- Visitors spent over $22 billion dollars in Michigan in 2014, supporting nearly 327,000 jobs (Tourism Economics 2014). Invasive species impact the use and beauty of Michigan's shorelines, trails and parks, which may result in a reduction in visitor spending and citizen enjoyment
- Michigan's Forest Products Industry supports 96,000 jobs and contributes more than $20 billion to the state's economy each year (Michigan DNR 2015). Invasive forest pests including emerald ash borer, oak wilt and beech bark disease kill trees and significantly impact the value of urban properties, forests and timber resources. The estimated cost of treating or removing dead ash within developed land in Michigan's communities due to emerald ash borer was $230 million in 2009[9]. A map of oak wilt cases in Kalkaska County is below.

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

The Cooperative Invasive Species Management Area serving Charlevoix, Antrim, Kalkaska, and Emmet counties (CAKE CISMA) and Kalkaska Conservation are focused on habitat-specific management: planning to manage for the resource (aka that natural area) and restoration therefore will remove and control anything that is not supposed to be there. Natural areas for consideration are high-quality natural areas in Charlevoix, Antrim, Kalkaska, and Emmet Counties such as around coastal dunes (e.g. Lake Michigan) and waterways, riparian areas (e.g. Skegemog Lake Wildlife Area). Lake Skegemog and surrounding areas are of particular interest.

On the shore of Lake Skegemog is the Skegemog Northern Fen within the Skegemog Lake Wildlife Area. The wildlife area was dedicated in 1979, is approximately six acres in size and is embedded within the Skegemog Rich Conifer Swamp. The area is recognized for being a good example of a rare natural community. Specific exotic invasive species noted in the area are reed canary grass (*Phalaris arundinacea*) and narrow-leaved cattail (*Typha angustifolia*). Other invasive species threatening the diversity and community structure of northern fens include: glossy buckthorn (*Rhamnus frangula*), multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellata*), purple loosestrife (*Lythrum salicaria*) hybrid cat-tail (*Typha xglauca*), reed (*Phragmites australis*) and Canada thistle (*Cirsium palustre*).

The following terrestrial species are causing significant harm:

- Japanese Knotweed, Giant knotweed and Bohemian knotweed, *Polygonaceae,* can be a concern to homeowners, and municipalities because of these plants' ability to grow into a structure's foundation, through sidewalks and road surfaces. These plants can also be spread by root fragments and stem sections. It can create monocultures that shade out desirable vegetation, creating poor habitats for native species. This is of particular concern along water bodies and has been shown to be extremely detrimental to waterways in the Eastern US.
- (Invasive) Phragmites is a large-scale clonal grass that rapidly colonizes wetlands. Phragmites crowds out native plants and alters habitat for native fauna. In doing so, Phragmites also alters human access to water resources and has adverse economic effects, including decreasing property value, inhibiting recreational use, and limiting populations of game species. It can become a fire hazard when it dries down
- Cypress Spurge is an erect, herbaceous to semi-woody perennial with bright yellow-green flowers that turn to purple-red as they mature. Cypress Spurge is toxic to horses and cows.
- Black Swallow Wort is a rapidly growing, herbaceous perennial in the Milkweed family. However, Black Swallow Wort is toxic to animals and the monarch butterfly.
- Oriental Bittersweet is a vine plant that can strangle a tree and causes tree mortality. This impacts ecosystem health and economic health that is associated with trees' health.

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

- Autumn olive is very widespread in Michigan. It is spread by birds and is recolonizing old farm fields. Its value to wildlife is relatively low (low in protein and other nutrients compared to our natives). It also is known for its nitrogen-fixing abilities.
- Oak wilt is an infectious vascular disease which affects all species of oak. Red oaks get the disease more frequently and succumb more readily than white oak. The disease is spread via root grafts and by sap-feeding beetles.
- Beech bark disease is caused by the combination of the *Neonectria* fungus and beech scale. Beech scales are yellow, soft-bodied insects that are 0.5 to 1.0 mm long as adults. The insects, found on the tree trunk and branches, feed on sap in the inner bark. The minute wounds caused by the scale insects eventually enable the Nectria fungus to enter the tree. The Nectria kills areas of woody tissue.

The following aquatic species are causing significant harm:

- Didymo or “rock snot” is an aquatic diatom that is brown, tan, or yellow in color. Unlike most algae, it feels like wet cotton and is not slimy. Grows in rivers, streams, and lakes. It occurs particularly in cool, oligotrophic, clear water
- Purple loosestrife is an herbaceous wetland perennial reaching 5 feet with reddish-purple flowers with five to seven petals are held in dense terminal cluster. Grows in moist soils, in wet meadows and prairies, shallow marsh, ditches, waste areas, and along lakes, ponds, streams, and rivers.
- Garlic mustard is an aquatic, herbaceous biennial, up to 4 feet in height. Forms round basal rosette the first year, flowers the second year and dies. Grows in forests, particularly floodplain forest, open wetlands, parking lots, campgrounds, paths, and roadsides.
- Eurasian watermilfoil is a submergent, aquatic perennial that reached 3-10 feet or more in length. Grows in ponds, lakes, and low-energy zones in rivers and streams.
- New Zealand mudsnail is an aquatic mollusk with an elongated shell 1/8 inch long with 7-8 whorls. Shell color varies from gray and dark brown to light brown. Grows in flowing freshwater with silt/sand to very brackish rivers; lives in water as deep as 60 feet in lakes or reservoirs.
- Red swamp crayfish is an aquatic crustacean with a dark red body and claws with spiky, bright red bumps, and black wedge-shaped stripe on underside. Grows in flowing to non-flowing freshwater or salt water; permanent ponds; areas of streams and ditches with organic debris; agricultural areas; wetlands.
- Zebra mussel is an aquatic mollusk with striped shells or dark or light shells with no stripes. Attach to objects (pipe, boats, etc.) causing major damage as colonies can block pipes, affecting power plants and water-treatment facilities.

Many of the species listed here are monitored and managed by CAKE CISMA. However, the list of invasive species impacting the county is extensive and many established species are treated on a case-by-case basis. Other species of concern include:

- Honeysuckle (non-native)
- Glossy buckthorn
- Common buckthorn
- Wild parsnip
- Multiflora rose
- Periwinkle

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

Common Name Scientific Name Category

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

The Michigan Watch List: Aquatic Invasive Plants and CAKE CISMA are also monitoring for additional species:

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

CAKE CISMA and Kalkaska Conservation District and other partners protect, enhance, and promote Northwest Michigan's natural communities through terrestrial invasive plant management, education, and outreach. Kalkaska County's natural resources are highly vulnerable to invasive animals, plants, and diseases. Significant natural features include forested areas including Pere Marquette State Forest and water bodies such as Lake Skegemog and Skegemog Lake Wildlife Area and the Manistee River and Boardman River. The impact the species listed on watch lists could be catastrophic for Kalkaska County's natural resources, agriculture, recreation, tourism, and economy.

Hazardous Materials: Fixed Site Incidents

According to FEMA, a hazardous material is any solid, liquid, or gas that can harm people, other living organisms, property, or the environment. They may be naturally occurring but are also increasingly man-made or brought more into human contact by our activities. Chemical manufacturers and industrial sites are sources for many such materials. When spilled or otherwise accidentally released at these facilities, known as a fixed site location, they pose a risk to quickly spread and create harm to the public.

Some hazardous material releases may impact food or water supply chains for large regions or even the entire state. An example would include the persistent chemical commonly known as PFAS (Per- and polyfluoroalkyl substances). Such releases may be treated as a transmittable public health emergency because of their ability to spread to significant portions of the entire state (see the associated chapter). While these may have been local releases at one time, their aggregate or long-term effect has moved beyond that of a typical acute hazardous materials release.

Location
One existing site of concern, as indicated from public input provided during the development of this plan, is the Kalkaska PBB Cattle Site, located at the northwest corner of 8 Point Road and Pine Road in Garfield Township. This is a Part 201 Site of Environmental Contamination with Land Use Restriction according to the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

Extent and Previous Occurrences
The Kalkaska PBB Cattle Site is the burial location of contaminated livestock from the 1973 incident where polybrominated biphenyls (PBBs) were accidently mixed with animal feed. As a result of the burial of the contaminated livestock, the site presumably contains hazardous substances in excess of the concentrations developed as the unrestricted residential criteria under Section 20120a (1)(a) or (17) of the NREPA.

A Declaration of Restrictive Covenant (Restrictive Covenant) has been recorded with the Kalkaska County Register of Deeds on August 10, 2018 for the purpose of protecting public health, safety, and welfare, and the environment by prohibiting or restricting activities that could result in unacceptable exposure to environmental contamination present at the property. The Michigan Department of Natural Resources (DNR) is the current owner of this property. A copy of the Restrictive Covenant is included as Appendix E.

The Michigan Department of Environmental Quality (DEQ) began monitoring groundwater around the burial site in 1977. The site had been selected because it was three miles from the nearest river and a natural underground clay layer above the water table would impede any contamination that escaped the lined pit. The department stopped monitoring in 2015 because of “minimal likelihood of movement” of PBB off the site, according to Nick Swiger of the DEQ. One monitoring well in the shallow aquifer registered a low-level PBB detection in 1984, but nothing before or since.[10]

Probability of Future Events and Vulnerability Assessment
During the development and review process of this Hazard Mitigation Plan update, a need was expressed to continue groundwater monitoring around this site of contamination as a measure to safeguard against human and animal exposure to potential PBB-contaminated groundwater emanating from this site.

[10] https://www.bridgemi.com/michigan-environment-watch/forty-years-ago-michigan-had-one-worst-mass-poisonings-us-history September 26, 2018. Bret Walton, Michigan Environment Watch.

Hazardous Materials: Transportation Incidents

A hazardous materials transportation incident is defined as an uncontrolled release of hazardous materials cargo during transport, capable of posing a risk to life, health, safety, property, or the environment.

For transportation purposes, a hazardous material is defined by the United States Department of Transportation (USDOT) as a "substance or material capable of posing an unreasonable risk to health, safety, or property when transported in commerce." Examples include solids, liquids, or gasses that can cause unreasonable harm to humans and other living organisms due to being radioactive, flammable, explosive, toxic, corrosive, a biohazard, an oxidizer, an asphyxiant, or hyperallergenic. Not all hazardous materials carry the same level of risk or have the potential to create a local emergency.

Weather is an important factor when responding to an incident, as it pertains to how likely an incident may spread, with winds, rain, and temperature impacting containment efforts. Additionally, the nature of the material, location and severity of the incident may require trained hazardous materials response teams.

Location

A location for a potential hazardous materials transportation incident is the Great Lakes Central Railroad, a freight corridor owned by MDOT. The general rail line location in the County is illustrated in Figure 21, and is located within the Townships of Boardman, Kalkaska and Rapid River, as well as the Village of Kalkaska. Train cars, which may contain hazardous substances, pass through this area on the rail line and can be stationary on the tracks for periods of time, particularly within the Village of Kalkaska.

Figure 21. Great Lakes Central Railroad Location in Kalkaska County

Source: MDOT, Michigan Railroad System Map, September 2022

Extent

Potential damages from a hazardous materials transportation incident include contamination of soil, crops, vegetation, water, or air; physical injury or loss of life (humans or wildlife), and destruction of property.

Previous Occurrences

There have not been any previous incidents related to the transportation of hazardous materials on the active railroad line in Kalkaska County.

Probability of Future Events and Vulnerability Assessment

The Pipeline Hazardous Materials Safety Administration, in consultation with the Federal Railroad Administration, issued a rule requiring railroads to share information regarding High-Hazard Flammable Train (HHFT) operations with State Emergency Response Commissions (SERCs) to improve preparedness. The Michigan Citizen-Community Emergency Response Coordinating Council (MCCERCC) is such a SERC. For security reasons, specific HHFT routes and shipments are not generally made available to the public. Local emergency managers and governmental planners may choose to contact the MCCERCC.

MDOT publishes commodities maps that highlight the state's most active freight transportation corridors. The rail line through Kalkaska County is not indicated on the maps for any of the commodities listed, which include chemicals. Based on this information, there is a low probability of a hazardous materials release from rail cars in the GLC railroad corridor in Kalkaska County. The impact of a potential spill to public health would be greatest if it occurred within the Village of Kalkaska, which is the most populated community in the County. The rail line also generally runs parallel to the heavily trafficked US-131.

Impacts from Climate Change

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

According to a new comprehensive report from the World Meteorological Organization (WMO), "A disaster related to a weather, climate or water hazard occurred every day on average over the past 50 years – killing 115 people and causing $202 million (US $) in losses daily The number of disasters has increased by a factor of five over the 50-year period, driven by climate change, more extreme weather and improved reporting. But, thanks to improved early warnings and disaster management, the number of deaths decreased almost three-fold[11]" (World Meteorological Organization, 2021).

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

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

The Great Lakes Integrated Sciences and Assessments (GLISA) is one of 11 NOAA Regional Integrated Sciences and Assessments teams that focus on helping the nation prepare for and adapt to climate variability and change. A summary of findings from NCA and the GLISA report, *Climate Change in the Great Lakes Region*[12], are provided to show the impacts of climate change throughout the state of Michigan.

Temperature
Warm-season temperatures are projected to increase more in the Midwest than any other region of the United States.[13] Since 1951, annual average air temperatures have increased by 2.3°F (1.3°C) in the U.S., Great Lakes region. By mid-century (2050), average air temperatures are projected to increase by 3°F to 6°F (1.7°C to 3.3°C). By end of century (2100), average air temperatures are projected to increase by 6°F to 11°F (3.3°C to 6.1°C).

The frost-free season is projected to increase 10 days by early this century (2016–2045), 20 days by mid-century (2036–2065), and possibly a month by late century (2070–2099) compared to the period 1976–2005 according to the higher scenario (RCP8.5).[14]

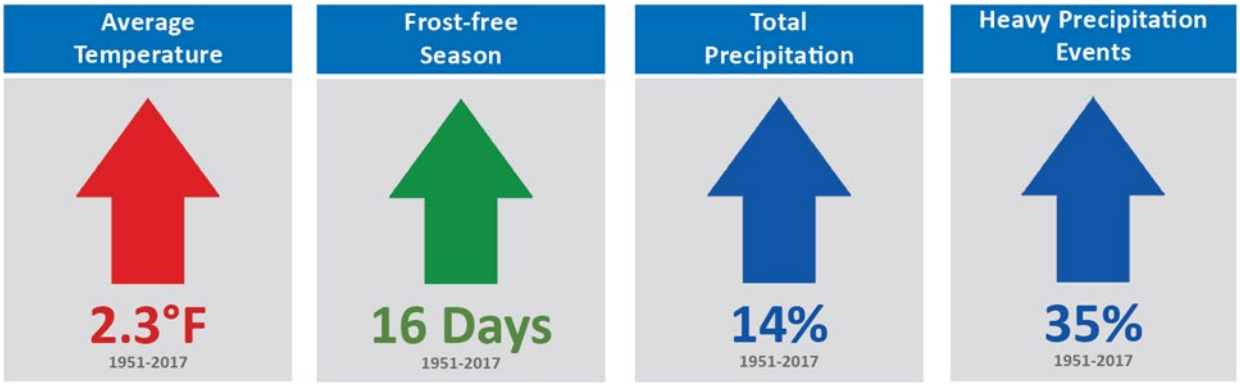
Precipitation
Since 1951, total annual precipitation has increased by 14% in the U.S., Great Lakes Region. Future projections suggest more precipitation on average, but not necessarily during all seasons (summer to be drier) and not for all locations depending on which model is used. Reduced lake ice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

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

[12] (2019, February 14). Retrieved from Climate Change in the Great Lakes Region: https://glisa.umich.edu/wp-content/uploads/2021/04/GLISA-2-Pager.pdf

[13] Vose, R. S., D. R. Easterling, K. E. Kunkel, A. N. LeGrande, and M. F. Wehner, 2017: Temperature Changes in the United States. *Climate Science Special Report: Fourth National Climate Assessment, Volume I*. Wuebbles, D. J., D. W. Fahey, K. A. Hibbard, D. J. Dokken, B. C. Stewart, and T. K. Maycock, Eds., U.S. Global Change Research Program, Washington, DC, USA, 185–206. doi:10.7930/J0N29V45.
[14] Hibbard, K. A., F. M. Hoffman, D. Huntzinger, and T. O. West, 2017: Changes in Land Cover and Terrestrial Biogeochemistry. *Climate Science Special Report: Fourth National Climate Assessment, Volume I*. Wuebbles, D. J., D. W. Fahey, K. A. Hibbard, D. J. Dokken, B. C. Stewart, and T. K. Maycock, Eds., U.S. Global Change Research Program, Washington, DC, USA, 277–302. doi:10.7930/J0416V6X.

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



Snow, Ice Cover and Lake Temperature

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

Extreme Weather

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

The NCA *Fourth National Climate Assessment Volume II: Impacts Risks, and Adaptation in the United States* reports, *"*Climate change is transforming where and how we live and presents growing challenges to human health and quality of life, the economy, and the natural systems that support us. Risks posed by climate variability and change vary by region and sector and by the vulnerability of people experiencing impacts. Social, economic, and geographic factors shape the exposure of people and communities to climate-related impacts and their capacity to respond.

A vulnerability assessment can be found in the two-page report: *Climate Change in the Great Lakes Region* by GLISA at https://glisa.umich.edu/wp-content/uploads/2021/04/GLISA-2-Pager.pdf. The report identifies key challenges from climate change such as:

- **Public Health**
  - Increased risk of heat waves and increased humidity may amplify the number of heat-related deaths and illnesses.
  - More storm activity and flooding, resulting in increased point- and non-point source pollution, will likely increase watershed contamination and water-borne illnesses, while warmer surface waters amplify the risk of toxic algal blooms and fish contamination.
- **Tourism and Recreation**
  - *Winter recreation/tourism are likely to suffer* due to reduced snow cover and shorter winters. Reduced lake ice cover and enhanced evaporation may lead to increased lake-effect snowfall in the near-term, but rising temperatures will cause more winter precipitation to fall as rain as opposed to snow across the region by late century.
  - Increasing temperatures and a longer summer season may *increase the demand for lake and beach use*.
  - Overall, *summer tourism may grow before temperature rise becomes unfavorable* for outdoor recreation.
  - *The fishing industry* (commercial and recreation) is likely to be impacted by the *decline of coldwater species of fish, such as lake trout and whitefish*.

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

V. Community Vulnerability Analysis

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

While many types of hazards considered in this plan could affect every jurisdiction in the County, certain characteristics of the population, public services, governmental regulations, and natural and built environments were considered in the evaluation of each community's unique vulnerabilities and assets related to hazard mitigation. For reference, the locations of some of these characteristics (i.e., public lands, pine forest area, infrastructure, campgrounds, mobile home areas, hazard areas) are illustrated in the maps provided in Appendix A.

	Kalkaska County Townships												Kalkaska County Villages
	Bear Lake	Blue Lake	Boardman	Clearwater	Coldsprings	Excelsior	Garfield	Kalkaska	Oliver	Orange	Rapid River	Springfield	Village of Kalkaska
Population Estimates (2019)	623	460	1,550	2,493	1,475	918	721	4,833	305	1,395	1,370	1,442	2,076
Severe Winter Weather Vulnerabilities													
Est. number of residents > age 65	216	217	258	498	351	135	211	878	74	166	224	248	est. 408 persons included in Kalkaska Twp. estimates
% of jurisdiction residents that are of a minority race	2.4%	2.0%	7.6%	5.9%	3.0%	1.5%	1.7%	10.4%	1.0%	2.4%	5.6%	3.9%	6.8%
# of households that are lower income (ALICE or below poverty level)	303	226	556	985	639	344	345	1,996	127	482	558	584	
Thunderstorm, High Winds, Hail, Tornado Vulnerabilities													
Mobile Home Neighborhoods			2	2	1			1					1
Campgrounds				1	1		1	6	1		1		
Public Recreation Lands	X	X	X	X	X	X	X	X	X	X	X	X	X
Previous Tornadoes			2		2	1	1	2			2	2	1
Est. number of residents > age 65	216	217	258	498	351	135	211	878	74	166	224	248	est. 408 persons included in Kalkaska Twp. estimates
% of jurisdiction residents that are of a minority race	2.4%	2.0%	7.6%	5.9%	3.0%	1.5%	1.7%	10.4%	1.0%	2.4%	5.6%	3.9%	6.8%
# of households that are lower income (ALICE or below poverty level)	303	226	556	985	639	344	345	1,996	127	482	558	584	
Lightning Vulnerabilities													
Campgrounds				1	1		1	6	1		1		
Communications Critical Infrastructure (Towers)		2		1		2	1				1		5
Public Recreation Lands	X	X	X	X	X	X	X	X	X	X	X	X	X
Flooding Vulnerabilities													
Previous flood incident areas	X	X		X	X	X	X	X		X	X		
Potential dam failure (for dams that have a condition rating)			Youngs Dam								Rugg Pond Dam		
# of Road/Stream Crossings with a Moderate to Severe Rating	0	0	0	1	0	0	0	0	1	0	0	0	0
# of Bridges with Poor, Severe or Critical Ratings	6	2	8	0	1	5	21	0	10	3	0	3	1
% of jurisdiction residents that are of a minority race	2.4%	2.0%	7.6%	5.9%	3.0%	1.5%	1.7%	10.4%	1.0%	2.4%	5.6%	3.9%	6.8%
# of households that are lower income (ALICE or below poverty level)	303	226	556	985	639	344	345	1,996	127	482	558	584	
Wildfire Vulnerabilities													
Pine Forest	X	X	X	X	X	X	X	X	X	X	X	X	X
Campgrounds				1	1		1	6	1		1		
Previous Large Fire Incident(s)	X												
Est. number of residents > age 65	216	217	258	498	351	135	211	878	74	166	224	248	est. 408 persons included in Kalkaska Twp. estimates
% of jurisdiction residents that are of a minority race	2.4%	2.0%	7.6%	5.9%	3.0%	1.5%	1.7%	10.4%	1.0%	2.4%	5.6%	3.9%	6.8%
# of households that are lower income (ALICE or below poverty level)	303	226	556	985	639	344	345	1,996	127	482	558	584	

	Kalkaska County Townships												Kalkaska County Villages
	Bear Lake	Blue Lake	Boardman	Clearwater	Coldsprings	Excelsior	Garfield	Kalkaska	Oliver	Orange	Rapid River	Springfield	Village of Kalkaska
Population Estimates (2019)	623	460	1,550	2,493	1,475	918	721	4,833	305	1,395	1,370	1,442	2,076
Drought Vulnerability													
Public Recreation Lands	X	X	X	X	X	X	X	X	X	X	X	X	X
Extreme Temperatures Vulnerabilities													
Est. number of residents > age 65	216	217	258	498	351	135	211	878	74	166	224	248	est. 408 persons included in Kalkaska Twp. estimates
% of jurisdiction residents that are of a minority race	2.4%	2.0%	7.6%	5.9%	3.0%	1.5%	1.7%	10.4%	1.0%	2.4%	5.6%	3.9%	6.8%
# of households that are lower income (ALICE or below poverty level)	303	226	556	985	639	344	345	1,996	127	482	558	584	
Invasive Species Concerns													
Areas mapped as a locations of particular concern				Lake Skegemog, Torch River, Torch Lake	Manistee Lake	Manistee Lake							
Public Health Emergency Vulnerabilities													
Assisted Living Facility													1
Est. number of residents > age 65	216	217	258	498	351	135	211	878	74	166	224	248	est. 408 persons included in Kalkaska Twp. estimates
% of jurisdiction residents that are of a minority race	2.4%	2.0%	7.6%	5.9%	3.0%	1.5%	1.7%	10.4%	1.0%	2.4%	5.6%	3.9%	6.8%
# of households that are lower income (ALICE or below poverty level)	303	226	556	985	639	344	345	1,996	127	482	558	584	
Hazardous Materials Fixed Site Incident Concerns													
PBB Cattle Burial Site - Part 201 Site of Contamination							X						
Hazardous Materials Transportation Incident Concerns													
Railroad cars containing hazardous materials that are idle or in active transport			X					X			X		X
Space Weather - Electromagnetic Pulses (EMPs) Vulnerabilities													
Communications Critical Infrastructure (Towers)		2		1		2	1				1		5
Energy Infrastructure (pipelines, natural gas production, transport, and storage; electric supply/substation)	1	6	1		1			5					

	Kalkaska County Townships												Kalkaska County Villages
	Bear Lake	Blue Lake	Boardman	Clearwater	Coldsprings	Excelsior	Garfield	Kalkaska	Oliver	Orange	Rapid River	Springfield	Village of Kalkaska
Population Estimates (2019)	623	460	1,550	2,493	1,475	918	721	4,833	305	1,395	1,370	1,442	2,076
Community Assets													
Emergency Services (i.e., Fire, Police, or EMS)	1	1	1	1	1	shared Fire Dept. with Coldsprings	1	Twp. Fire located in the Village					6
Shelter Sites	1	1		1	1	1	1	1 (located in the Village)			1		2
Health Care Facilities				1									4
County or Village Capital Improvements Plan/Program	None; CIP development and maintenance is a goal in the current County Master Plan and Village Master Plan												
County Planning Commission (active)	Yes												
County Master Plan (current)	Yes; Updated in 2023												
Planning Commission	Via County PC	Yes	Yes	Yes	Via County PC	Via County PC	Yes	Via County PC	Via County PC	Via County PC	Yes	Via County PC	Yes
Local Master Plan		Yes (2016); Goals/Obj. related to natural resource preservation; native plant species promotion; forestry management; high-speed internet; emergency services support	Yes (2016); Goals/Obj. related to natural resource protection	Yes (2019); Goals/Obj. related to natural resource protection, particularly surface/groundwater quality; maintain/improve fire & rescue service capabilities			Yes (not online)				Yes (not online)		Yes; update drafted in 2023. Goals/Obj. related to brownfield redevelopment; natural resource protection; improved stormwater mgmt.; promotion of housing rehabilitation programs/initiatives; ensuring water and sewer systems are self-supporting with fees and charges for operation and maintenance.
Zoning Ordinance	County Zoning; including zoning standards per the Upper Manistee River Natural River Plan	Township Zoning	Township Zoning	Township Zoning	County Zoning	County Zoning	Township Zoning; including zoning standards per the Upper Manistee River Natural River Plan	County Zoning	County Zoning; including zoning standards per the Upper Manistee River Natural River Plan	County Zoning	Township Zoning	County Zoning; including zoning standards per the Upper Manistee River Natural River Plan	Village Zoning
Boardman River Watershed Jurisdictions with Water Quality-Related Zoning Ordinance Provisions (P. 45, Table 15 in Boardman R. Watershed Prosperity Plan - 2018, Watershed Center Grand Traverse Bay)			X	X	X	X	X	X		X	X	X	X
Native Plant Species Encouraged or Required per Ordinance	Encouraged	Required in natural greenbelt zone on waterfront lots	Encouraged on waterfront lots	Required on waterfront lots	Encouraged	Encouraged		Encouraged	Encouraged	Encouraged	Encouraged on waterfront lots	Encouraged	Encouraged
Kalkaska County 2023 HMP Mitigation Strategies (numbers indicated) as related to 2023 County Master Plan goals/objectives	Natural resource and open space protection/preservation measures: land conservation easements; promote greenway infrastructure, wildlife corridors, natural habitat; pollution/erosion control enforcement; public education on conservation and land stewardship. Coordinate infrastructure improvements amongst local governments to maximize efficiency and minimize costs. Prohibit unnecessary removal or use of groundwater/surface water that would have no direct benefits to the residents of the County and which do not increase public safety, health, or welfare.												
Required Dam Emergency Action Plan on file											Yes - for Rugg Pond Dam, 2021		
State Soil Erosion, Sedimentation, and Stormwater Control Act 91 of the NREPA (enforced by Kalkaska County's Dept. of Planning, Zoning and Soil Erosion)	X	X	X	X	X	X	X	X	X	X	X	X	X
State of Michigan Construction Codes (enforced by Kalkaska County Building Dept.)	X	X	X	X	X	X	X	X	X	X	X	X	X
District Health Department #10 requires a Point of Sale Evaluation of onsite water/sewage disposal systems	X	X	X	X	X	X	X	X	X	X	X	X	X
Local Floodplain Management Ordinance (NFIP participant)			Yes										
Local outdoor burning ordinance	Residents are referred to MDNR website for current status on burning allowances: https://www.dnr.state.mi.us/burnpermits/												

	Kalkaska County Townships												Kalkaska County Villages
	Bear Lake	Blue Lake	Boardman	Clearwater	Coldsprings	Excelsior	Garfield	Kalkaska	Oliver	Orange	Rapid River	Springfield	Village of Kalkaska
Population Estimates (2019)	623	460	1,550	2,493	1,475	918	721	4,833	305	1,395	1,370	1,442	2,076
Community Assets													
Emergency Services (i.e., Fire, Police, or EMS)	1	1	1	1	1	shared Fire Dept. with Coldsprings	1	Twp. Fire located in the Village					6
Shelter Sites	1	1		1	1	1	1	1 (located in the Village)			1		2
Health Care Facilities				1									4
Boat Wash Station													
Aquatic Nuisances Ordinance (boat washing enforcement)													
Lake Protection Associations	Bear Lake Assn.			Elk-Skegemog Lakes Assn.	Manistee Lake Assn.	Manistee Lake Assn.							

VI. Goals and Objectives

The mission of the Kalkaska 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

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

- Enforce and/or incorporate natural hazards mitigation provisions in building code standards, ordinances, and procedures; and into the county's comprehensive master plan
- 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 review local roads, bridges, dams, and related transportation infrastructure for natural hazards vulnerability

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

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

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

- Encourage public and business involvement in natural hazards mitigation projects

VII. 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 mitigating 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 Kalkaska 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: RAVE Mobile Alert System; IPAWS (Integrated Public Alert and Warning System - FEMA's national system for local alerting that provides authenticated emergency and life-saving information to the public through mobile phones using Wireless Emergency Alerts, to radio and television via the Emergency Alert System, and on the National Oceanic and Atmospheric Administration's Weather Radio.)

Radio warning system: RAVE

Tornado/Severe Weather Systems: RAVE / IPAWS

Flood warning system: RAVE / IPAWS

Kalkaska County Emergency Management Department maintains contracts with local fire stations and township facilities in the county so that they may be utilized as temporary shelters in the event of an emergency (Table 35).

Table 35. Shelter Sites in Kalkaska County

Emergency Shelter Site Name	Generator (Y/N)	Overnight Accommodations (Y/N)	Street Address	City	ZIP
Bear Lake Township Hall	No	No	198 E. Bear Lake Rd.	Kalkaska	49646
Blue Lake Township Hall	Yes	No	10599 Twin Lake Rd. NE	Mancelona	49659
Clearwater Township Hall	No	No	5407 River St. NW	Rapid City	49676
Coldsprings Township Hall	No	No	6515 County Road 571 NE	Mancelona	49659
Excelsior Township Hall	Yes	No	987 County Road 571 NE	Kalkaska	49646
Garfield Township Hall	No	No	466 N. Sharon Rd. SE	Fife Lake	49633
Kaliseum Community Recreation Complex	No	No	1900 Fairgrounds Rd	Kalkaska	49646
Kalkaska County Commission on Aging/Senior Center	No	Yes	303 S. Coral Street	Kalkaska	49646
Kalkaska Township Hall	No	No	209 Laurel St.	Kalkaska	49646
Rapid River Township Hall	No	No	1010 Phelps Rd. NE	Kalkaska	49646

Mitigation Strategies and Implementation

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

A list of potential entities and programs is provided on the following pages that can assist with funding and implementation of the proposed hazard mitigation strategies. Each potential resource is assigned a letter code, and the appropriate letter(s) are listed in the “Resources” column of the strategies table.

Appendix C provides a review of mitigation strategies included in the 2016 plan, their current status, and how they have or have not been incorporated into the 2023 plan. The assigned priority levels for the 2016 strategies are also compared to what the 2023 plan has assigned for them. While both plans assigned priority levels of High, Medium, or Low for each strategy, the methodologies used to determine priority levels differ. The rationale used to determine the priority levels of strategies in the 2023 plan are described on page 75.

Appendix D provides a list of alternative mitigation strategies that were considered when developing strategies for each type of hazard.

ID	Resource	Description	Hazard Type	Website
A	**Kalkaska County staff**	Kalkaska County staff as appropriate	All hazards	https://www.kalkaskacounty.net/
B	**Local government staff**	All local units of government	All hazards	
C	**Local Emergency Services and Fire Departments**		Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Wildfire; Flooding; Extreme Temperatures; Public Health Emergency	
D	**Kalkaska County Commission on Aging**	The Commission on Aging provides services and support for seniors in Kalkaska County	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures; Public Health Emergency	https://www.kalkaskacounty.net/government/commission_on_aging/index.php
E	**District Health Department #10**	DHD #10 serves 10 counties in Michigan; those in the NW MI region include Kalkaska, Manistee, Missaukee, and Wexford counties. Their mission is to promote and enhance the health of our communities and environment through protection, prevention, and intervention. DHD #10 provides programs and services such as: immunizations; communicable disease reporting; issuing public health notifications; school health services; permitting processes for proper location and installation of water wells and septic systems; education about cleaning, monitoring and maintaining septic systems; septic or well repair financial assistance, and the inspection and licensing of food service establishments.	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures; Public Health Emergency	https://www.dhd10.org/
F	**Northern Michigan Community Action Association (NMCAA)**	NMCAA serves the counties of Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, Missaukee, Roscommon and Wexford. They provide the Weatherization Assistance Program and Emergency Home Repair Program for low- to moderate- income households. They also provide food distribution via the following USDA programs: monthly food package to low-income senior citizens via the Commodity Supplemental Food Program (CSFP), and The Emergency Food Assistance Program (TEFAP) to low-income persons through a quarterly distribution.	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures; Public Health Emergency	https://www.nmcaa.net
G	**"MI HOPE" Grants (Michigan Housing Opportunities Promoting Energy Efficiency)**	Program for up to $25K to repair or replace roofs, doors, windows, insulation, heating/cooling systems, water heaters, security lighting, Energy Star appliances and electrical systems for eligible low-income residents.	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures; Public Health Emergency	www.michigan.gov/mi-hope
H	**Habitat for Humanity Grand Traverse Region**	Home Repair Program for those whose income is under 60% of the Average Median Income (AMI) for their county; Can demonstrate a challenging circumstance such as limited income, disability, illness, or age that prevents them from making the repairs; and have owned their home for at least 12 months.	Severe winter weather; Thunderstorm, High Winds, Hail, Tornado, Lightning; Flooding; Extreme Temperatures; Public Health Emergency	https://www.habitatgtr.org/home-repair/
I	**Grand Traverse Regional Community Foundation - Kalkaska Area**	The Endowment for Kalkaska Area is designed to be responsive and flexible in addressing a variety of community needs and interests - both emerging and established - within Kalkaska County.	All hazards	https://www.gtrcf.org/kalkaska
J	**Groundwork Center for Resilient Communities**	With roots firmly embedded in the pro-health, pro-environment, and pro-economy principles of a local food system, the Groundwork Food and Farming team creates markets for local farmers, and helps connect locally grown food to school children, food pantry clients and families across the state.	Public Health Emergency	https://www.groundworkcenter.org/food-farming/
K	**Midwest Agriculture Climate Team**	MAC-T members are Extension specialists and state climatologists from many of the states represented in the Midwest Climate Hub, and NOAA NWS climate and weather specialists. The goal of this team is to share expertise regionally, discuss impacts and opportunities as it relates to agriculture and outlooks, and maintain an open line of communication so when weather/climate events do occur, the Midwest agriculture community is set to respond. The team meets monthly during the growing season regularly, and as needed during the winter season.	Drought, Extreme Temperatures, Flooding, Severe Winter Weather, High Winds, Hail	https://www.climatehubs.usda.gov/hubs/midwest/topic/midwest-agriculture-climate-team-mac-t
L	**NWS Climate Prediction Center**	The U.S. Drought Monitor is a map released every Thursday, showing parts of the U.S. that are in drought. The map uses five classifications: abnormally dry (D0), showing areas that may be going into or are coming out of drought, and four levels of drought: moderate (D1), severe (D2), extreme (D3) and exceptional (D4).	Drought	https://www.cpc.ncep.noaa.gov/products/Drought
M	**National Fire Protection Association Firewise USA Program**	Firewise USA Program: Each applicant must create a board/committee, complete a community wildfire risk assessment with a 3-year action plan to reduce ignition risk to homes, and complete annual educational and risk reduction actions identified in the plan.	Wildfire, Drought	https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA
N	**NFPA Community Wildfire Defense Grants**	Communities can use these grants from the USFS in a variety of ways to reduce the wildfire risk to people and property. One key use is capacity building for wildfire mitigation. For example, communities can use the grants to support the implementation and enforcement of wildfire-related codes and standards; to train people to assess wildfire risk and implement effective mitigation measures; and to perform outreach to community members through programs like Firewise USA®. Communities that build these fundamentals—sound land use and building practices, a skilled workforce, and an educated public—will be better prepared for sustained and effective risk reduction and better equipped to take advantage of future federal grants that prioritize communities with codes in place.	Wildfire, Drought	https://www.nfpa.org/Public-Education/Fire- causes-and-risks/Wildfire
O	**Consumer's Energy Utility Services**	Consumers Energy provides electrical and natural gas utility services. Energy through renewable energy sources is available. A power outage map is available to track outage locations.	All hazards.	https://www.consumersenergy.com/outagemap

ID	Resource	Description	Hazard Type	Website
P	**Great Lakes Energy Utility Services**	GLE provides electric and high-speed fiber internet and voice services. GLE provides an online power outage map to track outage locations. Also, Truestream's Status Map indicates where fiber internet is available or is being explored in the region.	All hazards.	https://www.gtlakes.com/power-outages/ https://www.truestreamfiber.com/status-map/
Q	**Connected Nation Michigan**	Connected Nation develops and provides the tools, resources, and methods that help states and communities create and implement solutions to their broadband and digital technology gaps. They assess and plan for the expansion of broadband access, adoption, and use. They empower people with technology skills and resources to improve their quality of life, and we develop public-private partnerships to bring technology access to targeted geographies and population.	All hazards.	https://connectednation.org/michigan/
R	**EGLE's Michigan Oil, and Gas and Minerals Division Data Explorer**	Interactive mapping tool to search for oil and gas well facilities and associated records throughout Michigan; list of oil and gas well types and status codes.	Flooding, Lightning, Tornado, Severe Winter Weather, High Winds	https://www.egle.state.mi.us/dataminer/ https://www.michigan.gov/egle/about/organization/oil-gas-and-minerals/oil-and-gas/oil-and-gas-well-type-and-status
S	**National Pipeline Mapping System - Public Map Viewer**	The National Pipeline Mapping System (NPMS) Public Map Viewer is a web-based mapping application designed to assist the general public with displaying and querying data related to: gas transmission and hazardous liquid pipelines, liquefied natural gas plants, and breakout tanks under Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) jurisdiction. This application does not contain distribution or gas gathering pipelines. Basic information about gas or hazardous liquid pipeline incidents is also available.	Extreme temperatures, flooding, and soil erosion.	https://www.npms.phmsa.dot.gov/
T	**EGLE's Wetlands Map Viewer**	The WMV application was created for the Department of Environment, Great Lakes, and Energy to provide the public with quick and easy access to wetland spatial data.	Flooding, Drought, Extreme Temperatures	https://www.mcgi.state.mi.us/wetlands/mcgiMap.html
U	**FEMA Floodplain Management Resources for Local Government Officials**	How to participate with the NFIP and tools and resources to provide higher standards for floodplain management.	Flooding	https://www.fema.gov/floodplain-management/manage-risk/local
V	**FEMA Flood Mitigation Assistance (FMA) Grant Program**	FMA is a non-disaster, competitive grant program that provides funding to states, local communities, federally recognized tribes. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program. ▪ $800 million available in funding for FY22 ▪ Application Period: September 30, 2022, to January 27, 2023 ▪ Period of Performance: 3 Years ▪ Cost-share: 25% non-federal ▪ Severe Repetitive Loss (up to 100% federal) ▪ Repetitive Loss (up to 90% federal) ▪ Priorities are set each fiscal year	Flooding	https://www.fema.gov/grants/mitigation/floods
W	**FEMA Building Resilient Infrastructure and Communities (BRIC) Grant Program**	BRIC is a non-disaster grant program, which provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects prior to a disaster. The BRIC program guiding principles are supporting communities through capability- and capacity building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency. Funding has doubled for BRIC to $2.295 billion for FY21. ▪ Caps: States/Territories Allocation and Activities: $2 million; Tribal set-aside: $2 million; National Competition: $2.133 billion ▪ Application Period: September 30, 2022 to January 27, 2023 ▪ Period of Performance: 3 year from start date on Recipient's federal award ▪ Cost-share: 25% non-federal ▪ Economically disadvantaged rural communities are eligible for 10% non-federal ▪ Priorities are set each fiscal year	All hazards	https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities
X	**FEMA Hazard Mitigation Grant Program (HGMP)**	HMGP is a post-disaster grant program, where funding is only made available under a Presidential major disaster declaration, in the areas of the State requested by the Governor. Federally-recognized tribes may also submit a request for a Presidential major disaster declaration within their impacted areas.	All hazards	https://www.fema.gov/grants/mitigation
Y	**HMGP Post-Fire Assistance (PFA) grant program**	This grant funds projects that make a community more resilient after a designated wildfire disaster. States and federally-recognized tribes affected by fires resulting in a Fire Management Assistance Grant (FMAG) declaration on or after October 5, 2018, are eligible to apply.	Wildfire, Drought	https://www.fema.gov/grants/mitigation/post-fire
Z	**State of MI: Resources and Best Practices to prevent and manage invasive species**	Prevention tips and action steps to control or remove invasive species.	Invasive Species	https://www.michigan.gov/invasives/take-action
AA	**Michigan Invasive Species Grant Program**	The Departments of Natural Resources, Environmental Quality and Agriculture and Rural Development work together to address strategic issues of prevention, detection, eradication, and control for both terrestrial and aquatic invasive species in Michigan. This program is designed to address strategic issues of prevention, detection, eradication and control for both terrestrial invasive species (TIS) and aquatic invasive species (AIS) in Michigan.	Invasive Species	www.michigan.gov/invasives/grants/misgp

ID	Resource	Description	Hazard Type	Website
BB	**EGLE's "NotMISpecies" webinar series**	This webinar series explores how agencies, universities and locally led organizations are working together to protect Michigan's natural resources through the Michigan Invasive Species Program. If you are concerned about the impacts of invasive species or interested in the techniques used to control them, join us as we examine species-specific actions, innovations in research and technology, and programs designed to help communities prevent and manage harmful invasive species.	Invasive Species	https://www.michigan.gov/invasives/take-action
CC	**Clean Boats, Clean Waters Program**	Funding from the Michigan Department of Environment, Great Lakes, and Energy and the Great Lakes Restoration Initiative has enabled Clean Boats, Clean Waters to grow into a comprehensive aquatic invasive species boater outreach program. The program's mission\ to prevent new aquatic invasive species introductions and limit their dispersal from water recreation activities through outreach and engagement. The program promotes understanding of boat cleaning practices and regulations through the distribution of educational materials, an online resource library, boat washing demonstrations, grants and partnerships.	Invasive Species	www.canr.msu.edu/clean_boats_clean_waters /index
DD	**Michigan State University Extension (MSUE)**	Resources available for: training elected and appointed officials, agriculture and food support programs, and natural resources protections.	All hazards	https://www.canr.msu.edu/outreach/
EE	**USDA Natural Resources Conservation Service (NRCS)**	The NRCS helps America's farmers, ranchers, and landowners conserve our nation's resources through voluntary programs and science-based solutions.	Drought; Extreme Temperatures; Invasive Species; Public Health Emergency	https://www.nrcs.usda.gov/
FF	**Kalkaska Conservation District**	Founded in 1950, the Kalkaska Conservation District works to steward the natural beauty of Kalkaska County. Through our efforts and community partners we're building thriving agriculture, healthy forests and the best recreation areas. All of these are essential to our local economy and high quality of life.	Flooding & Erosion; Invasive Species; Wildfire; Drought; Extreme Temperatures; Public Health Emergency	https://kalkaskaconservation.org/
GG	**Charlevoix, Antrim, Kalkaska, Emmet Cooperative Invasive Species Management Area**	To protect the natural resources, economy, and human health in Northern Lower Michigan through collaborative outreach and management of invasive species.	Invasive Species; Flooding and Erosion	https://www.michiganinvasives.org/cakecisma/
HH	**Conservation Resource Alliance**	Current projects include: Wild Roots, a cost-share program offering native plants to property owners at a greatly reduced rate; and The River Care Program, which ensures that natural resource professionals maintain a consistent and prioritized action plan for each river in the organization's region. River Care professionals not only find and repair physical problems before they become worse, they also team with local agencies, residents, and interest group representatives for fact-based conversations. These cross-functional teams can speak openly and affect change in an agile, efficient and transparent way. CRA works in the 10-county northwest MI region, along with the southerly adjoining counties of Mason, Lake, Osceola, Oceana and Newaygo.	Flooding & Erosion; Invasive Species; Drought; Extreme Heat; Public Health Emergency	https://www.rivercare.org/
II	**The Watershed Center Grand Traverse Bay**	The Watershed Center is solely dedicated to enhancing and protecting the quality of Grand Traverse Bay and its connected waterways.	Flooding & Erosion; Invasive Species, Public Health Emergency, Drought, Extreme Heat	https://gtbay.org/
JJ	**Upper Manistee River Association**	The purpose of this Association is to preserve and protect for future generations the Upper Manistee River system and its drainage as a world class natural resource. MRA consists largely, but not exclusively, of riparian property owners who share river related interests on that part of the Manistee River system, reaching from its head waters in southern Antrim and Otsego Counties downstream, 147 river miles, through Crawford, Kalkaska and Missaukee counties to highway US-131 in Wexford County.	Flooding & Erosion; Extreme Heat; Invasive Species, Public Health Emergency, Drought	
KK	**MSUE's Michigan Inland Lakes Partnership**	The purpose of the Michigan Inland Lakes Partnership (Partnership) is to engage state and local agencies, Native American Nations, outreach institutions (universities and other educational institutions), non-governmental organizations (NGOs), businesses, industries and citizens in a collaborative effort to ensure the quality, sustainability and ecological diversity of lakes, while considering society's needs. The Partnership will promote communication and cooperation between partners, communities and citizens interested in the management of Michigan's inland lakes, educating leaders, and strengthening stewardship efforts.	Inland flooding, shoreline erosion; Invasive Species	https://www.canr.msu.edu/michiganlakes/convention/
LL	**Bear Lake Association/ Lake Improvement Board**	Bear Lake Association informs and promotes the education of riparian property owners and other lake users about water issues and quality.	Inland flooding, shoreline erosion; Invasive Species	https://www.bearlakeassoc.com/
MM	**Manistee Lake Association/ Manistee Lake Improvement Board**		Inland flooding, shoreline erosion; Invasive Species	https://www.manisteelake.org/
NN	**Great Lakes Stream Crossing Inventory**	Previously, individual inventories were conducted by partnership agencies, watershed organizations, and road agencies but were not readily accessible to stakeholders and did not contain comparable information. The newly developed protocol and datasheet are intended to promote consistent data collection, selection criteria for improvement projects, and selection of appropriate Best Management Practices for each project to benefit all stakeholders. Information gathered on the datasheet can and has been used to prioritize structure replacement and successfully seek funding.	Flooding & Erosion	https://great-lakes-stream-crossing-inventory-michigan.hub.arcgis.com/

ID	Resource	Description	Hazard Type	Website
OO	**Michigan's Designated Natural Rivers Program**	Michigan's Natural Rivers program is a river protection effort that protects the natural quality of select river systems throughout the state by regulating their use and development through zoning rules. The Natural Rivers Program was developed to preserve, protect and enhance our state's finest river systems for the use and enjoyment of current and future generations by allowing property owners their right to reasonable development while protecting Michigan's unique river resources. There are 16 designated Natural River systems in Michigan. The designation includes the mainstream, as well as most of the tributaries. Nearly all construction, land change/earth moving, and placement of structures is regulated within 400-feet of any designated stream segment. Please consult with Natural Rivers Program staff for specific regulatory determinations.	Flooding & Erosion	https://www.michigan.gov/dnr/managing-resources/fisheries/natural-rivers
PP	**MDNR Natural Rivers Program Permitting Staff**	Contact Info	Flooding & Erosion	https://www.michigan.gov/dnr/-/media/Project/Websites/dnr/Documents/Fisheries/NaturalRivers/Natural-Rivers-Permitting-Staff-Map.pdf?rev=7a3c44f572f748b4af89534406b7e9c7

The Emergency Manager and Task Force considered factors like level of need, economic impact, ease of execution/level of effort, cost, and range of benefit (short term, long-term, small group/area, large group/area) when determining the level of priority for each strategy. Strategies that addressed a critical and/or emerging community need were prioritized as high priority strategies. High priority strategies are often action items that focus around planning efforts, implementation through zoning, and education efforts with moderate costs associated with them. Necessary, but ongoing tasks that provide a direct benefit to the community and natural resources were also categorized as either high or medium priority strategies. Strategies with minimal direct benefit to the community or natural resources were marked as low priority. The resources needed to implement the strategy / the cost of the strategy was considered, but not above the strategies potential benefit to the community.

PRIORITY

HIGH
MEDIUM
LOW

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

STRATEGY TYPES

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

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities in **BOLD**)	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Haz. Mati: Fixed Site Incidents	Haz. Mati: Transportation Incidents	Electromagnetic Pulses (EMPs)					1	2	3	4
Preparation and Awareness	1	**Incorporate the County Hazard Mitigation Plan's strategies** into elements of **County and local master plans.**	X	X	X	X	X	X	X	X	X	X	X	Countywide	**Kalkaska County, all townships, and Village of Kalkaska**	A, B	Ongoing	H	X	X	X	X
	2	**Continue to pursue interdepartmental cooperation and coordination of police, fire, rescue and EMS services** to achieve community-wide coverage availability.	X	X	X	X	X	X	X	X	X	X	X	Countywide	**County Sheriff; Village of Kalkaska Public Safety; local fire stations /EMS;** County EM	A, B, C	Ongoing	H	X				
	3	**Identify and promote resources that provide extreme weather and emergency notifications including RAVE, IPAWS, social media outlets, and radio channels**	X	X	X	X	X	X		X	X	X	X	Countywide	**County EM**	A, B	Ongoing	H				X
	4	**Continue to promote participation in Storm Spotter Training via partnership with the NWS.**		X										Countywide	**County EM**	A, B, C	Annually	L				X
	5	**Continue and expand public education/outreach efforts**, such as drills, exercises, programs, brochures, NOAA weather radio distribution, and website/social media information, **to aid in preparedness and resilience for hazard events.**	X	X	X	X	X	X	X	X	X	X	X	Countywide	**County EM**, DHD #10, MDNR	A, B, C	Annually	M	X	X		X
	5a	**Continue the preparedness practice of conducting the annual statewide tornado drill.**		X										Countywide	**County EM**	A, B, C	Annually	L	X			X
	5b	**Conduct public education and awareness activities such as programs, brochures, and online information, regarding flood mitigation efforts, wildfire prevention efforts, and preparedness for extreme temperature events**	X	X	X	X	X			X				Countywide	**County EM**, local fire Depts./First Responders, MDNR, ARC	A, B, C	Ongoing	M				X
	6	**Support the Kalkaska Commission on Aging's reduced cost snow plowing, meal delivery service, friendly visitor, and service with love programs.**	X	X	X	X	X			X				Countywide	**Kalkaska County Commission on Aging**	A, D	Ongoing	M	X			
	7	**Monitor and document persistent flood areas including areas of repetitive loss**				X								Countywide	**Kalkaska County**, local governments	A, B, C, T	Ongoing	M	X			
	8	**Continue to incorporate water conservation and floodplain management best practices into the planning and development process**				X		X						Countywide	**Kalkaska County Dept. of Building Codes**	A, B	Ongoing	H	X			
	9	**Assess local fire suppression access points and equipment and pursue improvements as needed.**			X									Countywide	County EM, KCRC, **Local fire departments; MDNR Wildfire Mgmt.,** Local governments	A, B, C	Ongoing	M	X			X
	10	**Continue to provide information to local communities that may benefit from participation in the Firewise USA® program.**			X			X						Countywide	**County EM, Local Fire Depts./First Responders,** MDNR, Local Governments	A, B, C, M	Ongoing	M	X			X
	11	**Continue to create Incident Action Plans for outdoor recreation sites including campgrounds and county parks.**	X	X	X	X	X			X				Countywide	**County EM**, MDNR, Private Campgrounds	A	Annually	M	X			X
	12	**Review and update event Incident Action Plans annually**	X	X	X	X	X	X		X				Countywide	**County EM**	A	Annually	M	X			

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities in **BOLD**)	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Haz. Matl: Fixed Site Incidents	Haz. Matl: Transportation Incidents	Electromagnetic Pulses (EMPs)					1	2	3	4
Preparation and Awareness	13	**Ensure that County residents, particularly vulnerable populations, have access to healthy, affordable food options.**						X	X	X				Countywide	**County Dispatch** keeps a list of vulnerable persons to check up on	A, D, F,	Ongoing	M	X	X	X	X
	13a	Consider involvement in **MSUE's School Gardens Program** (https://www.canr.msu.edu/community_food_systems/school-gardens/) and continue provision of the Kalkaska County **4-H Junior Master Gardener Program** partnership with schools for grades K-6						X	X	X				Countywide	**School districts**	A, DD, FF	3 years	L		X	X	X
	13b	**Utilize the dedicated space the county has for community garden use.**						X	X	X				Village of Kalkaska	**Kalkaska County**	A, B	1 - 3 Years	M			X	X
	13c	**Continue acceptance of WIC Project Fresh, Senior Project Fresh, SNAP/EB-T, Communities in Schools vouchers at the Kalkaska Farmers Market**								X				Countywide	**Kalkaska Farmers Market**	FF	Annually; May - December	M	X			
	13d	**Support food rescue programs, involving public/private partnerships** between farms, restaurants, hotels and other venues of large food production, can partner with local food pantries and schools to make good food more widely available.	X	X	X	X	X			X				Countywide	NMCAA; **KAIR food pantry**; School Districts (school meal programs); churches	A, D, F	Ongoing	L	X			
	14	**Continue to manage invasive species with treatment programs and promoting public awareness of invasive species management**							X					Countywide	Kalkaska County, KCD, **CAKE-CISMA**	A, Z, DD, FF, GG, II, JJ, KK, LL, MM, NN, OO	Ongoing	H	X		X	X
	15	**Continue programs and services offered by the DHD #10 and/or MDHHS**				X				X				Countywide	**DHD#10**, MDHHS	A, E	Ongoing	M	X	X	X	X
	16	**Continue to coordinate with the MDHHS for guidance via their State Pandemic Plan and information about new or emerging disease threats.**								X				Countywide	**DHD #10**, MDHHS; County EM	A, E	Ongoing	M	X			X
	17	**Share education materials with the public about the impacts of solar geomagnetic storms and EMPs and how to respond if an event occurs.**											X	Countywide	**Kalkaska County**	A	0 - 1 Year	H				X
Shelters	18	**Equip emergency shelter facilities with supplies to protect electronic equipment**											X	Countywide	**County EM**, local governments	A, B, C	1 Year	H				X
	19	**Consider back up communication systems available at emergency shelter facilities suitable for long-term power outages or network outages.**	X	X									X	Countywide	**County EM**, local governments	A	1 - 3 Years	M		X		X
	20	**Maintain an accurate inventory of emergency shelter sites (overnight vs. daily use types) within the service area;** review annually and update as needed.	X	X	X	X	X			X				Countywide	**County EM**; American Red Cross	A, B, C	Annually	M	X			
	21	**Provide local governments or public/private organizations information on funding sources for the installation of generators** to enhance capabilities of emergency shelter locations.	X	X	X	X	X			X				Countywide	**County EM**; Local Fire Depts.; Senior Centers; Municipal Offices	A, W	1 - 5 years	M		X		X
	22	**Review emergency shelter locations and consider additional sites as needed including emergency "safe rooms"**	X	X		X	X							Countywide	**County EM**; County Building Dept.; local govts; private and public site managers	A, W	3 years	L	X	X		
	23	**Provide emergency shelter location information at all outdoor recreation sites.**	X	X	X	X	X			X				Countywide	**Kalkaska County, MDNR**	A, W	1 year	M				X
	24	**Maintain procedures to create emergency quarantine areas in group living quarters**, such as overnight shelters or assisted living facilities.								X				Countywide	**ARC**, DHD #10, **Assisted living facilities**	A, W	Ongoing	L	X			

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities in **BOLD**)	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Haz. Matl: Fixed Site Incidents	Haz. Matl: Transportation Incidents	Electromagnetic Pulses (EMPs)						1	2	3	4
Buildings & Infrastructure	25	**Continue enforcement of the County Building Code, Soil Erosion and Sedimentation Code, and District Health Dept. Code for new construction through the permitting process.**	X	X		X	X			X				Countywide	**County Building Dept.; ACD; DHD#10**	A, E	Ongoing	H	X			
	26	**Consider revising zoning code requirements in high fire-risk areas to include wildland fire risk mitigation practices**			X									Countywide	**County Building Department, local governments**	B, M, N	Ongoing	H	X			X
	27	**Continue enforcement of the zoning standards for areas of land within these Michigan Designated Natural River systems: Boardman and Upper Manistee River**				X								All Townships EXCEPT Rapid River and Clearwater Townships	MDNR Natural Rivers Program Permitting Staff; **Local Township Boards**	B, OO	Ongoing	M	X		X	
	28	**Implement strategic action plan for Rugg Pond Dam**				X								Rapid River Township	**Kalkaska County**, KCD, Rapid River Township	A, B, W	1 - 2 years	H	X			
	29	**Investigate funding sources for maintenance repairs to the Youngs Dam in Boardman Twp.**				X								Boardman Township	**Boardman Township**	**A, B**	1 - 2 years	M		X		
	30	**Continue to pursue opportunities for brownfield and blight clean-up activities**, including demolition and clearance of vacant, condemned structures, **to remove actual and potential sources of land, water and air contamination.**	X	X	X	X				X	X			Countywide	**Village of Kalkaska**	A, B	Ongoing	M	X	X	X	X
	31	**Promote the availability of low-cost residential weatherization and home improvement programs.**	X	X	X	X	X			X				Countywide	**NMCAA**	D, G	1 - 3 years	M		X		X
	32	**Pursue FEMA hazard mitigation assistance grants as appropriate (i.e., culvert/bridge replacement, storm sewer retrofitting, storm water management, dry flood-proofing of structures; structure elevation; property acquisition, for structure demolition or relocation; nature-based solutions.)**	X	X	X	X	X		X	X				Countywide	**Kalkaska County, KCRC**, local governments	V, W	Ongoing	H		X	X	
	33	**Inventory and prioritize improvements for flood prone locations**				X								Countywide	**KCRC, Drain Commissioner**	W	1 year	M	X	X		
	33a	**Hoiles Drive NW, east of Baggs Road**				X								Clearwater Township		W	2 year	M		X		
	33b	**Rapid City Road NW near Zimmerman Road NW**				X								Clearwater Township		W	1 year	M		X		
	33c	**Hillcrest Boulevard, south side of Bear Lake**				X								Bear Lake Township		W	1 year	M		X		
	33d	**Arwood Trail NW**				X								Clearwater Township		W	1 year	M		X		
	33e	**Twin Lake Road between Big and Little Twin Lakes**				X								Blue Lake Township, Coldsprings Township		W	2 year	M		X		
	33f	**Lake Drive NE at base of hill from Maple Grove Drive NE**				X								Excelsior Township		W	2 year	M		X		
	34	**Inventory and prioritize improvements for problematic culverts or bridges that need reconstruction or replacement to improve water and habitat quality, as well as reduce occurrence of localized flooding.**				X								Countywide	**KCRC, MDOT,** Drain Commissioner	A, B	1 year	H	X	X	X	
	35	**Continue to require Point of Sale evaluations, where no sale of a parcel containing an on-site water supply and/or on-site sewage disposal system may take place until conditions are met.**				X				X				Countywide	County, **DHD#10**	A, B, E	Ongoing	M		X	X	

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities in **BOLD**)	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Haz. Matl: Fixed Site Incidents	Haz. Matl: Transportation Incidents	Electromagnetic Pulses (EMPs)					1	2	3	4
Utilities & Technology	36	**Continue work amongst the utility companies** (GLE, Consumers E.), **the Kalkaska County Road Commission & MDOT to clear vegetation** (particularly diseased or dead trees, i.e., from Emerald Ash Borer infestations) **along various road and utility right-of-ways** to minimize power outages and road blockages from storm damage.	X	X	X				X					Countywide	**KCRC, MDOT,** Great Lakes E., Consumers Energy	A, O, P	Ongoing	M	X		X	
	37	**Continue to maintain effective communications practices between electric utility companies and County Emergency Management regarding power restoration.** (County EM to post and promote the electrical outage map on social media account.)	X	X	X	X	X							Countywide	Consumers Energy or Great Lakes Energy and **County Emergency Mgmt.**	A, O, P	Ongoing	M				X
	38	**Investigate opportunities to bury overhead utilities**, such as during new construction or in areas regularly prone to power outages.	X	X	X		X							Countywide	**Lcoal Zoning Enforcement,** Consumers Energy or Great Lakes Energy	A, O, P, Q,	1 - 2 years	L	X	X		
	39	**Maintain Continuity of Operations (COOP) and Continuity of Government (COG) plans.**								X				Countywide	**County and Local Government Agencies; Public Schools**	A, O, P, Q,	Ongoing	H	X			
	40	**Continue to expand availability of high-speed internet service to allow for widely available remote work/learning.**	X							X				Countywide	**Local service providers;** Connected Nation MI; Kalkaska County	A, O, P, Q,	Ongoing	M	X	X		X

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities in **BOLD**)	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Haz. Matl: Fixed Site Incidents	Haz. Matl: Transportation Incidents	Electromagnetic Pulses (EMPs)						1	2	3	4
Environment & Natural Resources	41	**Continue to utilize and promote the expansion of technical assistance, outreach and education pertaining to invasive species management** (monitoring, treatment & removal) **provided by non-profit and government agencies.**							X					Countywide	**KCD, CAKE-CISMA,** CRA, MI EGLE, MDNR, MDARD, **MSUE**	A, B, Z, DD, EE, FF, GG, HH, II, JJ, KK, LL, MM, NN	Ongoing	H	X		X	X
	41a	**Continue to provide invasive species management services with reduced-cost services for landowners.**							X					Countywide	KCD, **CAKE-CISMA**, USDA-NRCS, MAEAP	DD, FF, GG	Ongoing	M			X	X
	41b	**Continue to conduct annual routine invasive species surveying and monitoring to identify new emergent invasive species** (*such as Cypress Spurge or Leafy Spurge)* before they get established and spread in the county.							X					Countywide	KCD, **CAKE-CISMA**, CRA, **Bear Lake Improvement Board**	DD, FF, GG	Ongoing	M	X		X	X
	41c	**Consider participating in EGLE's annual Great Lakes Aquatic Invasive Species "Landing Blitz" event at public boat launches**, emphasizing the need to Clean, Drain, Dry boats whenever they come out of the water, and Dispose of any unwanted bait in the trash.							X					Clearwater Township (DNR boat launch on Torch River); Coldsprings Township (Manistee Lake boat launch)	**CAKE-CISMA**	Z	Ongoing	M			X	X
	41d	**Promote MSUE's "Clean Boats, Clean Waters"** comprehensive aquatic invasive species **boater outreach program;** apply for grant funding to communicate aquatic invasive species prevention information through outreach materials and in-person educational events to boaters.							X					Public boat launches are located in all communities except the Village of Kalkaska, Excelsior Township and Boardman Township.	Kalkaska County Parks & Recreation, MDNR, **KCD**, local governments	DD	Annually	M	X		X	X
	41e	**Promote EGLE's "NotMISpecies" webinars and resources on invasives control and management**							X					Countywide	**KCD, CAKE-CISMA, MSUE**	BB	Ongoing	L			X	X
	41f	**Investigate alternative, effective and less expensive invasive species control measures**, such as livestock grazing.							X					Countywide	KCD, **CAKE-CISMA**	AA, DD, EE, FF, GG, HH	3 - 5 years	M			X	
	42	**Support management of natural areas and restoration and removal of species that are not supposed to be there**							X					Clearwater Township, Countywide	**KCD, CAKE-CISMA**	AA, DD, EE, FF, GG, HH	Ongoing	M	X		X	X
	43	**Install temporary or permanent boat-washing facilities at other water access sites** to reduce the spread of invasives.							X					Lake Skegemog, Torch Lake, Fife Lake	**Kalkaska County, MDNR, Lake Associations**	Z, AA, EE, FF, GG	2 - 3 years	M	X		X	X

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE											WHERE - Affected Locations or Groups	WHO - Responsible Parties (Lead entities in **BOLD**)	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Haz. Mati: Fixed Site Incidents	Haz. Mati: Transportation Incidents	Electromagnetic Pulses (EMPs)					1	2	3	4
Environment & Natural Resources	44	**Identify existing and potential new locations for boot and/or equipment cleaning facilities** at popular trailheads (non-motorized, equestrian, and ORV/Motorcycle) and on logging trails to reduce the spread of invasives species.							X					Countywide	**MDNR**, **GTRLC**, KCD, CAKE-CISMA,	Z, AA, EE, FF, GG	1 - 2 years	M	X		X	X
	45	**Consider adoption of local ordinances that regulate activities to prevent the introduction of or the contribution to the spread of invasive species,** such as prohibiting the use of invasive species in landscaping and/or vegetative riparian buffers, **and allow treatment of existing infestations.**							X					Countywide	**Local governments**	B, FF, GG	1 - 3 Years	H	X		X	X
	46	**Continue implementation of MDNR Forestry Management Plans that outline mitigation efforts for invasive species.**	X	X	X	X	X	X	X					MDNR Lands	**MDNR**	A, B, FF, GG	Ongoing	M	X		X	
	47	**Continue to conduct wildfire management such as prescribed burns and surface fuels management projects** (this also encourages regeneration of native plant species).			X				X					Countywide	**MDNR**	A, B, C	Ongoing	H	X		X	
	48	**Continue efforts to regularly clean up river and lake debris, as well as clean out plugged culverts** (due to beaver activity, sediment deposits, invasive species, etc.)				X								Countywide	**KCD, KCRC**	A, B, FF, GG	Ongoing	M			X	X
	49	**Identify and prioritize sites for open space protection/preservation, green infrastructure and/or stormwater management,** especially in areas prone to flooding or erosion.		X		X	X		X					Countywide	**Kalkaska County**, local governments, KCD, **GTRLC**, MDNR	A, B, FF, GG	2 - 3 years	M			X	
	50	**Encourage identified flood prone areas be used for open space**		X		X								Countywide	**Kalkaska County, local governments**	A, B, FF, GG	1 - 2 years	M			X	
	51	**Develop an interconnected system of trailways that link communities, parks, and existing trails**				X	X		X	X				Countywide	**Kalkaska County**, local governments, KCD, GTRLC, MDNR	A, B, FF, GG	5 years	L	X	X	X	X
	52	**Investigate the potential to continue groundwater monitoring for contamination in the vicinity of the Kalkaska County PBB Cattle Burial site.**								X	X			Garfield Twp.	MDNR, EGLE, **Kalkaska County**, Garfield Twp.	A, B, Z	1 - 2 years	L			X	X

VIII. Implementation

Hazard mitigation is any action taken before, during, or after a disaster to permanently eliminate or reduce the long-term risk to human life and property from natural and technological hazards. Mitigation is an essential element of emergency management, along with preparedness, response, and recovery. Emergency management includes four phases: actions to mitigate a disaster, a community prepares for a disaster; responds when it occurs; and then there is a transition into the recovery process. The process is cyclical and mitigation measures are evaluated and adopted constantly. The evaluation improves the preparedness posture of the County for the next incident, and so on. When successful, mitigation will lessen the impacts of natural hazards to such a degree that succeeding incidents will remain incidents and not become disasters.

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 Kalkaska County Emergency Management Office and will coordinate with the County Board of Commissioners.

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

- Kalkaska County Government Staff
- Townships and the Village of Kalkaska
- Kalkaska County Conservation District
- Kalkaska County Drain Commissioner
- Kalkaska County Road Commission
- District Health Department #10
- Charlevoix, Antrim, Kalkaska, Emmet Cooperative Invasive Species Management Area
- 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
- Federal Emergency Management Agency
- 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 village 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 will be handled by each jurisdiction that have an adopted Master Plan and regulate zoning in the project area.

The Village of Kalkaska and five townships (Blue Lake, Boardman, Clearwater, Garfield, and Rapid River) administer their own zoning. The remaining townships (Bear Lake, Coldsprings, Excelsior, Kalkaska, Oliver, Orange, and Springfield) utilize county zoning. Professional planners are utilized on an as needed basis to assist the county and communities in developing plans and zoning ordinances, provides resource information and technical assistance, and convene communities to address land use issues of common interest.

The Kalkaska County Construction Codes Department completes building and trade inspections for all building projects within the county and issues all building permits. Kalkaska County also employs a soil erosion control officer to issue soil erosion and sedimentation control permits.

Plan Integration
The Village of Kalkaska and all townships in Kalkaska County, and local and state agencies will consider integrating information from the hazard mitigation plan into their comprehensive and operations plans. Kalkaska County is updating their Master Plan and will consider incorporating policies to support hazard mitigation. 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 Kalkaska 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 Leelanau Board of Commissioners can review, approve, and adopt the plan. In order to properly update the plan, Leelanau County will need to seek funding from appropriate state and federal agencies.

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

APPENDIX A – MAPS

Click on links to view high resolution maps:

1. Environmental Features
https://drive.google.com/file/d/1Cr5_wfF13TbnW-IPdJVrOhrXVrlr7Atc/view?usp=sharing

2. Infrastructure
https://drive.google.com/file/d/19gKqIErMv7Ry-x-RNSq3264knjJ8LAMT/view?usp=sharing

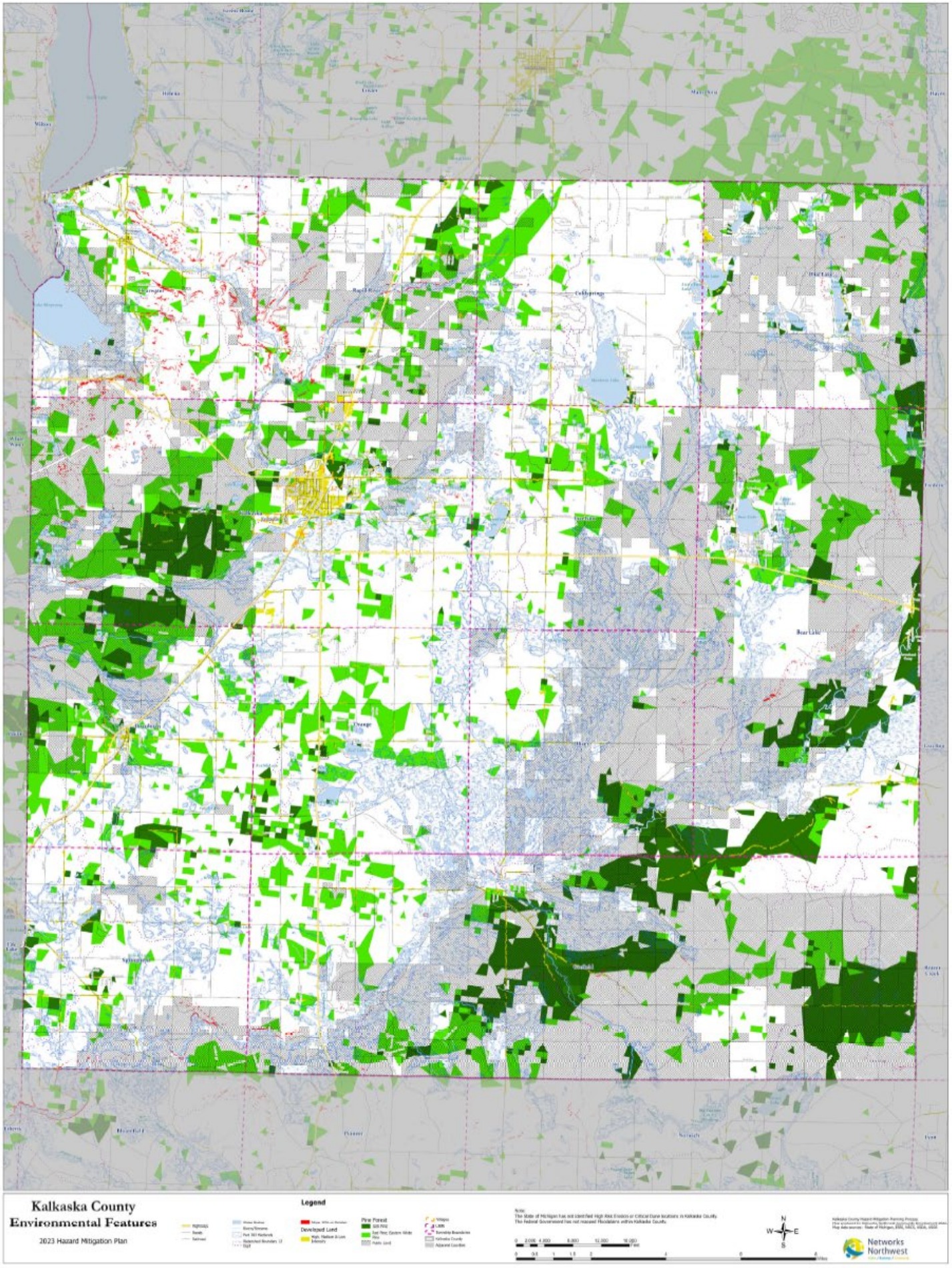
3. Hazard Areas
https://drive.google.com/file/d/1VgF2I_BeZ_83ElGvV384ca12h7rwcw_L/view?usp=sharing

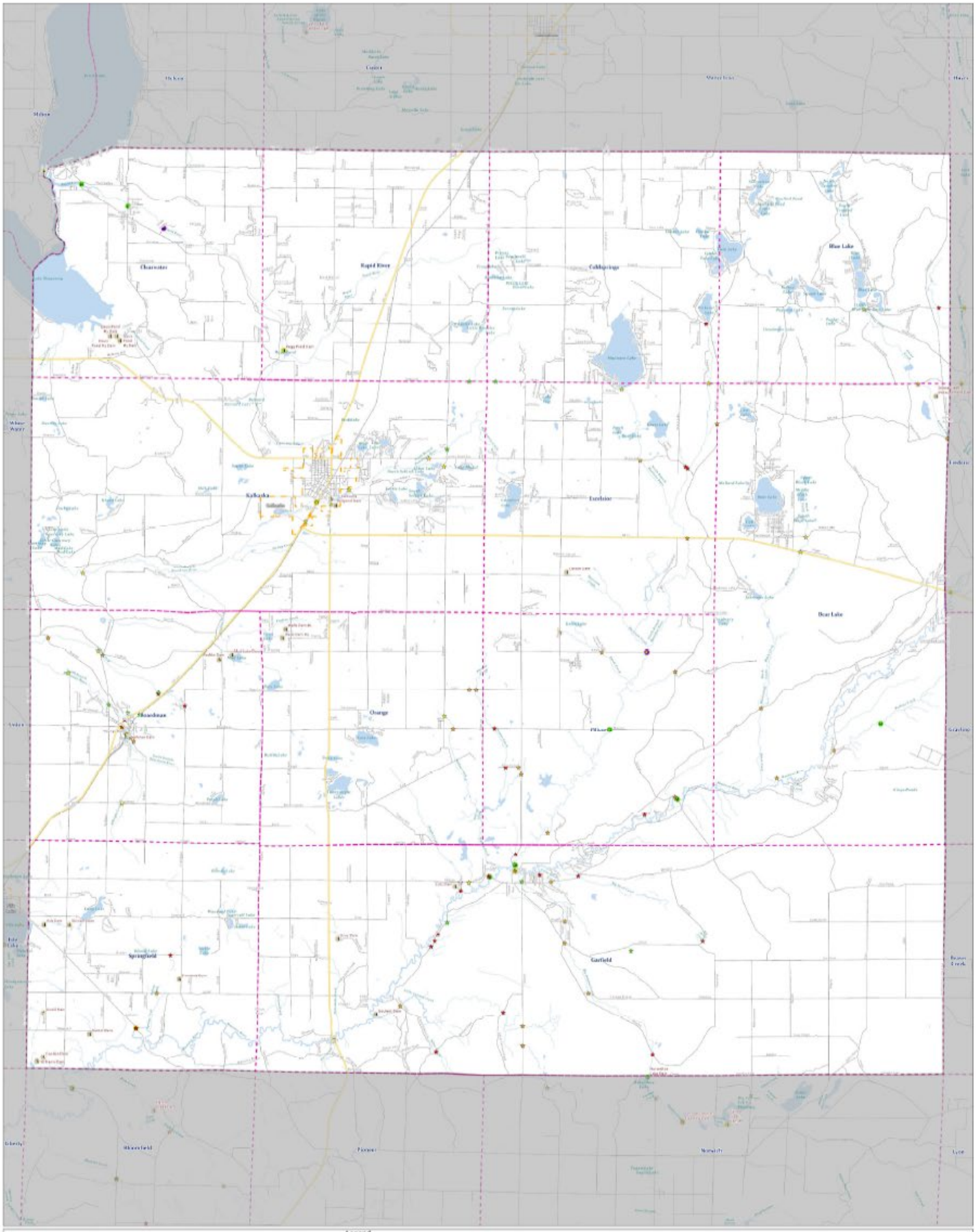
4. Vulnerable Populations and Hazard Areas
https://drive.google.com/file/d/1V3ck6dhLIcA2C_wKtS5Zza-zoEyQS9NK/view?usp=sharing

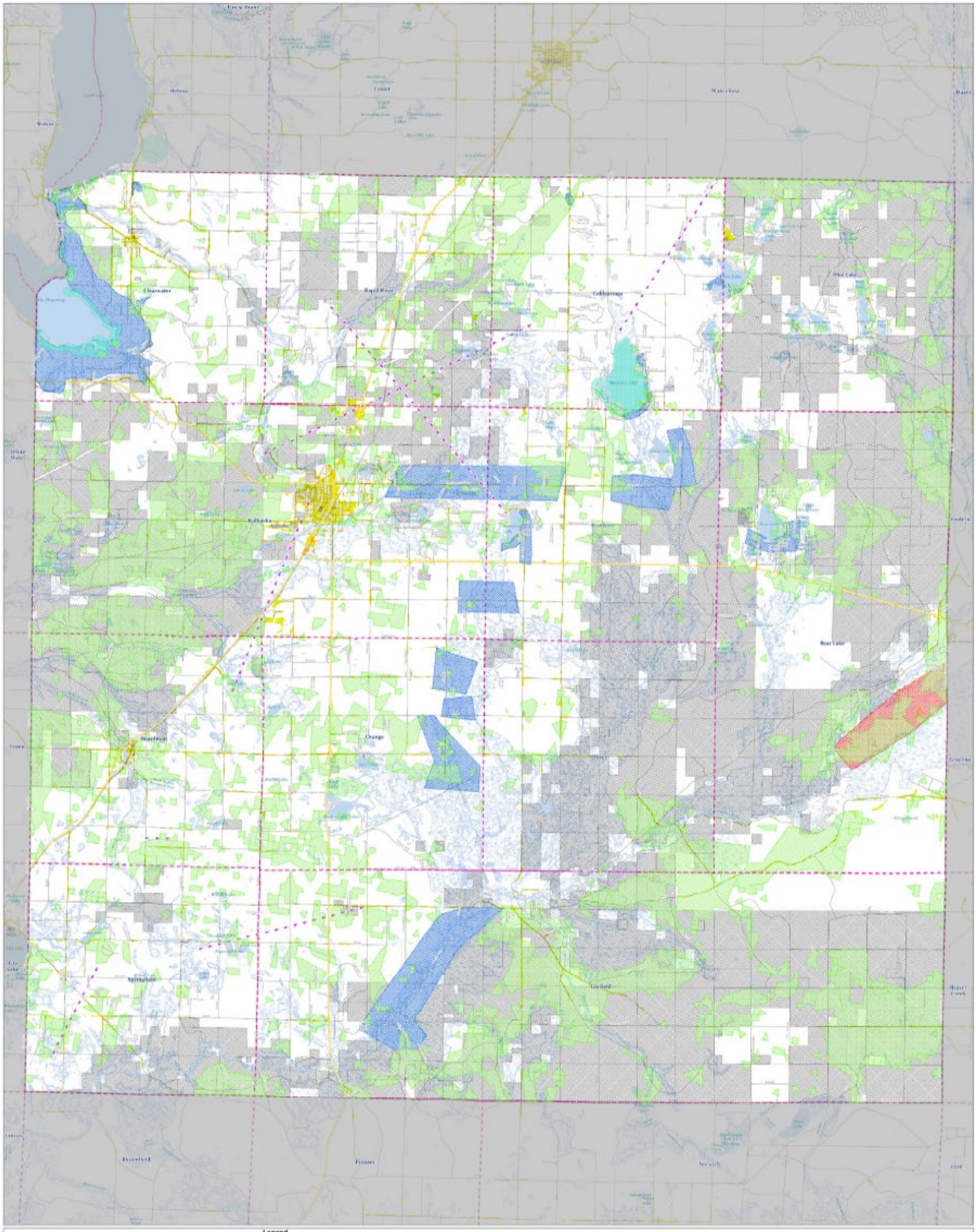
5. Critical Infrastructure
https://drive.google.com/file/d/157wUvxw5dwDq52yQRHeJx7pKLLMDjNdp/view?usp=sharing

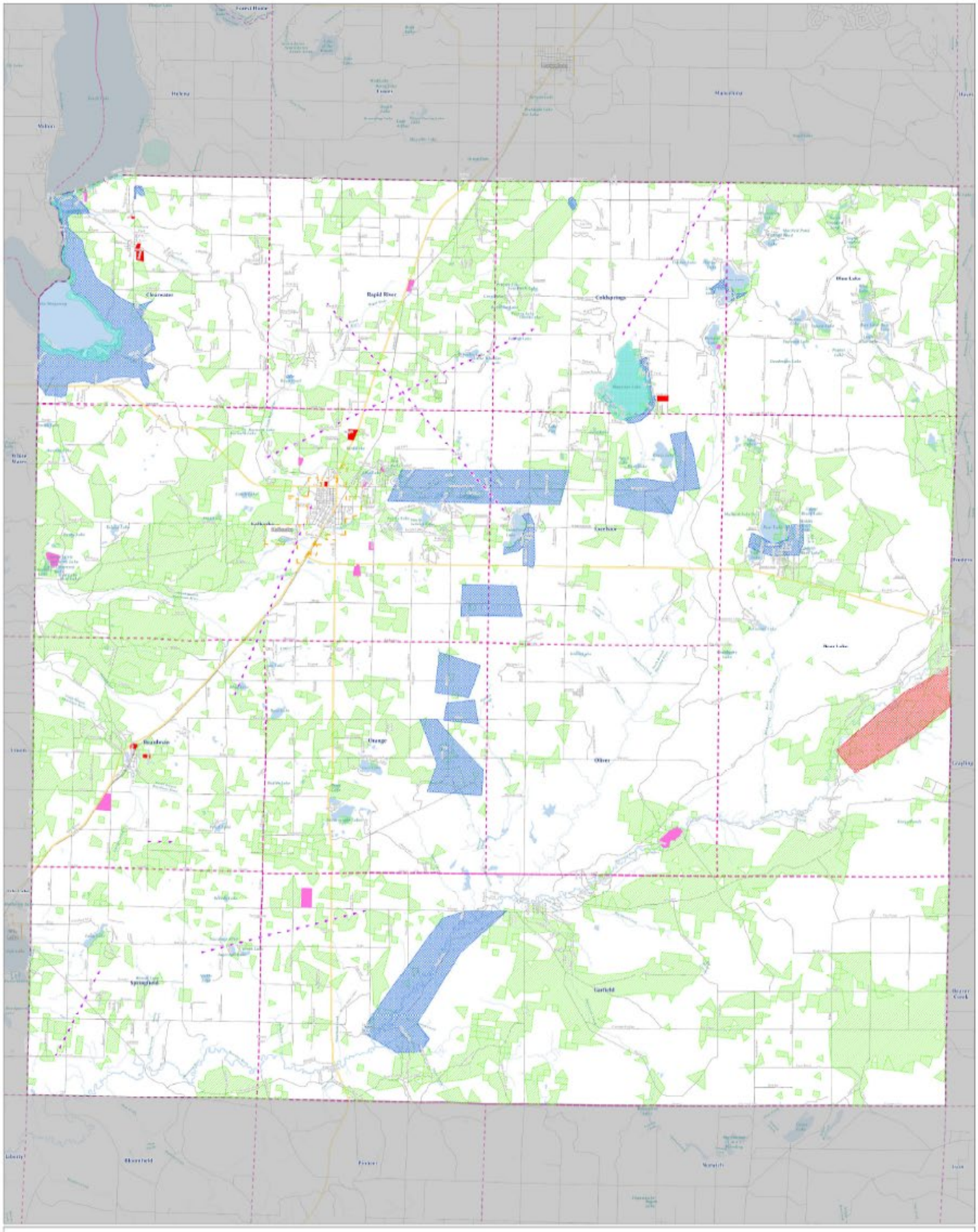
6. Critical Infrastructure and Hazard Areas
https://drive.google.com/file/d/1_TTlyayc5TiGV3tTG9R7ISrzV6rON-sG/view?usp=sharing

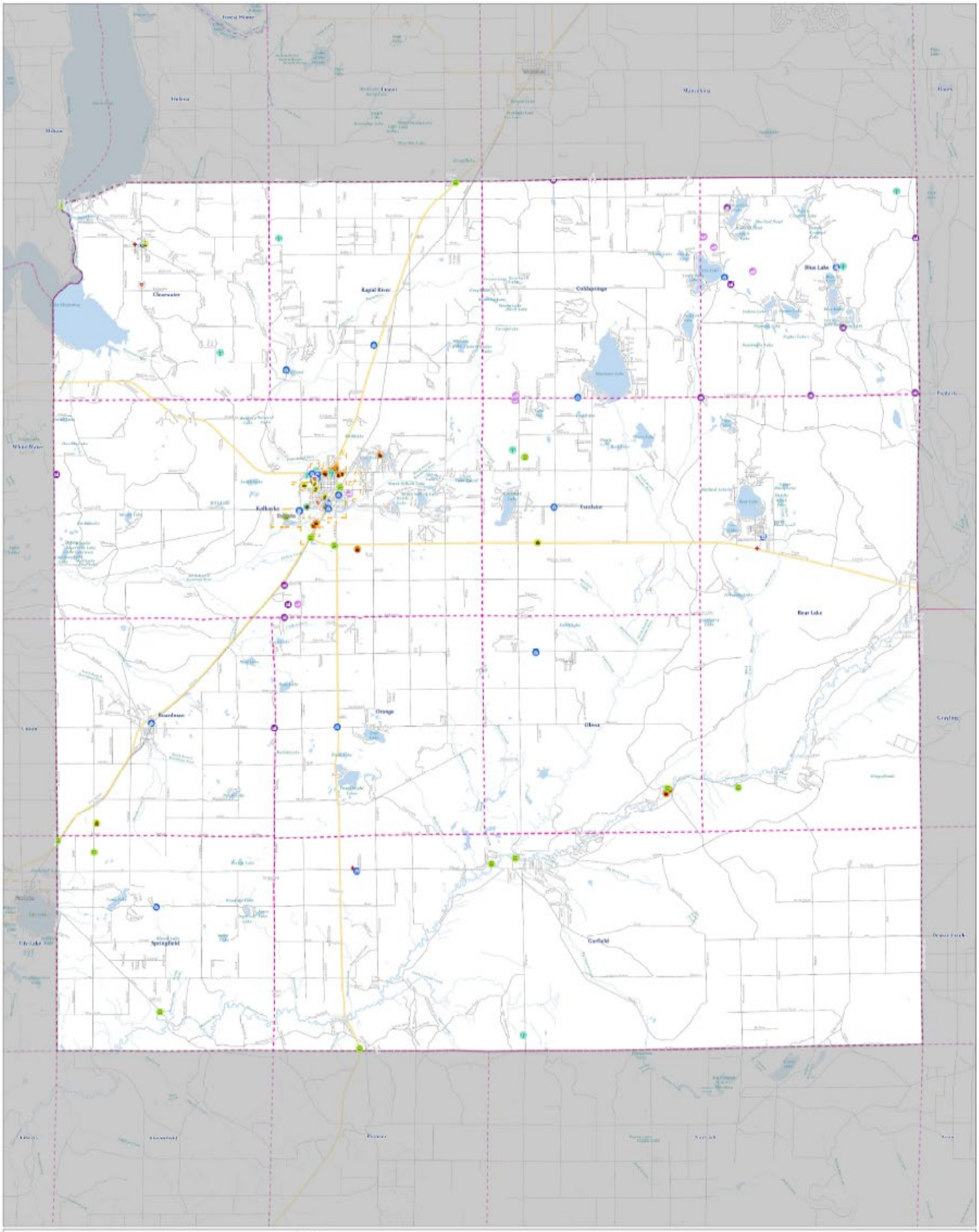
7. Boardman Township Flood Hazard Boundary Map (FEMA, 1977)

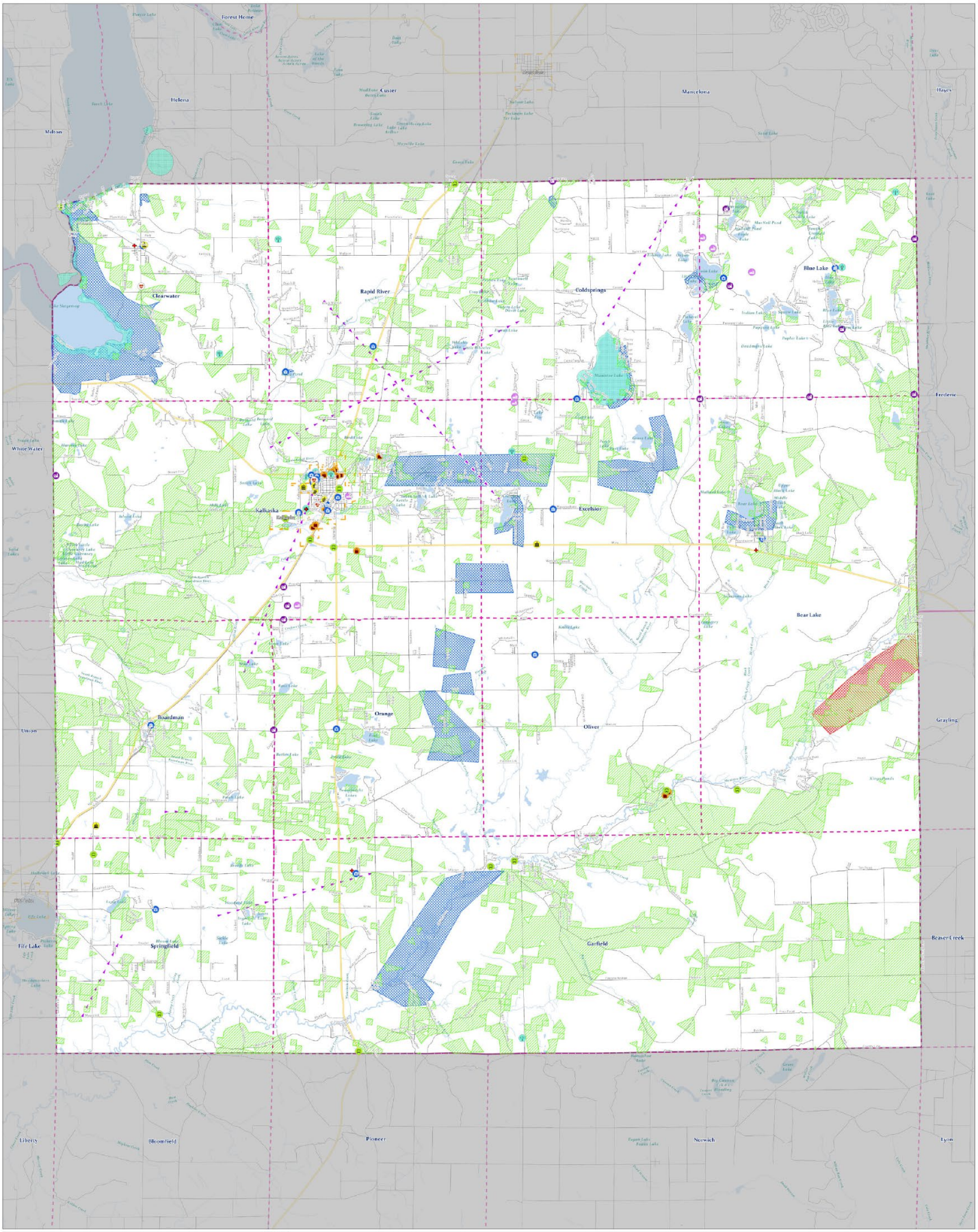

Kalkaska County
Environmental Features
2023 Hazard Mitigation Plan
Legend
Developed Land
Pine Forest
Networks Northwest


Kalkaska County
Infrastructure
2023 Hazard Mitigation Plan
Legend
Stream Crossings (CRA)
Severity
Bridge Condition
Rating
MI Dam Inventory
Condition
Highways
Roads
Railroad
Rivers/Streams
Water Bodies
Villages
Cities
Township Boundaries
Kalkaska County
Adjacent Counties
Kalkaska
Rapid River
Blue Lake
Excelsior
Orange
Garfield
Springfield
Networks Northwest


Kalkaska County
Hazard Areas
2023 Hazard Mitigation Plan
Legend
Hazard Area
Developed Land
Networks Northwest


Kalkaska County
Vulnerable Populations &
Hazard Areas
2023 Hazard Mitigation Plan
Legend
Networks Northwest


Kalkaska County
Critical Infrastructure Points
2023 Hazard Mitigation Plan
Legend
Critical Infrastructure Points
Networks Northwest



Kalkaska County Critical Infrastructure Points & Hazard Areas

2023 Hazard Mitigation Plan

Legend

Critical Infrastructure Points
- Commercial
- Communications
- Emergency Services
- Energy
- Government Facilities
- Healthcare
- Industry
- School
- Transportation

Hazard Area
- Fire
- Flood
- Pine Forest
- Tornado Paths
- Invasive Species

- Highways
- Roads
- Railroad
- Rivers/Streams
- Water Bodies
- Villages
- Cities
- Township Boundaries
- Kalkaska County
- Adjacent Counties

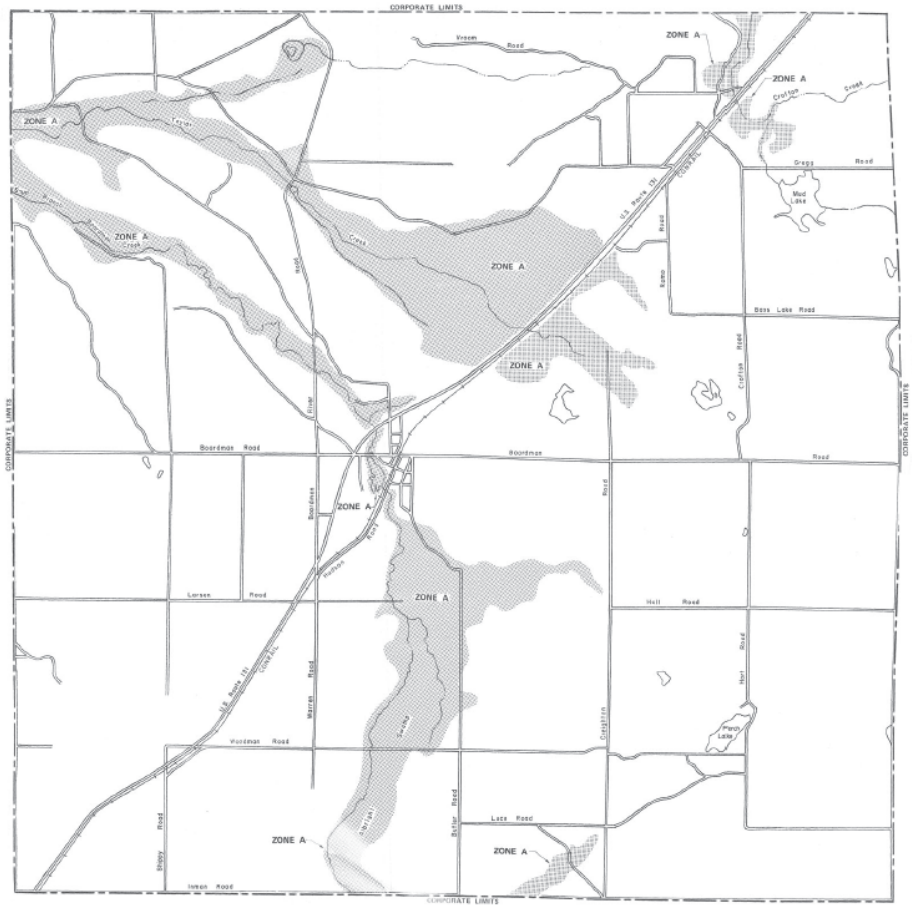
0 2,500 5,000 10,000 15,000 20,000 Feet

0 0.5 1 1.5 2 4 6 8 Miles

N W E S

Kalkaska County Hazard Mitigation Planning Process.
Map produced by Networks Northwest Community Development 2022.
Map data sources: State of Michigan, ESRI, NRCS, USDA, USGS, CRA, MDOT
Kalkaska County Emergency Management

Networks Northwest



KEY TO SYMBOLS

SPECIAL FLOOD HAZARD AREA — ZONE A

Note: These maps may not include all Special Flood Hazard Areas in the community. After a more detailed study, the Special Flood Hazard Areas shown on these maps may be modified, and other areas added.

CONSULT FIRM SERVICING COMPANY OR LOCAL INSURANCE AGENT OR BROKER TO DETERMINE IF PROPERTIES IN THIS COMMUNITY ARE ELIGIBLE FOR FLOOD INSURANCE.

INITIAL IDENTIFICATION DATE:
AUGUST 5, 1977

APPROXIMATE SCALE IN FEET
1000 0 2000

FLOOD HAZARD BOUNDARY MAP

TOWNSHIP OF BOARDMAN, MICHIGAN KALKASKA COUNTY

PAGE 1 OF 1

EFFECTIVE DATE:
AUGUST 5, 1977

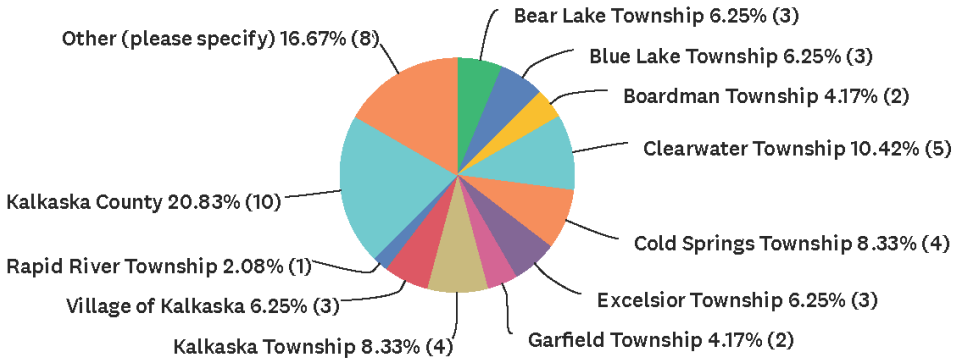
COMMUNITY—PANEL NUMBER
260430 0001 A

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

APPENDIX B – COMMUNITY SURVEY RESULTS

Q1 Please indicate the local jurisdiction you represent in Kalkaska County.

Answered: 48 Skipped: 0



ANSWER CHOICES	RESPONSES	
Bear Lake Township	6.25%	3
Blue Lake Township	6.25%	3
Boardman Township	4.17%	2
Clearwater Township	10.42%	5
Cold Springs Township	8.33%	4
Excelsior Township	6.25%	3
Garfield Township	4.17%	2
Kalkaska Township	8.33%	4
Village of Kalkaska	6.25%	3
Oliver Township	0.00%	0
Orange Township	0.00%	0
Rapid River Township	2.08%	1
Springfield Township	0.00%	0
Kalkaska County	20.83%	10
Other (please specify)	16.67%	8
TOTAL		48

#	OTHER (PLEASE SPECIFY)	DATE
1	Michigan State Police	11/29/2021 12:52 PM

2	Road Commission	11/29/2021 11:29 AM
3	Private and Public land within the county.	11/29/2021 8:59 AM
4	Kalkaska Conservation District	11/26/2021 11:41 AM
5	Both Coldsprings and Excelsuor Twp.s	11/24/2021 3:19 PM
6	we work in several jurisdictions in Kalkaska County	11/10/2021 3:14 PM
7	Antrim County	11/9/2021 8:43 AM
8	Entire County	11/8/2021 11:42 AM

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

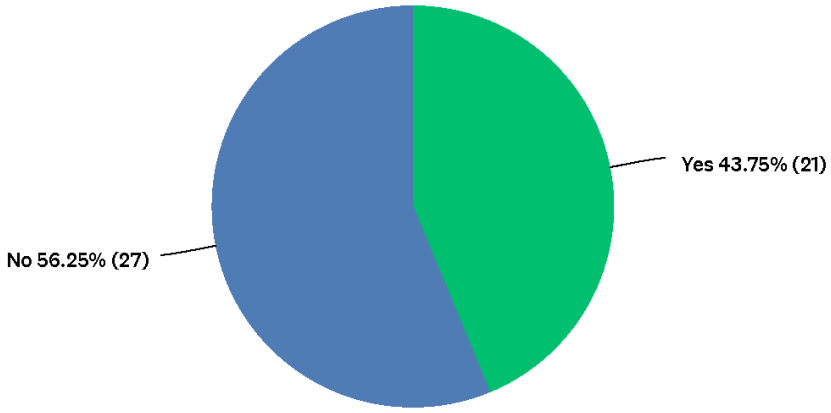
Answered: 48 Skipped: 0

#	RESPONSES	DATE
1	President of CETA	1/10/2022 11:21 AM
2	Manager	12/28/2021 3:57 PM
3	Elected Official	12/15/2021 9:33 AM
4	Elected official	12/14/2021 9:40 PM
5	County Clerk / Administrator	12/14/2021 4:19 PM
6	County Drain Commissioner and member of the County Damage Assessment Team.	12/14/2021 1:02 PM
7	Supervisor	12/9/2021 2:57 PM
8	Township Planning and Zoning Administrator	12/8/2021 3:35 PM
9	Clearwater Township Planning Commission, Vice-Chair	12/5/2021 10:56 AM
10	county commissioner	12/3/2021 12:39 PM
11	President, Bear Lake Association	12/2/2021 10:09 AM
12	Elected Official - Treasurer	12/2/2021 7:15 AM
13	Supervisor	12/2/2021 3:43 AM
14	elected official, clerk	12/1/2021 9:31 AM
15	citizen, township planning commission, townshiip zoning board of appeals	11/30/2021 12:20 PM
16	Citizen	11/30/2021 12:07 PM
17	Elected Official	11/29/2021 8:37 PM
18	Township elected official	11/29/2021 4:59 PM
19	County Law Enforcement	11/29/2021 2:19 PM
20	Michigan State Police providing policing to Kalkaska County.	11/29/2021 12:52 PM
21	Village Manager	11/29/2021 12:27 PM
22	Elected Official - County Commissioner	11/29/2021 11:40 AM
23	local government	11/29/2021 11:29 AM
24	Forest Fire Supervisor with the Department of Natural Resources. State Gov.	11/29/2021 8:59 AM
25	Fire chief	11/29/2021 7:27 AM

26	Municipal EMS	11/26/2021 11:58 AM
27	District manager, responsible for day-to-day activities of the District.	11/26/2021 11:41 AM
28	Yes	11/25/2021 1:34 PM
29	Township Trustee	11/24/2021 4:02 PM
30	Fire Chief	11/24/2021 3:19 PM
31	Kalkaska Township Fire Chief	11/24/2021 3:19 PM
32	Kalkaska Commission on Aging	11/24/2021 3:15 PM
33	Fire Department - Captain	11/24/2021 3:14 PM
34	Citizen	11/24/2021 3:00 PM
35	Township Clerk	11/16/2021 10:02 AM
36	Director of non-profit whose service are covers major portions of Kalkaska County	11/10/2021 3:14 PM
37	Michigan State Police - Law Enforcement	11/9/2021 11:16 AM
38	Adjacent County EM	11/9/2021 8:43 AM
39	Public Transportation Director	11/9/2021 7:57 AM
40	Road commission	11/8/2021 6:19 PM
41	Supervisor	11/8/2021 4:08 PM
42	Trustee	11/8/2021 1:49 PM
43	Cold springs Township Supervisor	11/8/2021 1:10 PM
44	village council	11/8/2021 12:33 PM
45	Fire Chief Twp Trustee	11/8/2021 12:16 PM
46	District Health Dept. #10	11/8/2021 11:42 AM
47	Township Clerk	11/8/2021 11:26 AM
48	Supervisor	11/8/2021 11:22 AM

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

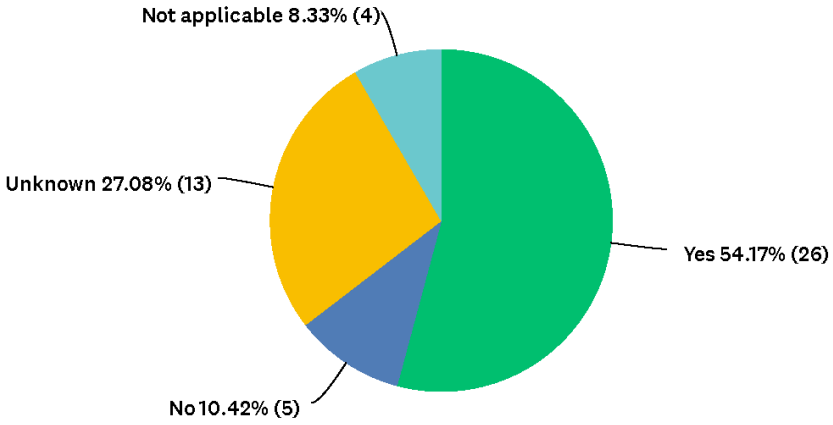
Answered: 48 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	43.75%	21
No	56.25%	27
TOTAL		48

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

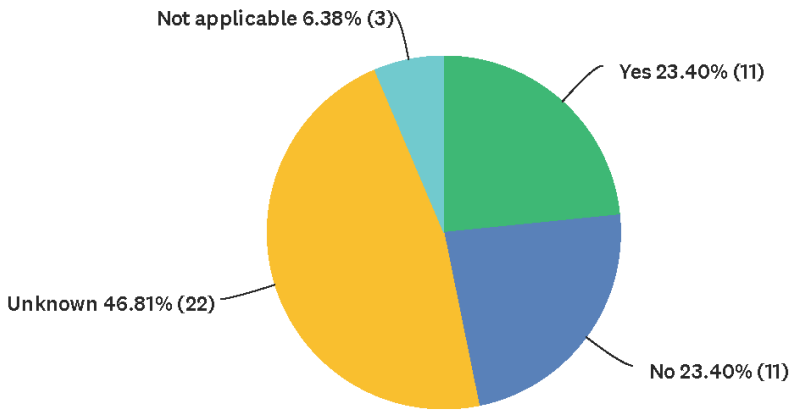
Answered: 48 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	54.17%	26
No	10.42%	5
Unknown	27.08%	13
Not applicable	8.33%	4
TOTAL		48

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

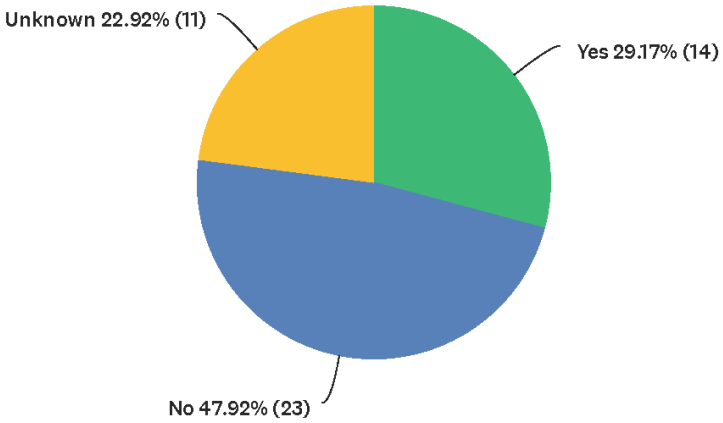
Answered: 47 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	23.40%	11
No	23.40%	11
Unknown	46.81%	22
Not applicable	6.38%	3
TOTAL		47

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

Answered: 48 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	29.17%	14
No	47.92%	23
Unknown	22.92%	11
TOTAL		48

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

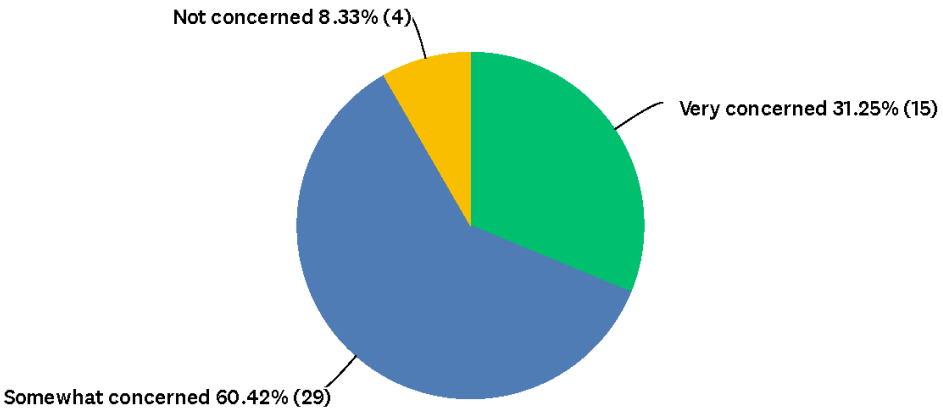
Answered: 28 Skipped: 20

#	RESPONSES	DATE
1	Na	1/10/2022 11:21 AM
2	Windstorm 2016	12/28/2021 3:57 PM
3	Significant and extended power outage due to a winter storm	12/15/2021 9:33 AM
4	Na	12/14/2021 9:40 PM
5	N/A	12/8/2021 3:35 PM
6	Possibly insect infestation such as emerald ash beetle, or Oak wilt, and other threats that have killed various types of trees. deforestation rate	12/5/2021 10:56 AM
7	None	12/2/2021 3:43 AM
8	2015 extreme winds that took down major amount of trees and electric lines	11/30/2021 12:20 PM
9	None	11/30/2021 12:07 PM
10	Fire and Flooding	11/29/2021 11:40 AM
11	trees	11/29/2021 11:29 AM
12	Wildfires across the state	11/29/2021 8:59 AM
13	NA	11/26/2021 11:58 AM
14	Flooding	11/26/2021 11:41 AM

15	Na	11/25/2021 1:34 PM
16	Straight line winds and 5 to 7 inches of rain fall in 3 hrs	11/24/2021 4:02 PM
17	N/A	11/24/2021 3:19 PM
18	Tornados, forest fires	11/24/2021 3:19 PM
19	Does COVID apply? If not, then I don't know.	11/24/2021 3:15 PM
20	NA	11/24/2021 3:00 PM
21	Tornado	11/16/2021 10:02 AM
22	Unknown	11/9/2021 11:16 AM
23	Straight line winds, tornadoes	11/9/2021 8:43 AM
24	N/A	11/8/2021 1:10 PM
25	Straight line winds	11/8/2021 12:16 PM
26	Winter Storms Pandemic	11/8/2021 11:42 AM
27	Snowstorm with electricity outage for 5 days.	11/8/2021 11:26 AM
28	Unknown	11/8/2021 11:22 AM

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

Answered: 48 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very concerned	31.25%	15
Somewhat concerned	60.42%	29
Not concerned	8.33%	4
TOTAL		48

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

Answered: 48 Skipped: 0

#	RESPONSES	DATE
1	Fire	1/10/2022 11:21 AM
2	Weather events.	12/28/2021 3:57 PM
3	I'm mostly concerned with Rugg Pond, Boardman River outside of Kalkaska Village limits, water tower.	12/15/2021 9:33 AM
4	Tornado or wind damage	12/14/2021 9:40 PM
5	blizzards, forest fire, pandemics,	12/14/2021 4:19 PM
6	From my county functions, flooding is my primary concern. There are many low areas in the county that are prone to localized flooding, particularly during the Spring snow melt. Covid has made clear that significant illness breakout is also a county wide concern.	12/14/2021 1:02 PM
7	Forest Fire	12/9/2021 2:57 PM
8	Fire	12/8/2021 3:35 PM
9	Fire is always at risk in our forests. We have a pond collecting a huge amount of silt, (Rugg Pond) will need attention soon.	12/5/2021 10:56 AM
10	fire, flood	12/3/2021 12:39 PM
11	tornadoes, fire, pandemic	12/2/2021 10:09 AM
12	Fire/ Illness	12/2/2021 7:15 AM
13	Fire,flood	12/2/2021 3:43 AM
14	fire, illness outbreak	12/1/2021 9:31 AM
15	fire, flood, drought, illness, wind, snow, ice, and more	11/30/2021 12:20 PM
16	Tornado	11/30/2021 12:07 PM
17	Tornado's - Forest Fires	11/29/2021 8:37 PM
18	Fires and weather related incidents	11/29/2021 4:59 PM
19	Wildfire and snow storm to eliminate electrical power in the county.	11/29/2021 2:19 PM
20	Illness and outbreak have been the most significant and recent hazardous event that I can recall.	11/29/2021 12:52 PM
21	illness outbreak or tornado/blizzard	11/29/2021 12:27 PM
22	Fire, Flood, Tornado, Any Event that caused Electrical Gride Failure	11/29/2021 11:40 AM
23	winds	11/29/2021 11:29 AM
24	Wildfires	11/29/2021 8:59 AM
25	Weather	11/29/2021 7:27 AM
26	Snow Storms	11/26/2021 11:58 AM
27	flooding, forest fire, wind storms, drought, global pandemic	11/26/2021 11:41 AM
28	Fire	11/25/2021 1:34 PM
29	Wind, heavy rain fall, ice storm loss of power grid and wild land fires	11/24/2021 4:02 PM

30	Fire, drought, Illness, weather related	11/24/2021 3:19 PM
31	Wind events, large snowfalls, wildfires	11/24/2021 3:19 PM
32	Rugg Pond concerns with the dam, illness outbreaks, power outages for area seniors, especially in the winter	11/24/2021 3:15 PM
33	Tornado Wild land fire	11/24/2021 3:14 PM
34	Fire	11/24/2021 3:00 PM
35	Flood, Tornado, Fire	11/16/2021 10:02 AM
36	Flood	11/10/2021 3:14 PM
37	Illness outbreak, gas/oil leaks, cell tower infrastructure takeover/destruction	11/9/2021 11:16 AM
38	fire, epidemic, tornado/winds	11/9/2021 8:43 AM
39	Weather related. Winter Storm/Blizzard Tornado	11/9/2021 7:57 AM
40	If the heat goes out and the snow gets deep the old county road garage could collapse, the loss of multiple plow trucks in the winter could be devastating.	11/8/2021 6:19 PM
41	Unknown	11/8/2021 4:08 PM
42	Storm damage	11/8/2021 1:49 PM
43	Contaminated well water	11/8/2021 1:10 PM
44	fire and illness	11/8/2021 12:33 PM
45	Ice storm Loss of electric grid	11/8/2021 12:16 PM
46	Winter Storm/Power Outage Illness Outbreak Fire	11/8/2021 11:42 AM
47	Storms	11/8/2021 11:26 AM
48	All the above	11/8/2021 11:22 AM

Q10 Does your community have concerns about infrastructure (dams, bridges, utilities, etc.) and the potential for a hazardous event in the future? Please describe.

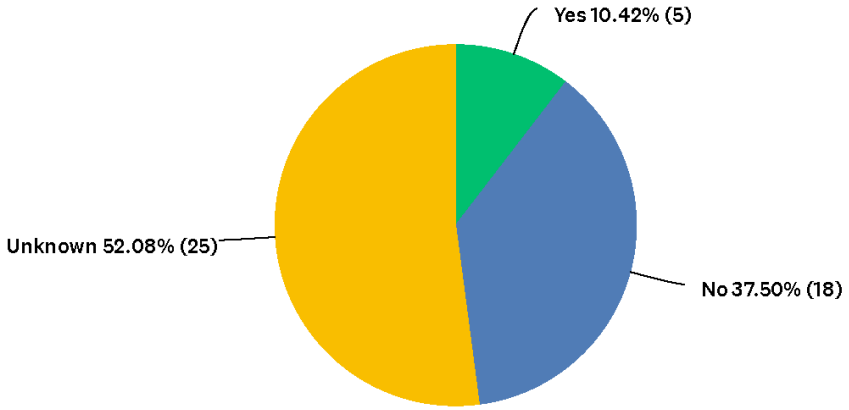
Answered: 41 Skipped: 7

#	RESPONSES	DATE
1	No	1/10/2022 11:21 AM
2	Softness of infrastructure to attack.	12/28/2021 3:57 PM
3	Yes, concerns over Rugg Pond dam.	12/15/2021 9:33 AM
4	No	12/14/2021 9:40 PM
5	power outages but mostly lack of broadband to communicate with people	12/14/2021 4:19 PM
6	Electric lines,	12/9/2021 2:57 PM
7	Unknown	12/8/2021 3:35 PM
8	We have multiple roads that have consistent water damage with heavy rain. (Zimmerman Road, Gillet Road) Bridges are old and sketchy on Rapid City Road and the rapid river, as well as Crystal Beach Road crossing the Torch River	12/5/2021 10:56 AM
9	some	12/3/2021 12:39 PM

10	In areas of our township cell reception is very poor. For instance my phone works at home on the east side of the township but when I go into work at the township hall I can not make or receive calls or texts. A few weeks ago we had severe weather, many trees were down and power was out. I went into work, we have a generator. The Planning Commission was meeting that morning also. We had no phone service at the hall (through Spectrum) no internet, couldn't print anything off our computers due to the wireless set up that was down, but most importantly we had absolutely no way to communicate with anyone. If there would have been an emergency event we would have been unable to contact anyone for help. That is very scary!!	12/2/2021 7:15 AM
11	Bridges,pipeline	12/2/2021 3:43 AM
12	no	12/1/2021 9:31 AM
13	Yes, dams, utilities, roads,	11/30/2021 12:20 PM
14	No	11/30/2021 12:07 PM
15	Power Outages	11/29/2021 8:37 PM
16	Yes, as we want to ensure the local infrastructure will allow for response from various entities to a hazardous situation.	11/29/2021 12:52 PM
17	no	11/29/2021 12:27 PM
18	We have the Rugg Pond Dam that is being monitored and evaluated Annually	11/29/2021 11:40 AM
19	culvert washouts	11/29/2021 11:29 AM
20	We have 2 dams	11/29/2021 7:27 AM
21	Power grid	11/26/2021 11:58 AM
22	Yes; undersize culverts leading to road failure in floods, potential for homes lost to wildfire on eastern 1/2 of county	11/26/2021 11:41 AM
23	NA	11/25/2021 1:34 PM
24	Rugg Pond dam failure or overtopping in Rapid River Twp	11/24/2021 4:02 PM
25	?	11/24/2021 3:19 PM
26	County yes. Township no.	11/24/2021 3:19 PM
27	Rugg Pond dam. I believe the county is working on a plan for Rugg Pond though	11/24/2021 3:15 PM
28	No	11/24/2021 3:00 PM
29	County Road 571 Flooding	11/16/2021 10:02 AM
30	Several bridges in the county are listed as severe or poor road stream crossings. There are numerous privately-owned small dams that could fail.	11/10/2021 3:14 PM
31	Yes, utilities and cell towers	11/9/2021 11:16 AM
32	N/A	11/9/2021 8:43 AM
33	We leverage state and federal bridge funds as available	11/8/2021 6:19 PM
34	NA	11/8/2021 4:08 PM
35	No	11/8/2021 1:49 PM
36	Need for wifi improvements	11/8/2021 1:10 PM
37	dont know	11/8/2021 12:33 PM
38	Rugg Pond Dam	11/8/2021 12:16 PM
39	Unknown on specific infrastructure, but yes.	11/8/2021 11:42 AM
40	Utilities	11/8/2021 11:26 AM
41	Yes dam bridges	11/8/2021 11:22 AM

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

Answered: 48 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	10.42%	5
No	37.50%	18
Unknown	52.08%	25
TOTAL		48

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

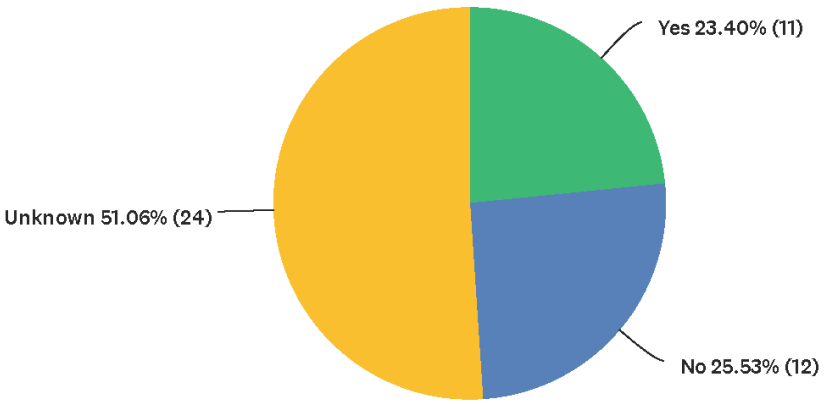
Answered: 22 Skipped: 26

#	RESPONSES	DATE
1	N/a	1/10/2022 11:21 AM
2	FDCVT. Standby generator.	12/28/2021 3:57 PM
3	unknown	12/15/2021 9:33 AM
4	Na	12/14/2021 9:40 PM
5	N/A	12/8/2021 3:35 PM
6	I am fairly new on the planning commission. Less than one year.	12/5/2021 10:56 AM
7	No	12/2/2021 3:43 AM
8	unknown	11/30/2021 12:20 PM
9	No	11/30/2021 12:07 PM

10	The Rugg Pond	11/29/2021 11:40 AM
11	n/a	11/29/2021 11:29 AM
12	Power generation in Fife Lake	11/26/2021 11:58 AM
13	n/a	11/26/2021 11:41 AM
14	NA	11/24/2021 4:02 PM
15	N/A	11/24/2021 3:19 PM
16	Possibly with assistance putting together the plan before.	11/24/2021 3:15 PM
17	Bridge	11/24/2021 3:00 PM
18	None	11/9/2021 11:16 AM
19	State and federal safety funds are frequently used for unsafe road projects.	11/8/2021 6:19 PM
20	Dna	11/8/2021 12:16 PM
21	n/a	11/8/2021 11:26 AM
22	Unknown	11/8/2021 11:22 AM

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

Answered: 47 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	23.40%	11
No	25.53%	12
Unknown	51.06%	24
TOTAL		47

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

Answered: 23 Skipped: 25

#	RESPONSES	DATE
1	Hardening infrastructure, especially electrical.	12/28/2021 3:57 PM
2	Possibly apply for grant funds to repair the dam.	12/15/2021 9:33 AM
3	Safe place in case of ematgency	12/14/2021 9:40 PM
4	N/A	12/8/2021 3:35 PM
5	Water testing. Ground water testing	12/5/2021 10:56 AM
6	We lease 15 acres to Verizon who has a cell tower on the property which is on the east side of the township adjacent to our fire barn. T-Mobile added hardware two years ago on the tower and we receive a monthly check for the rent of T-Mobile on the tower. We have recently sent a letter to Verizon and T-Mobile to see if it would be possible to place some sort of booster on the west side of the township to improve cell reception and internet service. We own 3 small towers in three separate locations within the township. We bought the towers so the 186 Network (formerly Chain of Lake Internet) could place their apparatus on the towers so that we could leave dial up internet in the past. Those towers brought a lot of our residents the welcome technology out of dial up internet service. Some of our township was still not served by 186 Networks due to the topography of our land. We are ready and willing to partner with someone to provide better cell coverage. We have funds and a desire to commit but need help with partnering with a cell service provider.	12/2/2021 7:15 AM
7	No	12/2/2021 3:43 AM
8	severe weather lake evacuation, Drainage to accomodate extreme downpour or flooding	11/30/2021 12:20 PM
9	No	11/30/2021 12:07 PM
10	Internet availability	11/29/2021 4:59 PM
11	n/a	11/29/2021 11:29 AM
12	WIldfire response, Initial attach plan, establishing a structural triage plan, identification of known hazards in the urban interface.	11/29/2021 8:59 AM
13	Identify and correct undersize culverts at road stream crossings.	11/26/2021 11:41 AM
14	Shelter for loss of power grid during winter months	11/24/2021 4:02 PM
15	?	11/24/2021 3:19 PM
16	?	11/24/2021 3:15 PM
17	Na	11/24/2021 3:00 PM
18	We will collaborate with Kalkaska County Emergency Management	11/9/2021 11:16 AM
19	We stretch funding for road repairs as far as we can.	11/8/2021 6:19 PM
20	?	11/8/2021 1:10 PM
21	Dna	11/8/2021 12:16 PM
22	Unknown	11/8/2021 11:26 AM
23	Unknown	11/8/2021 11:22 AM

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

Answered: 23 Skipped: 25

#	RESPONSES	DATE
1	Above.	12/28/2021 3:57 PM
2	Not that I'm aware of at this time.	12/15/2021 9:33 AM
3	No	12/14/2021 9:40 PM
4	N/A	12/8/2021 3:35 PM
5	I would like to see a combined effort to harden our grid, and communication resources.	12/5/2021 10:56 AM
6	I don't believe so.	12/2/2021 7:15 AM
7	No	12/2/2021 3:43 AM
8	x	11/30/2021 12:20 PM
9	No	11/30/2021 12:07 PM
10	Internet availability for hazard notification	11/29/2021 4:59 PM
11	Others can be added when discussed in more detail.	11/29/2021 8:59 AM
12	not at this time	11/26/2021 11:41 AM
13	Not at this time	11/24/2021 4:02 PM
14	I'm not sure. Mike Thompson is doing a great job knowing what should be considered for the county. I'll yield to his expertise.	11/24/2021 3:15 PM
15	No	11/9/2021 11:16 AM
16	Forest fires and tornadoes are our biggest exposure.	11/8/2021 6:19 PM
17	No	11/8/2021 4:08 PM
18	Not at this time.	11/8/2021 1:10 PM
19	none	11/8/2021 12:33 PM
20	.	11/8/2021 12:16 PM
21	No	11/8/2021 11:42 AM
22	We have been discussing using A.R.P.A. monies to set up our hall as a shelter.	11/8/2021 11:26 AM
23	Unknown	11/8/2021 11:22 AM

Q16 Are you interested in serving on the advisory team or being involved in future public engagement events for the plan update? Please share your contact information so we may include you on future invitations.

Answered: 30 Skipped: 18

#	RESPONSES	DATE
1	Yes.	12/28/2021 3:57 PM
2	No	12/14/2021 9:40 PM
3	County CLerk/Administrator 605 N Birch Street Kalkaska, MI 49646	12/14/2021 4:19 PM
4	sphillips@kalkaskacounty.org	12/14/2021 1:02 PM
5	No	12/8/2021 3:35 PM

APPENDIX C – 2016 HAZARD MITIGATION PLAN STRATEGIES AND CURRENT STATUS

2016 Kalkaska County Natural Hazard Mitigation Plan Action Strategies and 2023 Status

2015 Action Strategies	Responsible Parties	Timeframe	Prioritization	Cost	Benefit to Cost Ratio	2023 Status/EM Comments	2023 Related Strategies & Priority Level
Priority Area 1: High Winds and Tornado Mitigation							
a. Pursue the opportunity for grants to purchase weather radios and educate individuals about them	Emergency Management Coordinator, Emergency Responders, Kalkaska County, Village of Kalkaska, All 12 Townships	1-3 years after adoption of the plan	High=3	Low=1	3 (High Benefit)	Complete. Weather radios were provided by the NWS and distributed to local schools.	This strategy has been completed. Related strategies: #3 (High); #5 (Med)
b. Promote underground utilities within and outside the Kalkaska city limits	Zoning Administrator, County Building Inspector, Utility Companies, Kalkaska County, Village of Kalkaska, All 12 Townships	Ongoing	High=3	Low=1	3 (High Benefit)	Ongoing. Kalkaska County Emergency Management has been in conversations with the County Construction Codes department to encourage the requirement of underground utilities in all new building projects.	#38 (Low)
c. Public education for trailer, mobile, and modular homes to ensure safety; research if wind lift is taken into account for these homes	County Building Inspector, Emergency Management Coordinator, Zoning Administrator, Realtors, Kalkaska County, Village of Kalkaska, All 12 Townships	1-3 years from adoption of the plan	High=3	Medium=2	1.5 (Medium Benefit)	No Progress. This strategy was not continued in the 2023 plan. The County Construction Codes department follows the most current Building Codes as required by the State; these include wind lift and proper anchoring/construction for new mobile homes.	#25 (High)
d. Suggest that events, campgrounds, and others have an evacuation plan	Emergency Management Coordinator, Fire and Emergency Response, Kalkaska County, Village of Kalkaska, All 12 Townships	Ongoing	High=3	Low=1	3 (High Benefit)	Complete and ongoing. All events have Incident Action Plans written by EMC. Campground Emergency Procedures are located with the Kalkaska County Emergency Procedures document, updated 18 July 2022.	#11 (Medium)
Priority Area 2: Wildfire Mitigation							
a. Acquire appropriate fire suppression equipment for response	Emergency Management Coordinator, Fire & Emergency Departments, MI Department of Natural Resources, Kalkaska County, Village of Kalkaska, all 12 Townships	1-3 years from adoption of the plan	Medium=2	High=3	0.67 (Low Benefit)	Complete and Ongoing. Fire departments continue to acquire as possible within annual budgets.	#9 (Medium)
b. Prescribed burns and surface fuels management projects	Emergency Management Coordinator, County Planning, Local Fire and Emergency Departments, MI Department of Natural Resources	1-5 years from adoption of the plan	Medium=2	High=3	0.67 (Low Benefit)	Complete and Ongoing. MDNR coordinates with local fire departments for assistance and awareness regarding scheduled burn activities.	#47 (High)
c. Public education utilizing programs such as the National Fire Protection Association FireWise program, and Michigan DNR resources	County Planning, County Building Inspector, Emergency Management Coordinator, Kalkaska County, Village of Kalkaska, all 12 Townships	1-3 years from adoption of the plan	Medium=2	Medium=2	1 (Low Benefit)	Complete and Ongoing. EMC discusses with FD's and in presentations to public; brochures distributed FireWise program and brochures discussed and provided to Fire Chiefs; program discussed with Construction Codes department and brochures discussed and distributed.	#5b & #10 (Medium)

2016 Kalkaska County Natural Hazard Mitigation Plan Action Strategies and 2023 Status

2015 Action Strategies	Responsible Parties	Timeframe	Prioritization	Cost	Benefit to Cost Ratio	2023 Status/EM Comments	2023 Related Strategies & Priority Level
Priority Area 3: Snow and Ice Mitigation							
a. Emergency Operations Center has response information about available shelters and is in the process of signing contracts with churches, township halls, fire halls, and the Kaliseum for additional shelter space	Emergency Management Coordinator County Building Inspector, Kalkaska County, Village of Kalkaska, all 12 Townships	Ongoing	Low=1	Medium=2	0.5 (Low Benefit)	Complete and ongoing. This information is included in the Emergency Operations Plan updated 1 Apr 2022, and coordinates with the American Red Cross for shelter setup if needed.	#20 (Medium)
b. Continue enforcement of building code regarding snow limits through the permitting process	County Building Inspector, Kalkaska County, Village of Kalkaska, all 12 Townships	Ongoing	Low=1	Medium=2	0.5 (Low Benefit)	Ongoing. This is part of the duties of the Building Codes Department. Permit applicants are required to provide a site plan and drawings, which are reviewed for code compliance. Deficiencies are identified for correction during process and construction cannot begin until plans meet the standards. Occupancy isn't approved until all inspections are successfully completed.	#25 (High)
c. Public education on extreme weather preparation	Emergency Management Coordinator, Sheriffs Department, Commission on Aging, Kalkaska County, Village of Kalkaska, all 12 Townships	Ongoing	Low=1	Low=1	1 (Low Benefit)	Ongoing. Continual effort by EMC at local community presentations and utilizing social media (Kalkaska Emergency Services Facebook page) to discuss and promote methods available to the public, i.e. weather.gov info; Ready.gov, info., etc.	#3 (High); #5 and #5b (Medium)
d. Public awareness regarding roof shoveling through public service announcements	County Building Inspector Emergency Management Coordinator Housing Authority, Media, Kalkaska County, Village of Kalkaska, all 12 Townships	Ongoing	Low=1	Low=1	1 (Low Benefit)	Ongoing. This is done utilizing the social media as above, rather than PSA's.	#3 (High); #5 (Medium)
Priority Area 4: Flood Mitigation							
a. Continual maintenance and upkeep of Rugg Pond Dam	County Board of Commissioners County Planning Commission, Emergency Management Coordinator, Zoning Administrator, Department of Public Works, Kalkaska County, Village of Kalkaska, all 12 Townships	Ongoing	Low=1	High=3	0.33 (Low Benefit)	Ongoing. State inspections are completed as required. The County is awaiting results of an engineering study to determine whether to make repairs or remove the dam.	#28 (High)

APPENDIX D – CONSIDERATION OF ALTERNATIVE STRATEGIES

Hazard Mitigation Alternatives Considered for Kalkaska County

A check mark indicates it was included in the list of mitigation strategies.
Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

Hazard Mitigation Alternatives for General Thunderstorm Hazards, Hail, and/or Lightning	
✓	Increased coverage and use of NOAA Weather Radio, and public early warning systems and networks.
✓	Buried/protected power and utility lines. (NOTE: Where appropriate: Burial may sometimes cause additional problems and costs in cases where eventual cable breakages are harder to locate and more expensive to repair.)
✓	Tree trimming and maintenance to prevent limb breakage and safeguard nearby utility lines. (Ideal: Establishment of a community forestry program with a main goal of creating and maintaining a disaster-resistant landscape in public rights-of-way.)
✓	Using structural bracing, window shutters, laminated glass in window panes, and impact-resistant roof shingles to minimize damage to public and private structures.
✓	Moving vehicles into garages or other covered areas. *(Advice to be provided in public outreach efforts.)*
✓	Installing lightning protection devices on the community's communications infrastructure and critical structures. More widespread use of lightning protection devices might also occur. *(Advice to be provided in public outreach efforts).*
	Purchase of insurance that includes coverage for hail damage.
✓	Using surge protectors on critical electronic equipment. *(Advice to be provided in public outreach efforts).*

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

Hazard Mitigation Alternatives for the Extreme Temperatures Hazard	
✓	Organizing outreach to vulnerable populations during periods of extreme temperatures, including establishing and building awareness of accessible heating and/or cooling centers in the community, and other public information campaigns about this hazard.
✓	Increased coverage and use of NOAA Weather Radio.
✓	Provide and publicize designated heating and cooling centers within the community, where persons in need may go to obtain relief from outdoor temperatures.

Hazard Mitigation Alternatives Considered for Kalkaska County

A check mark indicates it was included in the list of mitigation strategies.
Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

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

Hazard Mitigation Alternatives for Fluvial (Riverine) Flooding	
✓	Floodplain management–planning acceptable uses for areas prone to flooding (through comprehensive planning, code enforcement, zoning, open space requirements, subdivision regulations, land use and capital improvements planning) and involving drain commissioners, hydrologic studies, etc. in these analyses and decisions.
	Acceptable land use densities, coverage and planning for particular soil types and topography (decreasing amount of impermeable ground coverage in upland and drainage areas, zoning and open space requirements suited to the capacity of soils and drainage systems to absorb rainwater runoff, appropriate land use and capital improvements planning) and involving drain commissioners, hydrologic studies, etc. in these analyses and decisions.
✓	Dry floodproofing of structures within known flood areas (strengthening walls, sealing openings, use of waterproof compounds or plastic sheeting on walls).
	Wet floodproofing of structures (controlled flooding of structures to balance water forces and discourage structural collapse during floods).
✓	Elevation of flood-prone structures above the 100-year flood level.
✓	Purchase or transfer of development rights - to discourage development in floodplain areas.
	"Floating" architectural designs for structures in flood-prone areas.
✓	Construction of elevated or alternative roads that are unaffected by flooding, or making roads more flood-resistant through better drainage and/or stabilization/armoring of vulnerable shoulders and embankments.
✓	Government acquisition, relocation, or condemnation of structures within floodplain or floodway areas.
✓	Employing techniques of erosion control within the watershed area (proper bank stabilization, techniques such as planting of vegetation on slopes, creation of terraces on hillsides, use of riprap boulders and geotextile fabric, etc.).
✓	Protection (or restoration) of wetlands and natural water retention areas.
✓	Higher engineering standards for drain and sewer capacity, or the expansion of infrastructure to higher capacity.
✓	Joining the National Flood Insurance Program (NFIP).
	Obtaining flood insurance. (Requires community participation in the NFIP.)
	Participation in the Community Rating System (CRS).

Hazard Mitigation Alternatives Considered for Kalkaska County

A check mark indicates it was included in the list of mitigation strategies.
Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

Hazard Mitigation Alternatives for Urban Flooding	
✓	Stormwater management–Adequate design, installation, maintenance, and monitoring of municipal storm sewer systems. Ordinances or amendments to assist in stormwater management (e.g. forbidding illicit discharges). Planning for and regulating areas prone to flooding (acceptable uses and development restrictions through comprehensive planning, code enforcement, zoning, open space requirements, subdivision regulations, purchased or transferred development rights, land use and capital improvements planning) and involving drain commissioners, hydrologic studies, etc. in these analyses and decisions.
	Homeowner's and rental insurance that includes coverage of damages and cleanup of sewer backflow impacts.
✓	Structural projects to channel water away from people and property (dikes, levees, floodwalls) or to increase drainage or absorption capacities (spillways, water detention and retention basins, relief drains, drain widening/dredging or rerouting, debris detention basins, logjam and debris removal, extra culverts, bridge modification, flood gates and pumps, wetlands protection and restoration).
✓	Higher engineering standards for drain and sewer capacity, or the expansion of infrastructure to higher capacity.
	Drainage easements (allowing the planned and regulated public use of privately owned land for temporary water retention and drainage).
	Installing (or re-routing or increasing the capacity of) storm drainage systems, including the separation of storm and sanitary sewage systems.
✓	Farmland and open space preservation.
	Elevating mechanical and utility devices above expected flood levels.
	Flood warning systems and the monitoring of water levels with stream gauges and trained monitors.
✓	Increased coverage and use of NOAA Weather Radio.
	Anchoring of manufactured homes to a permanent foundation in flood areas, but preferably these structures would be readily movable if necessary or else permanently relocated outside of flood-prone areas and erosion areas.
✓	Control and securing of debris, yard items, or stored objects (including oil, gasoline, and propane tanks, and paint and chemical barrels) in floodplains that may be swept away, damaged, or pose a hazard when flooding occurs. *(Advice to be provided in public outreach efforts).*
	Back-up generators for pumping and lift stations in sanitary sewer systems, and other measures (alarms, meters, remote controls, switchgear upgrades) to ensure clear drainage infrastructure.
	Detection and prevention/discouragement of illegal discharges into storm-water sewer systems, from home footing drains, downspouts and sump pumps.
	Increasing the function and capacity of sewage lift stations and treatment plants (installation, expansion, and maintenance), including possible separation of combined storm/sanitary sewer systems, if appropriate.
✓	Wetlands protection regulations and policies.
	Use of check valves, sump pumps and backflow preventers in homes and buildings.
	Acceptable land use densities, coverage and planning for particular soil types and topography (decreasing amount of impermeable ground coverage in upland and drainage areas, zoning and open space requirements suited to the capacity of soils and drainage systems to absorb rainwater runoff, appropriate land use and capital improvements planning) and involving drain commissioners, hydrologic studies, etc. in these analyses and decisions.
✓	Employing techniques of erosion control within the watershed area (proper bank stabilization, techniques such as planting of vegetation on slopes, creation of terraces on hillsides, use of riprap boulders and geotextile fabric, etc.).
✓	Protection (or restoration) of wetlands and natural water retention areas.
	Landslide mitigation ideas: Do not build houses, buildings, parks, or playgrounds close to steep slopes; install flexible pipe fittings to avoid gas and water line breakage.

A check mark indicates it was included in the list of mitigation strategies.
Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

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

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

	Hazard Mitigation Alternatives for Wildfire Hazard *(Note: Many of these actions are included in the Firewise USA public education program on wildfire preparedness)*
✓	Proper maintenance of property in or near wildland areas (including short grass; thinned trees and removal of low-hanging branches; selection of fire-resistant vegetation; use of fire resistant roofing and building materials; use of functional shutters on windows; keeping flammables such as curtains securely away from windows or using heavy fire-resistant drapes; creating and maintaining a buffer zone (defensible space) between structures and adjacent wild lands; use of the fire department's home safety inspections; sweeping/cleaning dead or dry leaves, needles, twigs, and combustibles from roofs, decks, eaves, porches, and yards; keeping woodpiles and other combustibles away from structures; use of boxed or enclosed eaves on houses; thorough cleaning-up of spilled flammable fluids; and keeping garage areas protected from blowing embers).
✓	Safe disposal of yard and house waste rather than through open burning. *(Advice to be provided in public outreach efforts).*
	Use of fire spotters, towers, planes.
✓	Use of structural fire mitigation systems such as interior and exterior sprinklers, smoke detectors, and fire extinguishers.
✓	Arson prevention activities, including reduction of blight (cleaning up areas of abandoned or collapsed structures, accumulated junk or debris, and lands with a history of flammable substances stored, spilled, or dumped on them).
✓	Public notification of fire weather and fire warnings.

A check mark indicates it was included in the list of mitigation strategies.
Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

✓	Prescribed burns and fuel management (thinning of flammable vegetation, possibly including selective logging to thin out some areas. Fuels cleared can be given away as firewood or made into wood chips for distribution.)
✓	Have adequate water supplies for emergency fire-fighting (in accordance with NFPA standards).
✓	The creation of fuel breaks (areas where the spread of wildfires will be slowed or stopped due to removal of fuels, or the use of fire-retardant materials/vegetation) in high-risk forest or other areas.
✓	Keeping roads and driveways accessible to vehicles and fire equipment–driveways should be relatively straight and flat, with at least some open spaces to turn, bridges that can support emergency vehicles, and clearance wide and high enough for two-way traffic and emergency vehicle access (spare keys to gates for properties should be provided to the local fire department, and an address should be visible from the road so homes can be located quickly).
✓	Enclosing the foundations of homes and buildings rather than leaving them open with their underside exposed to blown embers or materials.
✓	Safe use and maintenance/cleaning of fireplaces and chimneys (with the use of spark arresters and emphasis on proper storage of flammable items). Residents should be encouraged to inspect chimneys at least twice a year and clean them at least once a year.
✓	Proper maintenance and storage of motorized equipment that could catch on fire (from blown embers, etc.)
✓	Proper storage and use of flammables, including the use of flammable substances (such as when fueling machinery). Store gasoline, oily rags and other flammable materials in approved safety cans. Stack firewood at least 100 feet away and uphill from homes.
✓	Avoid building structures on hilltop locations, where they will be at greater risk from wildfires (also, hillsides facing south or west are more vulnerable to increased dryness and heat from sun exposure).
✓	Use of proper setbacks from slopes (outside of the "convection cone" of intense heat which would be projected up the slope of the hill as a wildfire "climbs" it).
✓	Obtaining insurance.

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

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

Hazard Mitigation Alternatives Considered for Kalkaska County

A check mark indicates it was included in the list of mitigation strategies.
Sources of alternatives: Michigan State Police's *2019 Michigan Hazard Analysis* and *Hazard Analysis Supplement*

	Hazard Mitigation Opportunities for Hazardous Materials – Fixed Site Incidents
✓	Compliance with and enforcement of the Resource Conservation and Recovery Act (RCRA), SARA Title III, and other regulations.
	Compliance with all industrial, fire, and safety regulations.
	Proper separation and buffering between industrial areas and other land uses.
	Location of industrial areas away from schools, nursing homes, etc.
✓	Public warning systems and networks for hazardous material releases.
✓	Increased coverage and use of NOAA Weather Radio (which can provide notification to the community during any period of emergency, including large-scale hazardous material incidents).
	Enhanced facility security.
	Elimination of clandestine methamphetamine laboratories through law enforcement and public education.
	Insurance coverage.

	Hazard Mitigation Opportunities for Hazardous Materials – Transportation Incidents
	Additional traffic control or new designs/routing for roadway areas that demonstrate a need for improvement.
	Long-term planning that provides more connector roads for reduced congestion of arterial roads.
	Railroad inspections and maintenance at railway/roadway grade crossings, along with the use of effective signs/signals in deficient areas (such as at rural railroad crossings).
	Proper planning, design, maintenance, and enhancements to designated truck routes.
	Locating schools, nursing homes, and similar facilities away from major hazardous materials routes.
✓	Public warning systems and networks for notification of hazardous materials incidents. Increased coverage and use of NOAA Weather Radio, which can provide notification to the community during any period of emergency, including large-scale hazardous material incidents.

	Hazard Mitigation Alternatives for Electromagnetic Pulses (Space Weather)
✓	Awareness campaigns for industries and systems involving satellite communications, GPS, or radio communications that could be disrupted by space weather events. In addition to the use of GPS for navigation, aviation, and military applications, that technology is also important for offshore drilling operations, precision farming, transportation, and mapping and surveying. Therefore, it is very important to protect these systems.
✓	Operating procedures that include back-up systems allowing complex systems (e.g. air traffic control) to continue to function when key technological systems (e.g. GPS, radio communications, satellites) malfunction. For example, some "legacy" systems might be retained as a back-up, new GPS signals and codes could be used to remove ranging errors, and protective and back-up components could be installed in vulnerable systems.
✓	The use of special procedures, equipment, and redundancies by utility systems (e.g. electrical power and pipeline systems) to minimize the potential for geomagnetic effects to cause inappropriate shutdowns, impaired or lost functionality, and system damage. For example: the provision of reserve system capacity may offset the effects of geomagnetic storms; or the temporary disconnection of vulnerable components for their own protection.
	Additional back-up satellites, for communications and navigation, may be needed to limit the damaging effects of a major solar storm, which may put current satellite equipment out of action and require their rapid replacements.

APPENDIX E - PBB CATTLE SITE RESTRICTIVE COVENANT

Kalkaska PBB Cattle Site
Kalkaska County
Location ID# **40000025**

Document # 3141623 RCOV Pages: 10
Received: 08/09/2018 11:16 AM
Recorded: 08/10/2018 10:49 AM
State of Michigan - Kalkaska County
Jo Ann DeGraaf, Register of Deeds

KERMIT ID# 11120117061

10

DECLARATION OF RESTRICTIVE COVENANT
FOR A RESTRICTED NONRESIDENTIAL REMEDIAL ACTION

MDEQ Reference No: **RC-RRD-201-17-061**

This Declaration of Restrictive Covenant (Restrictive Covenant) has been recorded with the Kalkaska County Register of Deeds for the purpose of protecting public health, safety, and welfare, and the environment by prohibiting or restricting activities that could result in unacceptable exposure to environmental contamination present at the property located starting at the northwest corner of the intersection of 8 Point Road and Pine Road, (T25N R5W Section 10, SE ¼) **Garfield Township, Kalkaska County** and legally described in Exhibit 1 attached hereto (Property). The "Limits of Land or Resource Use Restrictions," attached as Exhibit 2, provides **a legal description and a scaled drawing; a survey; *or* a description or drawing approved by the MDEQ** of those portions of the Property that are subject to land use or resource use restrictions specified in this Restrictive Covenant.

The Property is associated with **Kalkaska PBB Cattle Site, Site ID 400000025** for which response activitites were conducted pursuant to Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), MCL 324.20101 *et seq*. The Property described is the burial location of the contaminated livestock from the 1973 incident where polybrominated biphenyls (PBBs) were accidently mixed with animal feed. As a result of the burial of the contaminated livestock, the site presumably contains hazardous substances in excess of the concentrations developed as the unrestricted residential criteria under Section 20120a(1)(a) or (17) of the NREPA. The MDEQ recommends that prospective purchasers or users of the Property undertake appropriate due diligence prior to acquiring or using this Property, and undertake appropriate actions to comply with the due care requirements of Section 20107a of the NREPA.

The restrictions contained in this Restrictive Covenant, recorded pursuant to Section 20121(2) of the NREPA, are based upon information available at the time the response activities were implemented. Failure of the response activities to achieve and maintain the criteria, exposure controls, and any requirements specified by the response activities; future changes in the environmental condition of the Property or changes in the cleanup criteria as defined in the NREPA; the discovery of environmental conditions at the Property that were not accounted for during implementation of the response activities; or use of the Property in a manner inconsistent with the restrictions described herein, may result in this Restrictive Covenant not being protective of public health, safety, and welfare, and the environment.

30.00
DNR
PTR

Definitions

For the purposes of this Restrictive Covenant, the following definitions shall apply:

"MDEQ" means the Michigan Department of Environmental Quality, its successor entities, and those persons or entities acting on its behalf.

"Owner" means at any given time the then current title holder of the Property or any portion thereof.

All other terms used in this document which are defined in Part 3, Definitions, of the NREPA; Part 201 of the NREPA; or the Part 201 Administrative Rules, Michigan Administrative Code, 2013 AACS R 299.1 – R 299.50, shall have the same meaning in this document as in Parts 3 and 201 of the NREPA and the Part 201 Administrative Rules, as of the date of filing of this Restrictive Covenant.

Summary of Response Activities and Environmental Contamination

Hazardous substances including but not limited to Polybrominated biphenyls (PBBs) are located on the Property from disposal of livestock contaminated with PBBs in 1973. Prior to the recording of this Restrictive Covenant, response activities were undertaken to prevent the migration of the PBBs through the soil by placement of an infiltration barrier over the burial pit. Groundwater was also monitored in up to 16 groundwater monitor wells regularly from 1977 through 2015. However, with the burial of the contaminated livestock, hazardous substances likely remain present on the Property that require controls in the form of groundwater use restrictions and soil management restrictions to prevent unacceptable exposure. An infiltration barrier consisting of a polymer bentonite soil sealant (Dowell M-179) mixed with sand was placed over the burial pits at a rate of 35 tons per acre followed by an additional two feet of sand. The infiltration barrier was placed over two (2) burial areas / "cells", to limit and/or prevent groundwater infiltration and potential leaching of the PBB and decaying livestock. The infiltration barrier is identified on Exhibit 2 and the burial / infiltration areas are referred to as Phase I and Phase II PBB Contaminated Animal Disposal Area. A fence was erected around these areas to demarcate the burial location and to help prevent the disturbance of the infiltration barrier by limiting the use of the property by motorized vehicles.

NOW THEREFORE,

1) Declaration of Land Use or Resource Use Restrictions

   The **Department of Natural Resources (DNR), as the Owner of the Property,** hereby declares and covenants that the Property shall be subject to the following restrictions and conditions:

   a) Activity and Use Limitations

      i) Land Use Restriction: The Owner shall prohibit all residential land uses on the **portions of the Property as described in Exhibit 2.** Residential land use may

include, but is not limited to, homes and surrounding yards, condominiums, and apartments where people live and sleep for significant periods of time. Cleanup criteria for land-use based response activities are located in the Government Documents Section of the State of Michigan Library.

ii) **Exposure restriction for use of groundwater:**
The Owner shall prohibit the construction and use of wells or other devices on the Property to extract groundwater for consumption, irrigation, or any other purpose, except as provided below:

(a) Wells and other devices constructed as part of a response activity for the purpose of evaluating groundwater quality or to remediate subsurface contamination associated with a release of hazardous substances into the environment are permitted provided the construction of the wells or devices complies with all applicable local, state, and federal laws and regulations and does not cause or result in a new release, exacerbation of existing contamination, or any other violation of local, state, or federal laws or regulations.

(b) Short-term dewatering for construction purposes is permitted provided the dewatering, including management and disposal of the groundwater, is conducted in accordance with all applicable local, state, and federal laws and regulations and does not cause or result in a new release, exacerbation of existing contamination, or any other violation of local, state, and federal environmental laws and regulations.

iii) **Infiltration Barrier Restriction:**
The polymer bentonite soil sealant (Dowell M-179) mixed with sand and overlying two-foot thick sand layer at the locations shown in Exhibit 2 serves to limit infiltration of water within portions of the Property designated in Exhibit 2. The Owner shall prohibit any excavation, drilling, boring or other intrusive activity, that could affect the integrity of the polymer bentonite soil sealant (Dowell M-179) and overlying sand layer, except during short-term construction or repair projects or for purposes of further treating or remediating the subject contamination. Any excavation or other intrusive activity, including removing, altering, or disturbing the polymer bentonite soil sealant (Dowell M-179) and overlying sand layer, that could affect the integrity of the barrier, must include the use of engineering controls to prevent the infiltration of water into the animal disposal locations underlying the barrier until the barrier is repaired or replaced. The barrier must be repaired or replaced with a cover that provides at least an equivalent degree of protection as the original barrier within 14 days of completion of the work. Repair and/or replacement of the barrier must be completed unless additional sampling is conducted which demonstrates that a barrier in the area is no longer necessary in accordance with the applicable provisions and requirements of Part 201 of the NREPA.

Fencing. Fencing has been erected within portions of the Property designated in Exhibit 2 to limit access to areas where the infiltration barrier is located.

b) Contaminated Soil Management The Owner shall manage all soils, media and/or debris located **within portions of the Property designated in Exhibit 2** in accordance with the applicable requirements of Section 20120c of the NREPA; Part 111, Hazardous Waste Management, of the NREPA; Toxic Substances Control Act (TSCA), 15 USC 2601 *et seq.*; Subtitle C of the Resource Conservation and Recovery Act, 42 U.S.C. Section 6901 *et seq.*; the administrative rules promulgated thereunder; and all other relevant state and federal laws.

2) Running with the Land. This Restrictive Covenant shall run with the Property and shall be binding on the Owner; future owners; and their successors and assigns, lessees, easement holders, and any authorized agents, employees, or persons acting under their direction and control. Pursuant to Section 20121(5)(b) of the NREPA, the duration of this Restrictive Convent is **perpetual**. Improper modification or rescission of any restriction necessary to prevent unacceptable exposure to regulated substances may result in the need to perform additional response activities by those parties responsible for performing response activity at the Property or to comply with Section 20107a of the NREPA.

3) Enforcement of Restrictive Covenant. The State of Michigan, through the MDEQ, or the DNR, may individually enforce the restrictions set forth in this Restrictive Covenant by legal action in a court of competent jurisdiction.

4) Severability. If any provision of this Restrictive Covenant is held to be invalid by any court of competent jurisdiction, the invalidity of such provision shall not affect the validity of any other provisions hereof, and all such other provisions shall continue unimpaired and in full force and effect.

5) Authority to Execute Restrictive Covenant. The undersigned person executing this Restrictive Covenant is the Owner and represents and certifies that he or she is duly authorized and has been empowered to execute and record this Restrictive Covenant.

6) Additional Provisions. The provisions provided in the section below are not required for this restrictive covenant to be in compliance with Part 201 of the NREPA. The Owner agreed to provisions when the Restrictive Covenant was recorded. Accordingly, the MDEQ may not enforce the Owner's obligations outlined in these provisions.

a) **Notice - The Owner shall provide notice to the DEQ of the Owner's intent to transfer any interest in the Property at least fourteen (14) business days prior to consummating the conveyance. A conveyance of title, easement, or other interest in the Property shall not be consummated by the Owner without adequate and complete provision for compliance with the applicable provisions of Section 20116 of the NREPA. The notice required to be made to the MDEQ under this Paragraph shall be made to: Director, Remediation and Redevelopment Division, MDEQ, P.O. Box 30426, Lansing, Michigan 48909-7926; and shall include a statement that the notice is being made pursuant to the requirements of this Restrictive Covenant, MDEQ Reference Number RC-RRD-201-17-061. A copy of this Restrictive Covenant shall be provided to all future owners, heirs, successors, lessees, easement holders, assigns, and transferees by the person transferring the interest.**

b) **Access** - **The Owner grants to the MDEQ, and their designated representatives, the right to enter the Property at reasonable times for the purpose of determining and monitoring compliance with the provisions within this Declaration of Restrictive Covenant, including the right to take samples, inspect the maintenance of the response activity measures and inspect any records relating to them, and to perform any actions necessary to maintain compliance with Part 201.**

c) **Maintenance and Due Care - The Owner shall annually inspect the fencing shown on Exhibit 2. The Owner shall also comply with the restrictions and obligations in this Restrictive Covenant as part of the Owner's due care requirements under Section 20107a of Part 201 of the NREPA.**

IN WITNESS WHEREOF, I, **Keith Creagh**, representative of the Michigan Department of Natural Resources, the current and legal Owner of the Property, has caused this Restrictive Covenant to be executed on this 31st day of July, 2018. **I authorize the MDNR Office of Minerals Management to file the Declaration of Restrictive Covenant with the Kalkaska County Register of Deeds for recording.**

Michigan Department of Natural Resources

By: _____
Signature

Name: Keith Creagh
Print or Type Name

Its: Director MDNR
Title

STATE OF **MICHIGAN**
COUNTY OF Ingham

The foregoing instrument was acknowledged before me this 31st day of July, 2018, by Keith Creagh, Director of the Michigan Department of Natural Resources, on behalf of the State of Michigan.

_____
Notary Public Signature

Lynda Kay Jones, Notary Public
Clinton County, Michigan
Acting in Ingham County
My commission expires: October 1, 2020

Prepared by and when recorded return to:

Mark Sweatman
Michigan Department of Natural Resources
Office of Minerals Management
P.O. Box 30452
Lansing, MI 48909

EXHIBIT 1

LEGAL DECRIPTION OF PROPERTY

East 1/2 of the Southeast 1/4
Section 10 T25N R5W
Garfield Township, Kalkaska County, Michigan

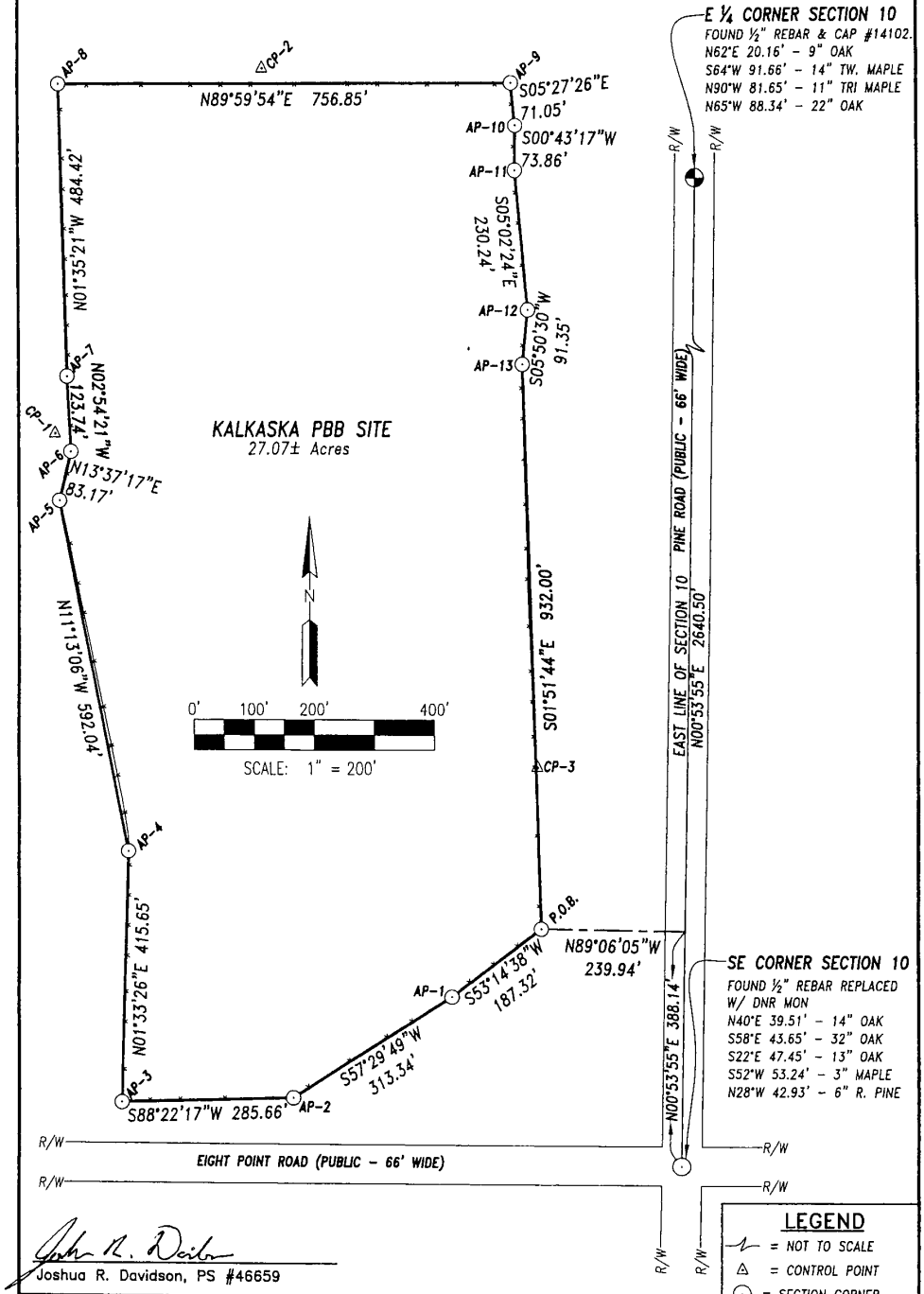
Parcel Identification Number: 40-007-210-001-00

EXHIBIT 2

LIMITS OF LAND OR RESOURCE USE RESTRICTIONS

See attached Certificate of Survey

CERTIFICATE OF SURVEY



Joshua R. Davidson, PS #46659

KALKASKA PBB SITE

PART OF SECTION 10, T25N, R5W,
GARFIELD TOWNSHIP,
KALKASKA COUNTY, MICHIGAN

SURVEYED BY: JRD
DRAWN BY: JRD DATE: 5/31/2018
FIELD WORK: JRD, DWV
PLAN NO. R-40-CT SHEET 1 OF 2

STATE OF MICHIGAN
JOSHUA R. DAVIDSON
PROFESSIONAL SURVEYOR
No. 46659
LICENSED PROFESSIONAL SURVEYOR

Michigan DNR

PROJECT NO.:FM-05-18 | F.Bk: T25N R5W "A"
FILE NAME: FM0518.dwg

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
Forest Resources Division-Survey Section
8015 Mackinaw Trail, Cadillac, MI, 49601

CERTIFICATE OF SURVEY

Legal Description

A parcel of land situated in the Southeast ¼ of section 10, T25N, R5W, Garfield Township, Kalkaska County, Michigan, described as follows:

Commencing at the Southeast corner of said section 10; Thence N00°53'55"E along the East section line, a distance of 388.14 feet; Thence N89°06'05"W a distance of 239.94 feet to the point of beginning;

Thence S53°14'38"W a distance of 187.32 feet; Thence S57°29'49"W a distance of 313.34 feet; Thence S88°22'17"W a distance of 285.66 feet; Thence N01°33'26"E a distance of 415.65 feet; Thence N11°13'06"W a distance of 592.04 feet; Thence N13°37'17"E a distance of 83.17 feet; Thence N02°54'21"W a distance of 123.74 feet; Thence N01°35'21"W a distance of 484.42 feet; Thence N89°59'54"E a distance of 756.85 feet; Thence S05°27'26"E a distance of 71.05 feet; Thence S00°43'17"W a distance of 73.86 feet; Thence S05°02'24"E a distance of 230.24 feet; Thence S05°50'30"W a distance of 91.35 feet; Thence S01°51'44"E a distance of 932.00 feet to the point of beginning, having an area of 27.07 acres more or less. Subject to any restrictions, right of ways or easements of record.

Notes:

Bearings are based NAD83(2011) State Plane Coordinates – Michigan Central Zone. Grid distances are shown on map. Project Combined Scale Factor = 0.9998781654.

Ground distance = grid distance / combined scale factor. Onsite survey control points were fixed by least squares adjustment using CORS stations "Kalkaska", "Grayling" and "Houghton Lake".

Control Points CP-1, CP-2 consist of a 2" aluminum cap on a ⅝" X 34" rebar in concrete.

Control Point CP-3 is a 2" aluminum cap on a ⅝" X 34" rebar.

Point Table- Grid Coordinates		
Point	Northing	Easting
POB	457281.95	19548135.11
AP-1	457169.85	19547985.03
AP-2	457001.48	19547720.77
AP-3	456993.36	19547435.22
AP-4	457408.86	19547446.52
AP-5	457989.59	19547331.34
AP-6	458070.42	19547350.93
AP-7	458194.01	19547344.66
AP-8	458678.24	19547331.22
AP-9	458678.26	19548088.07
AP-10	458607.53	19548094.82
AP-11	458533.68	19548093.89
AP-12	458304.33	19548114.12
AP-13	458213.46	19548104.82
CP-1	458099.68	19547324.95
CP-2	458703.59	19547672.36
CP-3	457549.95	19548129.06

I certify that I have surveyed and mapped the above described parcel of land and that the ratio of closure of the unadjusted field observations is at least 1/5000 and that the requirements of Public Act 132 of 1970 as amended have been complied with.

Joshua R. Davidson, PS #46659

Date: 5/31/18

LEGEND

- = NOT TO SCALE
- △ = CONTROL POINT
- ⊙ = SECTION CORNER
- ◔ = 1/4 SECTION CORNER
- ● = FOUND IRON
- ⊙ = SET 2" ALUM. CAP ON ⅝" X 34" REBAR

KALKASKA PBB SITE

PART OF SECTION 10, T25N, R5W, GARFIELD TOWNSHIP, KALKASKA COUNTY, MICHIGAN

SURVEYED BY: JRD

DRAWN BY: JRD DATE: 5/31/2018

FIELD WORK: JRD, DWV

PLAN NO. R-40-CT SHEET 2 OF 2

STATE OF MICHIGAN
JOSHUA R. DAVIDSON
PROFESSIONAL SURVEYOR
No. 46659
LICENSED PROFESSIONAL SURVEYOR

Michigan DNR

PROJECT NO.:FM-05-18 | F.Bk: T25N R5W "A"

FILE NAME: FM0518.dwg

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
Forest Resources Division-Survey Section
8015 Mackinaw Trail, Cadillac, MI, 49601

APPENDIX F - PARTICIPATION TABLE

Participation Table for the Development of the 2023 Kalkaska County Hazard Mitigation Plan

Participating Entity	Representative	Title	Survey Participant	LPT/LEPC Meeting 05/25/2021	HM Kick Off Meeting 7/1/2021	LPT/LEPC Meeting 08/24/2021	LPT/LEPC Meeting 11/22/2021	LPT/LEPC Meeting 02/22/2022
Kalkaska County Board of Commissioners	Truman Bicum	District 1 Commissioner						
	Bob Baldwin	District 2 Commissioner				X		
	Kohn Fisher	District 3 Commissioner						
	James Sweet	District 4 Commissioner						
	Dave Comai	District 5 Commissioner						
	Craig Crambell	District 6 Commissioner						
	Jeff Sieting	District 7 Commissioner						
Kalkaska County Planning Commission	Stuart McKinnon	Chair						
	Robert Mickevicius	Vice-Chair						
	John West	Commissioner						
	Eric Hendricks	Commissioner						
Kalkaska County	Mike Thompson	Emergency Management Coordinator (former)		X	X	X	X	X
	Doug Pratt	Emergency Management Coordinator						
	Seth Phillips	Drain Commissioner	X					
	Dean Farrier	County Surveyor						
	Christy Matley	Chief Deputy County Clerk						
	Deborah Hill	Clerk/Administrator	X					
	Pat Whiteford	Sheriff		X				X
	Dave Wagner	Undersheriff						X
	Scott Griffith	Sargent				X		
	Jodi Magee	Commission on Aging Director	X	X		X		
	Lisa Anderson	Commission on Aging Community Support Specialist						
	Laura Hendricks	Planning Commission Secretary/Zoning						
Bear Lake Township	George (Bud) Banker	Supervisor						
	Delanna David	Clerk (former)	X					
	Bob Dixon	Trustee						
	Sam Rahaim	Bear Lake Assn. President	X					
Blue Lake Township	Greg Brierley	Fire Chief	X				X	
	Blair Shearer	Supervisor	X					
	Christine Almose	Treasurer	X					
Boardman Township	John Miltenberger	Fire Chief	X					
	Dave Witek	Trustee						
	Paul Erickson	Supervisor; County Road Commission liaison and Hospital Board rep.	X					
Clearwater Township	Greg Bradley	Fire Chief	X	X		X		
	Margaret Spann	Deputy Clerk						
	Jim Leffew	Planning Commissioner	X					
Coldsprings Township	Rick Delaney	Trustee						
	Raymond Hoffman	Supervisor	X					
	Gayenell Gentelia	Clerk	X					
Coldsprings-Excelsior Fire Dept.	Eugene Headley	Fire Chief	X					
Excelsior Township	Richard VanBeek	Supervisor	X					
	Annie Wallace	Clerk	X					
	Norman Groner	Trustee						
Garfield Township	Todd Jones	Supervisor	X					
	Kim Jones	Fire Chief, Station 3						
Kalkaska Township	Derek Hogerheide	Fire Chief						X
	Ryan Brewer	Fire Department						
	Michael Winter	Supervisor						
	David E. Wolfe Jr.	Trustee						
Oliver Township	Mike Cox	Trustee						
	Sonja Dunham	Clerk (former)						
	Deborah Bishop	Treasurer						
	Alexa Szymchack	Trustee (former)						

Participation Table for the Development of the 2023 Kalkaska County Hazard Mitigation Plan

Participating Entity	Representative	Title	Kalkaska Fire Chief's Meeting 03/16/22	Kalkaska Michigan Twps. Association Meeting 04/18/22	Community Input Meeting - Kalkaska County Hazards 4/26/22	LPT/LEPC Meeting 08/23/22	LPT/LEPC Meeting 11/22/22
Kalkaska County Board of Commissioners	Truman Bicum	District 1 Commissioner					
	Bob Baldwin	District 2 Commissioner		X			
	Kohn Fisher	District 3 Commissioner		X			
	James Sweet	District 4 Commissioner					
	Dave Comai	District 5 Commissioner					
	Craig Crambell	District 6 Commissioner					
	Jeff Sieting	District 7 Commissioner					
Kalkaska County Planning Commission	Stuart McKinnon	Chair					
	Robert Mickevicius	Vice-Chair					
	John West	Commissioner					
	Eric Hendricks	Commissioner					
Kalkaska County	Mike Thompson	Emergency Management Coordinator (former)	X		X	X	X
	Doug Pratt	Emergency Management Coordinator					
	Seth Phillips	Drain Commissioner				X	X
	Dean Farrier	County Surveyor					
	Christy Matley	Chief Deputy County Clerk					
	Deborah Hill	Clerk/Administrator					
	Pat Whiteford	Sheriff		X			
	Dave Wagner	Undersheriff					
	Scott Griffith	Sargent					
	Jodi Magee	Commission on Aging Director		X	X	X	
	Lisa Anderson	Commission on Aging Community Support Specialist					
	Laura Hendricks	Planning Commission Secretary/Zoning					
Bear Lake Township	George (Bud) Banker	Supervisor		X			
	Delanna David	Clerk (former)					
	Bob Dixon	Trustee			X		
	Sam Rahaim	Bear Lake Assn. President					
Blue Lake Township	Greg Brierley	Fire Chief	X				
	Blair Shearer	Supervisor					
	Christine Almose	Treasurer					
Boardman Township	John Miltenberger	Fire Chief	X				
	Dave Witek	Trustee			X		
	Paul Erickson	Supervisor; County Road Commission liaison and Hospital Board rep.					
Clearwater Township	Greg Bradley	Fire Chief					
	Margaret Spann	Deputy Clerk					
	Jim Leffew	Planning Commissioner					
Coldsprings Township	Rick Delaney	Trustee		X			
	Raymond Hoffman	Supervisor					
	Gayenell Gentelia	Clerk					
Coldsprings-Excelsior Fire Dept.	Eugene Headley	Fire Chief	X				
Excelsior Township	Richard VanBeek	Supervisor		X			
	Annie Wallace	Clerk		X			
	Norman Groner	Trustee		X			
Garfield Township	Todd Jones	Supervisor			X		
	Kim Jones	Fire Chief, Station 3					
Kalkaska Township	Derek Hogerheide	Fire Chief					
	Ryan Brewer	Fire Department	X				
	Michael Winter	Supervisor		X			
	David E. Wolfe Jr.	Trustee		X			
Oliver Township	Mike Cox	Trustee					
	Sonja Dunham	Clerk (former)		X			
	Deborah Bishop	Treasurer		X			
	Alexa Szymchack	Trustee (former)		X			

Participation Table for the Development of the 2023 Kalkaska County Hazard Mitigation Plan

Participating Entity	Representative	Title	Kalkaska County Planning Commission Meeting 1/25/2023	Email and Phone Discussion 1/30/2023	Proposed Changes from County Planning Commission Meeting on 3/8/2023	LEPC meeting (Zoom) 3/16/23	County PC Meeting 3/21/23	Public Hearing 4/19/2023
Kalkaska County Board of Commissioners	Truman Bicum	District 1 Commissioner	X					
	Bob Baldwin	District 2 Commissioner	X					X
	Kohn Fisher	District 3 Commissioner	X			X	X	X
	James Sweet	District 4 Commissioner	X				X	X
	Dave Comai	District 5 Commissioner	X					X
	Craig Crambell	District 6 Commissioner						X
	Jeff Sieting	District 7 Commissioner	X					X
Kalkaska County Planning Commission	Stuart McKinnon	Chair	X		X		X	
	Robert Mickevicius	Vice-Chair	X				X	
	John West	Commissioner	X				X	
	Eric Hendricks	Commissioner	X					
Kalkaska County	Mike Thompson	Emergency Management Coordinator (former)	X			X		
	Doug Pratt	Emergency Management Coordinator				X		
	Seth Phillips	Drain Commissioner	X			X		
	Dean Farrier	County Surveyor	X					
	Christy Matley	Chief Deputy County Clerk						X
	Deborah Hill	Clerk/Administrator						
	Pat Whiteford	Sheriff	X					
	Dave Wagner	Undersheriff						
	Scott Griffith	Sargent						
	Jodi Magee	Commission on Aging Director						
	Lisa Anderson	Commission on Aging Community Support Specialist				X		
	Laura Hendricks	Planning Commission Secretary/Zoning	X		X		X	
Bear Lake Township	George (Bud) Banker	Supervisor	X					
	Delanna David	Clerk (former)						
	Bob Dixon	Trustee						
	Sam Rahaim	Bear Lake Assn. President						
Blue Lake Township	Greg Brierley	Fire Chief				X		
	Blair Shearer	Supervisor	X					
	Christine Almose	Treasurer						
Boardman Township	John Miltenberger	Fire Chief						
	Dave Witek	Trustee						
	Paul Erickson	Supervisor; County Road Commission liaison and Hospital Board rep.	X					
Clearwater Township	Greg Bradley	Fire Chief						
	Margaret Spann	Deputy Clerk	X				X	
	Jim Leffew	Planning Commissioner	X			X	X	
Coldsprings Township	Rick Delaney	Trustee						
	Raymond Hoffman	Supervisor						
	Gayenell Gentelia	Clerk	X					
Coldsprings-Excelsior Fire Dept.	Eugene Headley	Fire Chief						
Excelsior Township	Richard VanBeek	Supervisor						
	Annie Wallace	Clerk	X			X		
	Norman Groner	Trustee						
Garfield Township	Todd Jones	Supervisor						
	Kim Jones	Fire Chief, Station 3						
Kalkaska Township	Derek Hogerheide	Fire Chief						
	Ryan Brewer	Fire Department						
	Michael Winter	Supervisor						
	David E. Wolfe Jr.	Trustee						
Oliver Township	Mike Cox	Trustee	X					
	Sonja Dunham	Clerk (former)						
	Deborah Bishop	Treasurer						
	Alexa Szymchack	Trustee (former)						

Participation Table for the Development of the 2023 Kalkaska County Hazard Mitigation Plan

Participating Entity	Representative	Title	Survey Participant	LPT/LEPC Meeting 05/25/2021	HM Kick Off Meeting 7/1/2021	LPT/LEPC Meeting 08/24/2021	LPT/LEPC Meeting 11/22/2021	LPT/LEPC Meeting 02/22/2022
Orange Township	Eric Hendricks	Clerk						
Rapid River Township	Valerie Hansen	Clerk						
	Matthew Brenner	Trustee						
	David McKinnon	Trustee						
	Terry Williams	Supervisor						
	Robert Hall	Planning and Zoning Administrator	X					
Springfield Township	Thomas Gonyer	Supervisor						
	Scott Tinker	Fire Department						
	Jessica Marvin	Treasurer						
Village of Kalkaska	Lt. Aaron Popa	Village Manager; Dept. of Public Safety	X			X		
Kalkaska Conservation District	Mark Randolph	District Manager	X					
Charlevoix Antrim Kalkaska Emmet - Cooperative Invasive Species Management Area	Lindsey Bona-Eggeman	Program Coordinator						
Kalkaska Public Transit Authority	Tracy Fisher	Transportation Director		X				
	Harry Shipp			X				
District Health Dept. #10	Bret Haner	Emergency Preparedness Coordinator	X	X				
Kalkaska County Road Commission	John S. Rogers	Manager	X					
	Mike Cox	Road Commission Chairman	X					
Kalkaska Public Schools	Rick Heitmeyer	Superintendent						
	John Rogers	(Former) Vice President						
Kalkaska Memorial Health Center	Teresa Smith	Medical Staff Services						
	Mike Tinkle	Medical Staff Services						
	Mike Fitch							
	Connie Farrier	Service Line Director/Support Services						
Kalkaska EMS	Mike Berendsohn	Director	X					
Michigan Townships Association District 6	Sharon A Schultz	Director						
Crawford County	Doug Pratt	Emergency Manager						
Antrim County	Leslie Meyers	Emergency Management Coordinator (former)	X					
American Red Cross	Meghan Powers	Disaster Program Manager	X					
Michigan Department of Health and Human Services	Donna Wednieski			X				
MDNR		Forest Fire Supervisor	X					
Michigan State Police - Emergency Management and Homeland Security Division	F/LT Travis House	MSP Cadillac Post Commander				X		
	F/Lt Mike DeCastro	District 7 Coordinator						
	Mike Sobocinski	Hazard Planning Analyst			X			
Networks Northwest	Jennifer Neal	Community Planner		X			X	
	Stephanie Marchbanks	Community Planner					X	X
	Rob Carson	Regional Director of Community Development			X			
	Zach Vega	Community Planner			X			
	Frank Post	Contracted Employee			X	X		

Participation Table for the Development of the 2023 Kalkaska County Hazard Mitigation Plan

Participating Entity	Representative	Title	Kalkaska Fire Chief's Meeting 03/16/22	Kalkaska Michigan Twps. Association Meeting 04/18/22	Community Input Meeting - Kalkaska County Hazards 4/26/22	LPT/LEPC Meeting 08/23/22	LPT/LEPC Meeting 11/22/22
Orange Township	Eric Hendricks	Clerk		X	X		
Rapid River Township	Valerie Hansen	Clerk		X			
	Matthew Brenner	Trustee		X			
	David McKinnon	Trustee		X			
	Terry Williams	Supervisor					
	Robert Hall	Planning and Zoning Administrator					
Springfield Township	Thomas Gonyer	Supervisor		X			
	Scott Tinker	Fire Department	X				
	Jessica Marvin	Treasurer					
Village of Kalkaska	Lt. Aaron Popa	Village Manager; Dept. of Public Safety			X		X
Kalkaska Conservation District	Mark Randolph	District Manager					
Charlevoix Antrim Kalkaska Emmet - Cooperative Invasive Species Management Area	Lindsey Bona-Eggeman	Program Coordinator					
Kalkaska Public Transit Authority	Tracy Fisher	Transportation Director					
	Harry Shipp						
District Health Dept. #10	Bret Haner	Emergency Preparedness Coordinator					
Kalkaska County Road Commission	John S. Rogers	Manager			X		
	Mike Cox	Road Commission Chairman			X		
Kalkaska Public Schools	Rick Heitmeyer	Superintendent		X			
	John Rogers	(Former) Vice President		X			
Kalkaska Memorial Health Center	Teresa Smith	Medical Staff Services		X			
	Mike Tinkle	Medical Staff Services		X			
	Mike Fitch						
	Connie Farrier	Service Line Director/Support Services					
Kalkaska EMS	Mike Berendsohn	Director					
Michigan Townships Association District 6	Sharon A Schultz	Director		X			
Crawford County	Doug Pratt	Emergency Manager				X	
Antrim County	Leslie Meyers	Emergency Management Coordinator (former)					
American Red Cross	Meghan Powers	Disaster Program Manager					X
Michigan Department of Health and Human Services	Donna Wednieski						
MDNR		Forest Fire Supervisor					
Michigan State Police - Emergency Management and Homeland Security Division	F/LT Travis House	MSP Cadillac Post Commander					
	F/Lt Mike DeCastro	District 7 Coordinator					X
	Mike Sobocinski	Hazard Planning Analyst					
Networks Northwest	Jennifer Neal	Community Planner	X		X	X	X
	Stephanie Marchbanks	Community Planner	X	X	X	X	X
	Rob Carson	Regional Director of Community Development					
	Zach Vega	Community Planner					
	Frank Post	Contracted Employee					

Participation Table for the Development of the 2023 Kalkaska County Hazard Mitigation Plan

Participating Entity	Representative	Title	Kalkaska County Planning Commission Meeting 1/25/2023	Email and Phone Discussion 1/30/2023	Proposed Changes from County Planning Commission Meeting on 3/8/2023	LEPC meeting (Zoom) 3/16/23	County PC Meeting 3/21/23	Public Hearing 4/19/2023
Orange Township	Eric Hendricks	Clerk	X					
Rapid River Township	Valerie Hansen	Clerk						
	Matthew Brenner	Trustee	X					
	David McKinnon	Trustee						
	Terry Williams	Supervisor	X					
	Robert Hall	Planning and Zoning Administrator						
Springfield Township	Thomas Gonyer	Supervisor						
	Scott Tinker	Fire Department						
	Jessica Marvin	Treasurer	X					
Village of Kalkaska	Lt. Aaron Popa	Village Manager; Dept. of Public Safety						
Kalkaska Conservation District	Mark Randolph	District Manager						
Charlevoix Antrim Kalkaska Emmet - Cooperative Invasive Species Management Area	Lindsey Bona-Eggeman	Program Coordinator		X				
Kalkaska Public Transit Authority	Tracy Fisher	Transportation Director						
	Harry Shipp							
District Health Dept. #10	Bret Haner	Emergency Preparedness Coordinator						
Kalkaska County Road Commission	John S. Rogers	Manager						
	Mike Cox	Road Commission Chairman	X					
Kalkaska Public Schools	Rick Heitmeyer	Superintendent						
	John Rogers	(Former) Vice President						
Kalkaska Memorial Health Center	Teresa Smith	Medical Staff Services						
	Mike Tinkle	Medical Staff Services						
	Mike Fitch		X					
	Connie Farrier	Service Line Director/Support Services	X					
Kalkaska EMS	Mike Berendsohn	Director						
Michigan Townships Association District 6	Sharon A Schultz	Director						
Crawford County	Doug Pratt	Emergency Manager						
Antrim County	Leslie Meyers	Emergency Management Coordinator (former)						
American Red Cross	Meghan Powers	Disaster Program Manager						
Michigan Department of Health and Human Services	Donna Wednieski							
MDNR		Forest Fire Supervisor						
Michigan State Police - Emergency Management and Homeland Security Division	F/LT Travis House	MSP Cadillac Post Commander						
	F/Lt Mike DeCastro	District 7 Coordinator						
	Mike Sobocinski	Hazard Planning Analyst						
Networks Northwest	Jennifer Neal	Community Planner	X	X		X	X	X
	Stephanie Marchbanks	Community Planner	X			X		
	Rob Carson	Regional Director of Community Development						
	Zach Vega	Community Planner						
	Frank Post	Contracted Employee						

APPENDIX G – MEETING AND PUBLIC INPUT DOCUMENTATION

Hazard Mitigation Plan Update Kick Off Meeting

July 1, 2021, 9:30 a.m.

Networks Northwest
600 East Front Street, Suite 205
Traverse City, MI 49686
Conference Room #2

Agenda

I. Welcome

II. Introductions

III. Roles and Responsibilities
   a. Federal Emergency Management Agency
   b. Michigan State Police
   c. Networks Northwest
   d. County and Tribal Staff
   e. Local Government Staff
   f. Local Stakeholders
   g. General Public

IV. Communication

V. The Process
   a. Phase I – Obtain Public Input
   b. Phase II – Complete Hazard Analysis
   c. Phase III – Create Action Plan
   d. Phases IV – Update Plans and Maps
   e. Phase V – Facilitate Local Adoptions

VI. Project Timeline
   a. Period of Performance Expires: December 16, 2023

VII. Next Steps

Hazard Mitigation Plan Update Kick Off Meeting

July 1, 2021, 9:30 a.m.

Networks Northwest
600 East Front Street, Suite 205
Traverse City, MI 49686
Conference Room #2

I. In-person meeting location information

The Networks Northwest main office has an attached parking garage with entrances from Front Street and Railroad Avenue. Enter the building on the second floor and access Conference Room #2 through the door on the right. The conference room is down the hall on the left, past the bathrooms.

II. Remote meeting attendance

Community Planning is inviting you to a scheduled Zoom meeting.

Topic: Hazard Mitigation Kick Off
Time: Jul 1, 2021 09:30 AM Eastern Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/2319295012

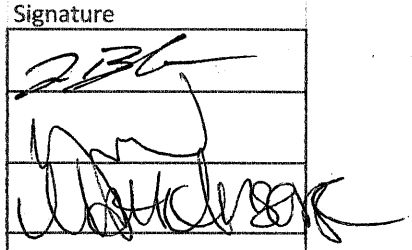
Meeting ID: 231 929 5012
One tap mobile
+16468769923,,2319295012# US (New York)
+13017158592,,2319295012# US (Washington DC)

Dial by your location
+1 646 876 9923 US (New York)
+1 301 715 8592 US (Washington DC)
+1 312 626 6799 US (Chicago)
+1 669 900 6833 US (San Jose)
+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
Meeting ID: 231 929 5012
Find your local number: https://us02web.zoom.us/u/kbKc4W10Ib

Date: Meeting Title:

	Name	Title/ Organization	Email	Phone #	Salary Fed Funded	Miles to Mtg	Miles from Mtg
1	Travis Baker	EM Director Wexford County	tbaker@wexfordcounty.org	231-306-2130	Yes	37 47	37 47
2	Brandy Martin	Incident Commander Little River Band	brandymartin@lrboi-nsn.gov	231-398-6818	no	60	60
3	Matt Anserge	EM/911 Leelanau	manserge@leelanau.gov	231 256-8715	Yes	25	25
4	Zach Vega	comm. planner NWNW	zach.vega@networknorthwest.org	231.			
5	Rob Carson	Networks Northwest	rob.carson@networknorthwest.org	2	Yes.	45	45
6	Frank Post		Frank.Post@live.com	231-383-0558		64	64
7							
8							
9							
10							
11							
12							
13							
14							
15							

Signature



09:34:30 From Mike Sobocinski to Community Planning(Direct Message) : Mike Sobocinski, MSP/EMHSD - Position is federally funded and therefore not eligible for matching federal planning grant.
09:34:51 From Rebecca Hubers to Everyone : Rebecca Hubers - Benzie County Emergency Management / rhubers@benzieco.net / 231-882-0567
09:36:01 From PLANNING EMD to Everyone : Linda Hartshorne-Shafer, Missaukee County Planning/Emergency Management Director, planningemd@missaukee.org, 231-839-7264 Ext 3
09:36:08 From Manistee County to Community Planning(Direct Message) : Michael Machen/Deputy 911 Director/Emergency Manager/ $59,000 mmachen@manistee911.org/231-723-9970/ Yes Federally Funded
09:37:43 From Mike Thompson to Everyone : Mike Thompson, Kalkaska County Emergency Management Coordinator, mthompson@kalso.org, 231.258.3319 ext. 2229
09:37:49 From Garrett Fairchild GTB Fire Dept to Everyone : Garrett Fairchild / GTB Fire Chief / garrett.fairchild@gtbindians.com / 231-534-7161
09:40:07 From Mike Sobocinski to Community Planning(Direct Message) : Is this introduction separate from my agenda item?
09:40:40 From JAMurphy to Everyone : Jolanda Murphy, Grand Traverse Band Emergency Manager, Jolanda.murphy@gtbindians.com, 231-534-7111
09:42:22 From Becky Oien to Everyone : Rebecca Oien, Grand Traverse Band, Tribal Manager, becky.oien@gtbindians.com 231-534-7136
09:44:12 From Rebecca Hubers to Everyone : my mic must not be working
10:01:22 From Manistee County to Community Planning(Direct Message) : Lisa Sagala, Manistee County Administrator $84,,200 231-398-3501, lsagala@manisteecountymi.gov
10:02:49 From Manistee County to Community Planning(Direct Message) : Mike Szokola, Manistee County Planner, $68,500 mszokola@manisteecountymi.gov, 231-398-3527
10:10:24 From Mike Sobocinski to Everyone : FEMA Map Service Center (access to NFIP flood map information): https://msc.fema.gov/portal/home
10:11:46 From Mike Sobocinski to Everyone : FEMA has an impressive new mapping resource called the National Risk Index, providing information by county or even census tract. Risks from natural hazards, social vulnerability, etc. https://www.fema.gov/flood-maps/products-tools/national-risk-index
10:14:31 From Mike Sobocinski to Everyone : The Michigan Hazard Analysis (2019) provides an overview of natural hazards throughout Michigan. You can search the document for your county's name to find local information more quickly (Ctrl F search function)
https://www.michigan.gov/documents/msp/MHA_2019__full_update_natural_hazards_653708_7.pdf
10:38:03 From Rebecca Hubers to Everyone : I'm sorry I have to walk away now to attend another meeting - thank you

Kalkaska County LPT/LEPC

Meeting minutes/notes for 24 August 2021

Present: Jodi Magee, COA; Greg Bradley, Clearwater Fire/Rescue #5;F/LT Travis House, MSP; SGT Scott Griffith, KSO/Dispatch; Mike Thompson, Kalkaska County Emergency Management Coordinator

Present via Zoom: Bob Baldwin, County Commissioner District #2, LT Aaron Popa, KDPS

Guest: Frank Post, Planner, Networks Northwest

Meeting called to order at: 0935 hours

Introductions

Approve agenda: agenda approved by Chair without comment

Motion to approve previous minutes: Minutes of the 25 May 2021 meeting approved by Chair without comment

Old Business:

a. **Guest Presentation:** Frank Post, Planner for Networks Northwest, presented more preliminary information regarding the Hazard Mitigation Plan update that Networks Northwest is heading up. Although the current plan expires on 5 December 2021 and the new plan will not be completed by that date, FEMA has indicated that our current approved plan will suffice and cover the county's needs until the new plan in completed and approved by the State, FEMA, and all of the political bodies of the County (Village, County, Townships). Kalkaska County's current Hazard Mitigation Plan is strong and is a great starting point for the update, but the team will be looking at "current" high risk issues in our County, and how those issues can be prepared for and mitigated. A good beginning review would be for each of you in the LPT/LEPC to access the Hazard Mitigation Plan on the county website (www.kalkaskacounty.net) and look under "Departments" for the Emergency Management section; at the bottom of the page you can find the Hazard Mitigation Plan. Please review pages 7-11 to get a good overview of the project. Mr. Post noted that the weather information in the plan will be updated to allow for a more current picture when verifying and possibly reprioritizing the hazards which might befall the County. Networks Northwest will continue to head up the project, but smaller level meetings might be called so that committee members are able to input questions/concerns/ideas for the plan.

b. Kalkaska Covid Update – In the absence of Bret Haner, DHD#10, Thompson noted that the cases in Kalkaska County continue to increase, reportedly 7 new cases over the weekend. The need for masking, social distancing, and hygiene, along with vaccinations, continue to be the best way to keep our county safe.

New Business:

a. CIKR (Critical Infrastructure and Key Resources) is a means of logging and monitoring all of the assets, infrastructure, responding agencies, companies, farms, etc., within the county. All of these assets and infrastructure will be geo located and weighed so as to create a "score" so that funding can be made available from FEMA if needed. This is a mandatory project with due dates assigned; Sectors of assets that need to be input by 1 Feb 2022 are: Water, Energy, Transportation, Emergency Services, Chemical, Food/Ag, Dams, IT, Healthcare, and Manufacturing. Bob Baldwin noted that an RFP has been going out to recommend steps for improvement to Rugg Pond Dam. Results are not available at this time.

Member Reports:

Jodi Magee reported that everything is up and running at COA. Staff has been safe and well during this Covid period.

Public Comment:

None presented

Adjournment: Meeting adjourned by Thompson at 1014 hours.

The next meeting of the LPT/LEPC will be at 0930 hours on 23 November 2021. Location of the next meeting will be determined and shared. If there is a need for, or desire for, virtual attendance, connectivity instructions will be sent approximately one week prior to the scheduled meeting.

December 6, 2021

Dear Commissioner,

The Kalkaska County Emergency Management Office is updating the 2016-2021 Natural Hazard Mitigation Plan. Mike Thompson, Emergency Management Coordinator, will be assisted by Networks Northwest to complete the plan update process. The Natural Hazard Mitigation Plan identifies natural disaster risks and vulnerabilities to Kalkaska County, develops long-term strategies for protecting people and property from similar events, and establishes a coordinated process to implement the plan. The process will be led by a team of officials from public safety, fire, EMS, public works, public health, environmental, planning, non-profit organizations and elected officials who will provide valuable insight into the identification of hazards and their impacts on residents and businesses.

To begin this plan update, the planning team is inviting you to participate in the Community Survey now available. This survey is open to all community members, and the feedback generated will help us understand how familiar the community is with hazard mitigation planning, what hazard-specific issues are most important, and the mitigation actions and strategies residents and communities would like to implement. You may access the survey through the following link: https://www.surveymonkey.com/r/2PYGNMZ

The plan update process will take place over a two year period (now through December 2023). Resident and stakeholder feedback will continue to be solicited throughout the planning process. The public is encouraged to attend public engagement events that will be held to collect feedback and provide direction for the plan. Project events and updates for each plan will be posted periodically throughout the process on the Emergency Management website. We will work through the following process:

Phase I: Data collection and community survey
Phase II: Hazard Identification and Risk Assessment
Phase III: Review and update hazard mitigation goals, priority areas, and implementation strategies.
Phase IV: Draft plan public comment period. Post the plan electronically and meet with the public for comments. Incorporate feedback from the public review period and make final edits to the plan.
Phase V: Plan Adoption. Facilitate the plan adoption process with the County Board of Commissioners and local officials.

Upon completion, the plan will be submitted to FEMA for review and approval. To be eligible for pre-disaster mitigation project grants awarded by FEMA, participating jurisdictions must contribute to the creation of the plan and adopt the completed plan. If you are interested in participating in the plan development process or would like to be updated on the plan progress, please email Mike at mthompson@kalso.org or Jennifer Neal at Jennifer.neal@networksnorthwest.org.

Sincerely,

Jennifer Neal, AICP
Community Planner

December 20, 2021

Dear Kalkaska Conservation District Board Member,

The Kalkaska County Emergency Management Office is updating the 2016-2021 Natural Hazard Mitigation Plan. Mike Thompson, Emergency Management Coordinator, will be assisted by Networks Northwest to complete the plan update process. The Natural Hazard Mitigation Plan identifies natural disaster risks and vulnerabilities to Kalkaska County, develops long-term strategies for protecting people and property from similar events, and establishes a coordinated process to implement the plan. The process will be led by a team of officials from public safety, fire, EMS, public works, public health, environmental, planning, non-profit organizations and elected officials who will provide valuable insight into the identification of hazards and their impacts on residents and businesses.

To begin this plan update, the planning team is inviting you to participate in the Community Survey now available. This survey is open to all community members, and the feedback generated will help us understand how familiar the community is with hazard mitigation planning, what hazard-specific issues are most important, and the mitigation actions and strategies residents and communities would like to implement. You may access the survey through the following link: https://www.surveymonkey.com/r/2PYGNMZ

The plan update process will take place over a two year period (now through December 2023). Resident and stakeholder feedback will continue to be solicited throughout the planning process. The public is encouraged to attend public engagement events that will be held to collect feedback and provide direction for the plan. Project events and updates for each plan will be posted periodically throughout the process on the Emergency Management website. We will work through the following process:

Phase I: Data collection and community survey
Phase II: Hazard Identification and Risk Assessment
Phase III: Review and update hazard mitigation goals, priority areas, and implementation strategies.
Phase IV: Draft plan public comment period. Post the plan electronically and meet with the public for comments. Incorporate feedback from the public review period and make final edits to the plan.
Phase V: Plan Adoption. Facilitate the plan adoption process with the County Board of Commissioners and local officials.

Upon completion, the plan will be submitted to FEMA for review and approval. To be eligible for pre-disaster mitigation project grants awarded by FEMA, participating jurisdictions must contribute to the creation of the plan and adopt the completed plan. If you are interested in participating in the plan development process or would like to be updated on the plan progress, please email Mike at mthompson@kalso.org or Jennifer Neal at Jennifer.neal@networksnorthwest.org.

Sincerely,

Jennifer Neal, AICP
Community Planner

Kalkaska County LPT/LEPC Agenda

22 February 2022 0930 hours

Use the following link to join the meeting via Zoom

Join Zoom Meeting

https://us06web.zoom.us/j/81014517786?pwd=ZFltTGd4SG9nN2dNejh5ckIyVEp1Zz09

Meeting ID: 810 1451 7786
Passcode: 095103

One tap mobile
+13017158592,,81014517786#,,,,*095103# US (Washington DC)
+13126266799,,81014517786#,,,,*095103# US (Chicago)

1. Introductions
2. Approval of the Agenda
3. Review of August 2021 minutes (November 2021 meeting failed)
4. Old Business
    a. Natural Hazards Mitigation Plan – presented by Jennifer Neal and/or Stephanie Loria, Community Planners, Networks Northwest
    b. Kalkaska County Covid update
    c. National Cyber Security Review (NSCR) explanation and update
5. New Business
    a. New equipment for the EOC – Emergency Operations Center
    b. HMEP (Hazardous Materials Emergency Preparedness Grant) application
    c. 2022/2023 meeting schedule
6. Member Reports
7. Public Comment
8. Adjournment

Kalkaska County LPT/LEPC

Meeting minutes/notes for 22 February 2022

Present: Sheriff Pat Whiteford, KSO; Undersheriff Dave Wagner; Chief Derek Hogerheide, Kalkaska Township Fire Dept.; Mike Thompson, Kalkaska County Emergency Management Coordinator

Guest: Stephanie Loria, Community Planner, Networks Northwest

Meeting called to order at: 0935 hours

Introductions

Approve agenda: agenda approved without comment

Motion to approve previous minutes: Minutes of previous meetings (24 Aug 21 and 23 Nov 21) not reviewed or approved due to lack of attendance

Old Business:

a. **Guest Presentation:** Stephanie Loria, Community Planner for Networks Northwest (NNW), reviewed via PowerPoint presentation the upcoming Hazard Mitigation Update project.
b. Kalkaska Covid Update – not discussed; info sent to membership via email
c. National Cyber Security Review (NSCR) - Thompson discussed this required review. Results due to NSCR by 28 Feb 22; lack of submission will cause Kalkaska County to be ineligible for HSGP (Homeland Security Grant Program) funding.

New Business:

a. New Equipment for EOC - Thompson reported that funding through the Homeland Security Planning Board has been authorized to purchase laptops and monitors for dual screen processing for Kalkaska County.
b. HMEP (Hazardous Materials Emergency Preparedness) grant funding has been requested to secure software so that the Kalkaska County LEPC can access the reporting that has been submitted to EGLE from all of the Sara II & III sites in the county. This will allow for easier review by the committee on a regular basis
c. 2022/2023 meeting schedule - not discussed; schedule sent to membership via email

Member Reports:

None presented.

Public Comment:

None presented

Adjournment: Meeting adjourned by Thompson at 1048 hours.

The next meeting of the LPT/LEPC will be at 0930 hours on 24 May 2022. Information will be sent prior to the meeting for location and Zoom access.

MEETING SIGN-IN SHEET

Project:	Kalkaska County Fire Chiefs meeting	**Meeting Date:**	3.16.2022
Facilitator:	Networks Northwest	**Place/Room:**	Kalkaska Twp Hall 209 Laurel St.

Name	Organization	E-Mail
Stephanie Loria	Networks NW	stephanie.loria@networksnorthwest.org
Jenni Neal	" "	
Mike Thompson	Kalkaska EMS	mthompson@kalso.org
Scott Tink	Fife Lake Springfield Fire Dist	Chief.FLFES@gmail.com
John Miltenberger	Boardman Fire + Rescue	fordcountry.jm@gmail.com
Ryan Brewer	Kalkaska Twp Fire	Kalkaskafd@gmail.com
Eugene Headley	Coldsprings-Excelsior Fire	cefr@coldspringsexcelsior.org
Greg Beverley	Blue Lake Twp Fd	bluelakefirechief@att.net

YOU ARE INVITED!

The Second Quarterly Meeting of the Kalkaska Chapter of MTA will be held on Monday April 18th, 2021, at 7:00 pm. Please bring your own refreshments.

Meetings will be at the Kalkaska County Commission on Aging 303 S. Coral St. Kalkaska, Michigan to conduct the MTA Meeting from 7:00 pm – 8:30 pm.

Chairperson calls meeting to order at: _____

Pledge of Allegiance Led by: _____

Treasure Report: $_____

Minutes Approval: Motion by: _____, Seconded by: _____, Yeas: ____Nays: _____

Round Table Introductions and Organization Representing: Please stand and introduce yourself and your position.

General Information: The Internal Revenue Service issued the 2022 standard mileage rate is 58.5 cents per miles, up 2.5 cents from the 2021 rate.

Due to the amount of Individual's scheduled, we are asking that presentation be limited to 10 minutes and 5 minutes for question-and-answer time, to give others ample time to discuss their topics.

Current affairs will be discussed, including, but not limited to:

- **KCPD – Sheriff's Pat Whiteford Report on 800 pagers requests.**
- **CPNN – Stephanie Loria – Community Planner with Networks Northwest. Topic on Rugg Pond and grant monies available.**
- **MTA – Representative Sharon Schultz MTA- President and Ex Director and or others to attend next Chapter meeting. Time Change?**
- **MR Consulting – Marvin Radtke, Jr. Grant Writer for State and Federal Monies.**
- **KCL – John Roberts Director 2021 Annual Report**
- **Hospital Report – Kohn Fisher on KMHC/KALISEUM Project.**
- **ARPA (American Rescue Plan ACT) Chairperson Bob Baldwin applications received and approval processes.**

2022 MTA schedule 3rd quarter meeting date is July 18th at 7:00 PM.

Items to be discussion on next meeting:

- **Truestream –Brett Streby Great Lake Electric - Internet now available through the Power lines.**
- **Village Manger Popa discussion on well number 6 progress and replacement of Iron Filtering Process.**

Motion to Adjourn by: _____, Seconded by: _____

Meeting end time: _____

Recording Clerk, _____

4-18-2022 29 People ~~MZ~~ MTA

BEAR LAKE TOWNSHIP			
2nd Tuesday at 7 pm	Supervisor	George (Bud) Banker	X
	Clerk	Delanna David	
	Treasurer	Shirley Havens	
	Trustee	Jim Knight	
	Trustee	Bob Dixon	
	Assessor	Sally Murray	
BLUE LAKE TOWNSHIP			
1st Wednesday at 7 pm	Supervisor	Blair Shearer	
	Clerk	Tracy Nichol	
	Treasurer	Christine Almose	
	Trustee	Mary A. Shaw	
	Trustee	Lawrence Shoemaker	
	Assessor	David Grimm	
	Zoning Admin	Kathy Campbell	
BOARDMAN TOWNSHIP			
3rd Wednesday at 7 pm	Supervisor	Paul C. Erickson	
	Clerk	Tonya Hart	
	Treasurer	Nikki Gillette	
	Trustee	Dave Witek	
	Trustee	Bonnie Garrett	
	Assessor	Dawn Kuhns	
	Zoning Administrator	Mary Erickson	
CLEARWATER TOWNSHIP			
3rd Thurday at 7 pm	Supervisor	Tom Backers	
	Clerk	Melinda Booy	
	Treasurer	JoAnne Childs	
	Trustee	Gregory Bradley	
	Trustee	Albert Keyes	
	Assessor	Dawn Kuhns	
	Zoning Administrator	Tom Backers	
COLDSPRINGS TOWNSHIP			
2nd Monday at 7 pm	Supervisor	Raymond Hoffman	
	Clerk	Gayenell Gentelia	
	Treasurer	Brenda Smith	
	Trustee	Rick Delaney	X
	Trustee	Lowell Schaller	
	Assessor	Sally Murray	
EXCELSIOR TOWNSHIP			
1st Monday at 7 pm Exc. Sept. (1st Tues.)	Supervisor	Richard VanBeek	X
	Clerk	Annie Wallace	X
	Treasurer	Nina Cotton	
	Trustee	Norman Groner	X
	Trustee	Daniel Prokup	
	Assessor	Kevin Hunter	
GARFIELD TOWNSHIP			
2nd Thursday at 7 pm	Supervisor	Todd Jones	
	Clerk	Brett Southworth	
	Treasurer	Terri Sibole	
	Trustee	Bryan Moore	
	Trustee	Eric Rohn	
	Assessor	Eric Sandy	

	Zoning Admin	Kenny Nason	
	Planning Chair	Al Potts	
KALKASKA TOWNSHIP			
1st Tuesday at 7 pm	Supervisor	Michael Winter	X
	Clerk	Kristie Swikoski	
	Treasurer	Dawn Kuhns	
	Trustee	David E. Wolfe Jr	X
	Trustee	John Arnold	
	Assessor	Amy Jenema	
OLIVER TOWNSHIP			
2nd Tuesday at 7 pm	Supervisor	Peggy Young	
	Clerk	Sonja Dunham	X
	Treasurer	Deborah Bishop	X
	Trustee	Michael Fisher	
	Trustee	Alexa Szymchack	X
	Assessor	Scott Rokos	
ORANGE TOWNSHIP			
2nd Monday at 7 pm	Supervisor	Trevor Ball	
	Clerk	Eric Hendricks	X
	Treasurer	Julie Lenz	
	Trustee	Susan Ball	
	Trustee	Tom Mason	
	Assessor	Sally Murray	
RAPID RIVER TOWNSHIP			
2nd Tuesday at 7 p.m.	Supervisor	Terry Williams	
	Clerk	Valerie Hansen	X
	Treasurer	Rhonda Argyle	
	Trustee	Matthew Brenner	X
	Trustee	David McKinnon	X
SPRINGFIELD TWP			
2nd Tuesday at 7 pm	Supervisor	Thomas Gonyer	X
	Clerk	Sandra Parker	
	Treasurer	Jessica Marvin	
	Trustee	Jeremy J. Birgy	
	Trustee	Kevin Stein	
VILLAGE OF KALKASKA			
2nd Monday at 6 pm	Village President	Harley Wales	
	President Pro-Tem	Michelle Miller	
	Village Manager	Aaron Popa	
	Zoning Administrator	Aaron Popa	
	Village Clerk	Angie Koon	
	Village Treasurer	Valerie Tracey	
	Trustee	Diana Needham	
	Trustee	Elizabeth Dunham	
	Trustee	Robert Bishop	
	Trustee	D. Allen White	
	Trustee	Robert Larsen	
COUNTY COMMISSIONERS	District #1	Truman	
	District #2	Bob Baldwin	X
	District #3	Kohn Fisher	X
	District #4	James Sweet	
	District #5	Dave Comai	

	District #6	Craig Crambell	
	District #7	Katina Banko	
MTA - DISTRICT 6 DIRECTOR	MTA District 6	Sharon A Schultz	X
KALKASKA PUBLIC SCHOOLS	Superintendent	Rick Heitmeyer	X
	President	Rachael Birgy	
	Vice President	John Rogers	X
	Treasurer	Mary M. Scobey	
	Secretary	Wendy Watson	
	Trustee	Regan Foerster	
	Trustee	Dr. Richard Hodgman	
	Trustee	Sarah Dudek	
PROBATE JUDGE	Judge	Lynne M. Buday	
	Prosecutor	Ryan Ziegler	
KALKASKA SHERIFF DEPARTMENT		Pat Whiteford	X
KALKASKA MEMORIAL HEALTH CENTER	Medical Staff Services	Teresa Smith	X
		Mike Tinkle	X
KMHC BOARD		Bruce Zenner	
COUNTY CLERK		Deborah Hill	
COMMISSION ON AGING	Director	Jodi Magee	X

DAVE WOLFE

JOHN ROBERTS

TODD CHRASTEK

LISA LEEDY

MARVIN RADTKE SR

Almose	Christine	
Argyle	Rhonda	
Arnold	John	
Backers	Tom	
Banker	George	
Banko	Katina	
Birgy	Rachael	
Bishop	Deborah	
Bob Baldwin	Bob	
Booy	Melinda	
Bradley	Gregory	
Brenner	Matthew	
Buday	Lynne	
Campbell	Kathy	
Childs	JoAnne	
Cotton	Nina	
Crambell	Craig	
Dave Comai	Dave	
David	Delanna	
Delaney	Rick	
Dixon	Bob	
Dudek	Sarah	
Dunham	Sonja	
Erickson	Mary	
Erickson	Paul	
Foerster	Regan	
Garrett	Bonnie	
Gentelia	Gayenell	
Gillette	Nikki	
Gonyer	Thomas	
Groner	Norman	
Hall	Bob	
Hansen	Valerie	
Hart	Tonya	
Havens	Shirley	
Heitmeyer	Rick	
Hendricks	Eric	
Hill	Deborah	
Hodgman	Dr Richard	
Hoffman	Raymon	
Hunter	Kevin	
James Sweet	James	
Keyes	Albert	
Knight	Jim	
Kohn Fisher	Kohn	
Kuhns	Dawn	
Lenz	Julie	

Loria	Stephanie	
Magee	Jodi	
McKinnon	David	
Murray	Sally	
Nason	Kenny	
Nichol	Tracy	
Parker	Sandra	
Popa	Aaron	
Potts	Al	
Prokup	Daniel	
Rambles	Charlies	
Rogers	John	
Rokos	Scott	
Sandy	Eric	
Schaller	Lowell	
Schultz	Sharon	Sharon Schultz
Scobey	Mary	
Shearer	Blair	
Sibole	Terri	
Smith	Brenda	
Smith	Teresa	Teresa Smith
Southworth	Brett	
Swikoski	Kristie	
Truman	Truman	
VanBeek	Richard	
Wallace	Annie	Annie Wallace
Watson	Wendy	
Whiteford	Pat	
Williams	Terry	
Winter	Michael	
Witek	Dave	
Young	Peggy	
Zenner	Bruce	
Radtke	Marvin	
Roberts	John	
Stephanie	Loria	
Streby	Brett	

MTA Guest Sign In Sheet

Print First Name	Print Last Name
Dave Wolfe	Wolfe
NORMAN	GRONEK
Richard	VANBEEK
Marvin	Radtke JR
Lisa	Leedy
George	Banker
Sharon	Schultz - MTA Rep
Todd	Chwastek
MICHAEL TINKLE	
Alexa Szymchack	Oliver Township Clerk

4/18/2022 Kalkaska MTA Meeting – Natural Hazard Mitigation Plan Update

The Kalkaska County Emergency Management Office is updating its 2016 Natural Hazard Mitigation Plan. Mike Thompson, Kalkaska County Emergency Management Coordinator, will be assisted by Networks Northwest Community Planning staff to complete the plan update process.

The Natural Hazard Mitigation Plan **identifies natural disaster risks and vulnerabilities to Kalkaska County, develops long-term strategies for protecting people and property from similar events, and establishes a coordinated process to implement the plan.** The process will be led by a team of officials from public safety, fire, EMS, public works, public health, environmental, planning, non-profit organizations and elected officials who will provide valuable insight into the identification of hazards and their impacts on residents and businesses.

The plan update process will take place over a two year period (now through December 2023). Resident and stakeholder feedback will continue to be solicited throughout the planning process. The public is encouraged to attend public engagement events that will be held to collect feedback and provide direction for the plan. Project events and updates for each plan will be posted periodically throughout the process at nwm.org/HazardPlan. We will work through the following process:

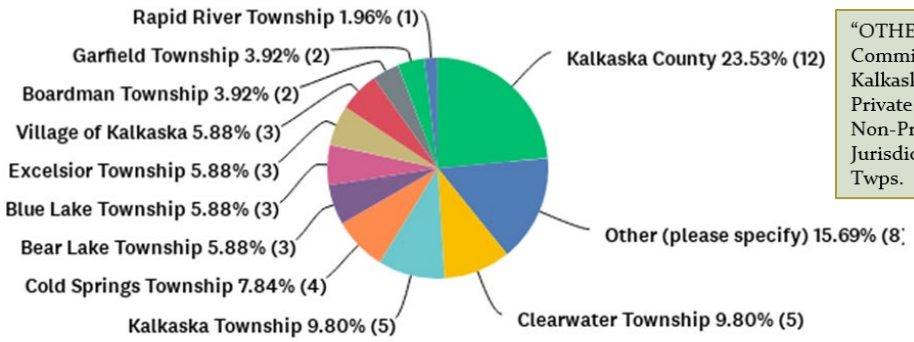
Phase I: Data Collection and Community Survey (Nov 2021-Feb 2022 – survey excerpts on pg. 2)
Phase II: Hazard Identification and Risk Assessment (Spring 2022)
Phase III: Review and update hazard mitigation goals, priority areas, and implementation strategies.
Phase IV: Draft plan public comment period. Post the plan electronically and meet with the public for comments. Incorporate feedback from the public review period and make final edits to the plan.
Phase V: Plan Adoption. Facilitate the plan adoption process with the County Board of Commissioners and local officials.

Upon completion, the plan will be submitted to FEMA for review and approval. **A jurisdiction within the county will only be eligible for pre-disaster mitigation project grants awarded by FEMA if they contribute to the creation of the plan and adopt the completed plan.** If you are interested in participating in the plan development process or would like to be updated on the plan progress, please email Mike Thompson at mthompson@kalso.org or Stephanie Loria at Stephanie.loria@networksnorthwest.org

You're Invited!
Upcoming ZOOM Meeting 4/26/2022 10:00 a.m.
Kalkaska County Hazard Mitigation Community Meeting
Discussion of your community's concerns and vulnerabilities regarding impacts from natural hazards.
https://us02web.zoom.us/j/2319295012
Meeting ID: 231 929 5012
+16468769923, 2319295012# US (New York)

Q1 Please indicate the local jurisdiction you represent in Kalkaska County.

Answered: 48 Skipped: 0



"OTHER": MI State Police; County Road Commission; DHD #10; Antrim County; Kalkaska Conservation District; MDNR - Private and Public Lands in the County; Non-Profit Director - Multiple Jurisdictions; Both Excelsior & Coldsprings Twps.

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

Answered: 48 Skipped: 0

#1. Wildfire (29)
#2. Illness Outbreak/Pandemic (17)
#3. Flooding/Heavy Rainfall (13)
#4. Winter Storms(12)
#5. Tornado (10)
#6. High Winds/Straight line Winds (9)
#7. Drought (5)
#8. Dams (3)

Potential FEMA Hazard Mitigation Grants to pursue after the updated 5-Year Plan is FEMA-Approved:

- **Building Resilient Infrastructure & Communities (BRIC) Funding Program**
  - $700 million available for FY 2020
  - Prioritizes awards to "economically disadvantaged rural communities" (most communities in Kalkaska County), which allows for just a 10% non-federal grant match (vs. 25%).
  - Some example projects:
    - Wildfire mitigation activities such as forest or grassland fire management
    - Communication infrastructure upgrades
    - Electrical grid improvements
    - Adoption and enforcement of updated building codes
    - Facility retrofitting – i.e., creating a designated community shelter out of an existing building or making a building more resistant to floods, wind, or wildfire.

- **Resilience Grants**
  - Dam Safety for high hazard-potential dams***Only if the dam is considered an "unacceptable risk" to the public** Rugg Pond Dam may not qualify based on last safety inspection report from 2019.

From: Stephanie Loria [mailto:stephanie.loria@networksnorthwest.org]
Sent: Tuesday, April 19, 2022 10:37 AM
Cc: Jennifer Neal <jennifer.neal@networksnorthwest.org>; Zach Vega <zach.vega@networksnorthwest.org>
Subject: Zoom Meeting with Kalkaska County Communities to Discuss Natural Hazard Impacts

Dear Kalkaska County Community Representative,

The Kalkaska County Emergency Management Department and Networks Northwest invite you to a *Zoom* meeting of local officials to discuss natural hazard event impacts in the County. The desired outcome of this meeting is to understand the types of natural hazard events and their impacts to the County's population, built environment, natural environment, and economy. This information will be used in the Natural Hazard Mitigation Plan update to develop mitigation goals and strategies. Local participation in this planning process is crucial and a requirement of FEMA, the approval agency. We request that at least one representative from each community in Kalkaska County attend the meeting. We look forward to seeing you (virtually) on -

Tuesday, April 26, 2022 from 10:00 am-11:30 am

Topic: Kalkaska County Hazard Mitigation Community Meeting
Time: Apr 26, 2022 10:00 AM Eastern Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/2319295012

Meeting ID: 231 929 5012
One tap mobile
+16468769923,,2319295012# US (New York)
+13017158592,,2319295012# US (Washington DC)

Dial by your location
+1 646 876 9923 US (New York)
+1 301 715 8592 US (Washington DC)
+1 312 626 6799 US (Chicago)
+1 669 900 6833 US (San Jose)
+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
Meeting ID: 231 929 5012
Find your local number: https://us02web.zoom.us/u/kbKc4W10lb

Kindly reply (to sender only) if you wish to attend.

The updated Natural Hazard Mitigation Plan for Kalkaska County, to be completed before the end of 2023, will identify natural disaster risks and vulnerabilities to each community, develop long-term strategies for protecting people and property from similar events, and establish a coordinated process to implement the plan.

If you have any questions, please contact Stephanie Loria at stephanie.loria@networksnorthwest.org or Mike Thompson at mthompson@kalso.org Background information, such as the previous 2016 HM Plan, and updates on the current Hazard Mitigation planning process for the county can be found at: https://www.networksnorthwest.org/community/natural-hazard-mitigation/kalkaska-county.html

Stephanie Loria
Community Planner
Networks Northwest

Desk: 231.439.5247
Mobile: 231.590.0930
stephanie.loria@networksnorthwest.org

Networks Northwest
Talent / Business / Community
2240 Mitchell Park Dr., Suite B
Petoskey MI 49770

Kalkaska County Hazard Mitigation – 4.26.22 Public Input Meeting via Zoom

Notes

Attendee	Representation
John S. Rogers	Kalkaska County Road Commission Manager
Mike Cox	Kalkaska County Road Commission
Mike Thompson	Kalkaska County Emergency Management
Jodi Magee	Kalkaska Council on Aging
Aaron Popa	Village of Kalkaska – Manager/Chief of Police
Todd Jones	Garfield Twp. Supervisor
Bob Dixon	Bear Lake Twp. Trustee
Eric Hendricks	Orange Twp. Clerk
Dave Witek	Boardman Township Trustee
Stephanie Loria	Networks NW Community Planner
Jennifer Neal	Networks NW Community Planner

Zoom Poll – Top Hazards of Concern

1. Thunderstorm/Wind
2. Extreme Winter Weather
3. Wildfire
4. Excessive Rainfall

Group Discussions – Impacts on People, Economy, Natural Environment and Built Environment

Thunderstorms/ Wind Storms

- First responders to wind/tornado – EMS, police, fire, road commission – have the burden of rescues and damage cleanup
- Loss of power has a wider range of impact on people
- Property damage/debris cleanup impact is county wide
- More potential for huge population injury is a large outdoor event like the Trout Festival EM dept. has to think about evacuation plans, routes to move people, shelter locations.
- Road Commission – large volume rain events washout culverts. Not that culverts are undersized, but they are aging – get oxidated with rust, holes, weakened material. On both paved/unpaved roads. Washouts of gravel undermine the road bed. 2014 spring flooding resulted in $250,000 in culvert replacement. Will provide me a list of repair costs. Turned in request for FEMA to fund cleanup of $140,500 in washout/culvert repairs but was denied.
- Dutch John Rd. in Garfield Twp., near Manistee River closed for a week in early April 2022. Golden Road (in Orange Twp.?) and Tyler Roads (in which Twp.?) also recently failed.
- Always washout issues with spring runoff and rainfall on gravel roads that are hilly.
- August 2015 windstorm caused $43,500 in cleanup costs – trees in road R.O.W. Cleanup done between 8/3/2015 and 8/20/2015
- Beaver dam activity also plugs up culverts
- Boardman Twp – road/culvert impacts fairly regularly with spring rains

Winter Storms

- Emergency Management – concern with how to shelter people short-term. Want to utilize ARPA $ to update/retrofit buildings for shelter use (need kitchen/dining area, bathrooms, generator, heat/AC, WiFi)
- Dave Witek – Boardman Twp. hall is not equipped to house people. It has 2 bathrooms but no showers, kitchen or generator).
- Winter weather slows down EMS/Fire/Police response times
- Using ARPA $ to evaluate deficiencies in emergency shelter availability
- Extreme cold – not so much a risk for most people unless it's a long-term type of event, but definitely an issue when it occurs for the very poor who may live in houses without proper insulation/construction; their furnaces don't work and they heat their house with the oven. Pipes in their homes may also freeze.
- Freeze/thaw cycle wreaks havoc on roads, as well as heavy snow and ice.

Extreme Heat/Drought

- Depending on the time of year, fire danger can be high. Can have a dry spring or fall, combined with high temps and/or winds. These times are when Fire Depts. get the most calls for wildfires.
- Lack of A/C in homes of elderly or those with disabilities
- Boardman Twp. Hall does have A/C, but facility is limited in size.
- Privately owned buildings like churches, event centers, warehouses, VFW halls might be good alternative cooling sites – possible partnership opportunity.
- Jodi – The COA has helped purchase fans for seniors in the past. We also promote our local senior center as a site for seniors or anyone to come hang out in during the day when it's very hot. We can still purchase fans too if needed.
- COA has 5 building they can use for seniors
    - Kalkaska (can use for heating/cooling center; getting one generator)
    - Bear Lake Twp Hall
    - Garfield Twp Hall
    - S. Boardman Senior Center
    - Clearwater Twp. (Rapid City)
- Kalkaska Memorial Assisted Living Facility by the Hospital – hospital has a generator
- No known issues with impacts to agriculture industry. People in the county often pride themselves on their independence, and get help from neighbors if in need.

Vulnerable Populations – Group Discussion

- Aged population and extremely poor; those with physical limitations; also those very young under 2 years of age who do not have coping mechanisms to cold and heat
- Add lists of these people when they can to 911 dispatch but there are many more other people that do not want to share their information
- Remote populations – who live out in the woods, do not associate with public much in general. Don't know what their situation is. General resistance of these people to sharing their info. With the government. Resist outside government intervention.

- Get a lot of blight complaints and have a sheriff with them on blight inspection calls. Might be able to gather their information this way.
- Strategy is needed to conduct outreach efforts about available community assistance
    - COA has a newsletter sent out about who to contact about what;
    - Newsletter in Boardman Twp. sent out with tax bills, but this will not reach renters
    - Rarely have more than 1-2 people in attendance at Boardman Twp. meetings; little citizen interest in governmental participation
    - Also older population may have a general aversion to using computers
    - Postal mail is probably the best option to send information out.
    - Need to send out information to community members on shelter locations, too.
- County uses "Rave" for EM notification. Started it in 2020. It's an opt-in system and hard to get people to opt in. EM will be having an informational meeting with CODE RED to see if that would be a better system to use.

- Federal, state, local, tribal and territorial public safety officials can send Non-Weather Emergency Messages (NWEMs) through the Federal Emergency Management Agency (FEMA) Integrated Public Alert and Warning System (IPAWS) to the National Weather Service (NWS) for broadcast over NOAA Weather Radio (NWR) All Hazards and other NWS dissemination systems.
- This capability was reintroduced in 2021 as a redesign of the previous enhanced NWEM dissemination functionality developed in 2006 as the All-Hazards Emergency Message Collection

https://www.weather.gov/NonWeatherAlerts/

Invasive Species – Group Discussion

- They stock many of their lakes with fish – aquatic invasive species could be a costly impact on their natural resources tourism industry. Waterways more of an issue in Boardman Twp. Want to keep and attract tourism to the lakes – a major sector in the county. Youngs Dam Pond is stocked with fish – costs a lot of money.
- Small lakes bring in big $ in tourism
    - European Milfoil – can't afford it to spread
- Spongy Moth – horrible last year; cyclical event. Ruins tourism, parks dirty from leaf litter/moths. Need to address the issue before it becomes a problem.
- CAKE – CISMA and EGLE – good resources to look at for public education on these issues. EGLE provided advice on what native plants should be present along the sides of the Boardman Dam. Mark at Soil Conservation District advised on what to use for shoring up the dam.
- Christmas trees – have some in the County. They are always susceptible to root diseases, fungus, etc.

Pandemic – Group Discussion

- Overall, Boardman Twp. did not see a lot of impact to their regular government operations. Just switching to Zoom meetings. Volunteers in the Fire Dept. stayed on – participation stayed the same. No one is a full time employee with the Twp.
- Eric Hendricks – Orange Twp. – they continued to meet in person. Elections in 2020 had to use more caution with political divisiveness climate.
- Road Commission – loss of gas tax $ to road commissions due to fewer people driving and buying gas.

- First responders – no impact/change in response times. Still retained volunteers/staff.
- Mostly a local economic impact to citizens with job losses, lack of childcare...
- Council on Aging – centers could not be open for a while. Difficult to keep up with changing policies – didn't know what to do so they did what they thought was best with their own guidelines. "Rules" were changing every day.
- Had good access to get the PPE they needed from the State, FEMA
- Learned that a pandemic CAN happen – not a distant possibility
- Hospital had their own PPE sources. Medical staff did a good job and did what they needed to do. Handled it as well as they could even as guidelines were constantly changing.
- People found a way to get things done and make the best out of the situation presented.
- EMS worked through the hospital for PPE supplies.
    - Have some staffing issues
    - Had a couple EMS in the county but it didn't affect response rates/volunteer force.

Dams

- Youngs Dam in Boardman Twp. – 5 year inspection report revealed no structural issues but some maintenance needed – replace a pipe and shoreup. Looking at using ARPA $.
- Rugg Pond Dam Committee evaluating whether to fix or demolish it.

Wildfire

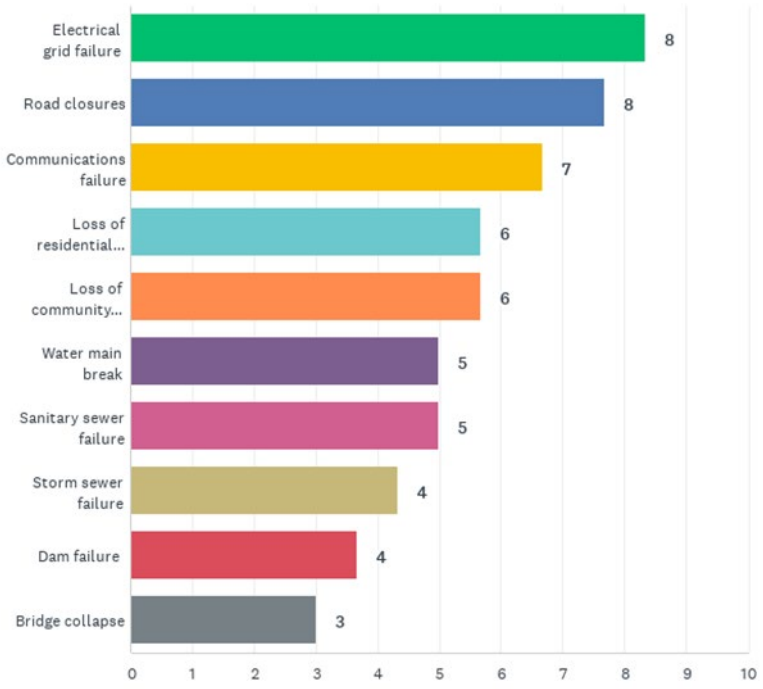
- Risk corresponds with MDNR fire risk map – southern areas of the county.
- Boardman Twp. is > 40% MDNR land.
- Twp. might have a brush truck from the 1980s.
- Few small fires in NW quadrant of the Twp. but usually nothing more than ½ an acre

Problematic Road Condition Locations

- Clearwater Twp.: South side of Lake Skegemog, Holles Dr: lots of flooding near houses and yards
- Cold Springs Twp.: CR 571 between Starvation Lake Rd. and Twin Lake Rd. – Water was 18" on the centerline in 2021. Just got $ to fix. New culverts to be installed underneath.
- Cold Springs/Blue Lake Twps: Twin Lake Road between the two Twin Lakes – had to close the road 2020-21. Road covered by water; groundwater table rose up.
- Cold Springs Twp: South side of Manistee Lake – Shore Rd. houses at lake level, yards flood, no drainage
- Bear Lake Twp: South shore of Bear Lake – combination of hill, houses, road and lake. Steep; erosion present here.
- Excelsior Twp: Grass Lake Road – area is all swamp and is one of the busiest connector roads in the county. Lost a few culverts.
- Excelsior Twp: Crawford Lake Road and Crawford Lake – hilly; houses in between road and lake get water in their yards

Rank the infrastructure failures that would most concern you, with 1 being the most concerning and 9 being the least concerning.

(3 surveys submitted)



	1	2	3	4	5	6	7	8	9	10	TOTAL	SCORE
Electrical grid failure	33.33% 1	0.00% 0	33.33% 1	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	8.33
Road closures	33.33% 1	0.00% 0	0.00% 0	33.33% 1	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	7.67
Communications failure	0.00% 0	66.67% 2	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	33.33% 1	0.00% 0	3	6.67
Loss of residential homes/businesses	0.00% 0	0.00% 0	33.33% 1	0.00% 0	33.33% 1	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	3	5.67
Loss of community facility (school, hospital, park, campground etc.)	0.00% 0	0.00% 0	0.00% 0	33.33% 1	0.00% 0	66.67% 2	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	5.67
Water main break	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	33.33% 1	0.00% 0	3	5.00
Sanitary sewer failure	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	33.33% 1	3	5.00
Storm sewer failure	0.00% 0	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	33.33% 1	0.00% 0	33.33% 1	3	4.33
Dam failure	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	66.67% 2	33.33% 1	0.00% 0	0.00% 0	3	3.67
Bridge collapse	0.00% 0	0.00% 0	0.00% 0	0.00% 0	33.33% 1	0.00% 0	0.00% 0	0.00% 0	33.33% 1	33.33% 1	3	3.00

10:02:39 From John S. Rogers to Everyone:
John S. Rogers
10:02:45 From Manager/Chief Popa to Everyone:
Village Manager Aaron Popa Village of Kalkaska
10:02:51 From Mike Thompson to Everyone:
Mike Thompson - Kalkaska Emergency Management - Federally Funded
10:03:16 From John S. Rogers to Everyone:
John S. Rogers, Manager, Kalkaska County Road Commission
10:03:24 From todd jone Garfield twp to Everyone:
Todd Jones , Garfield Twp Supervisor, Kalkaska County
10:03:30 From Dave Witek to Everyone:
Dave Witek - Trustee, Boardman Township. I'm sorry but what do you mean "Federally Funded", in what way?
10:05:32 From Robertâ€™s iPad (2 to Everyone:
TrusteeBob Dixon Bear Lake Twptrustee
10:42:49 From Stephanie Loria_Networks NW to Everyone:
stephanie.loria@networksnorthwest.org
10:54:10 From Jodi Magee to Everyone:
The COA has helped purchase fans for seniors in the past. We also promote our local senior center as a site for seniors or anyone to come hang out in during the day when it's very hot.
10:54:49 From Jodi Magee to Everyone:
We can still purchase fans too if needed.

Kalkaska County LPT/LEPC Agenda

23 August 2022 0930 hours

Use the following link to join the meeting via Zoom

Join Zoom Meeting

Join Zoom Meeting
https://us06web.zoom.us/j/86398550156?pwd=NkFGUUdUVi9DR1JNSytkWFdxTmM5Zz09

Meeting ID: 863 9855 0156
Passcode: 210907
One tap mobile
+16469313860,,86398550156#

Dial by your location
+1 646 931 3860 US

Meeting ID: 863 9855 0156
Passcode: 210907

1. Introductions
2. Approval of the Agenda
3. Review of February 2022 minutes
4. Old Business
    a. Natural Hazards Mitigation Plan – presented by Jennifer Neal and/or Stephanie Loria, Community Planners, Networks Northwest
    b. HMEP (Hazardous Materials Emergency Preparedness Grant) application
5. New Business
    a. New equipment for the EOC – Emergency Operations Center
6. Member Reports
7. Public Comment
8. Adjournment

Kalkaska County LPT/LEPC

Meeting notes for 22 November 2022

Present: Mike Thompson, Kalkaska County Emergency Management Coordinator; Bret Haner, DHD #10

Guests: Jennifer Neal, Community Planner, Networks Northwest; Stephanie Marchbanks, Community Planner, Networks Northwest

By Zoom: Megan Powers, ARC; Chief Aaron Popa, Kalkaska Village PD; Seth Philips, Kalkaska County Drain Commissioner; F/LT Mike deCastro, MSP EMHSD

Meeting called to order at: 0939 hours

Introductions

Approve agenda: no quorum

Motion to approve previous minutes: No quorum

Presentation: Ms. Neal and Ms. Marchbanks continued to discuss the upgrade for the Natural Hazards Mitigation Plan. There is to be a meeting on 16 February 2023 with the Kalkaska County Planning Commission and stakeholders in the county regarding the plan and concerns/comments/additions/subtractions discussed at the meeting. After that meeting, incorporated changes will be presented to the LPT/LEPC (at a date determined in the future) for further review. The Planning Commission will have one more meeting to approve the document to forward to the County for approval. The Plan will be sent to the state and FEMA for final approval before taking it to the county and townships for signatures.

Much discussion about the plan and nuances was presented and taken by Networks Northwest for inclusion in the plan.

Public Comment:

None presented

Adjournment: Meeting adjourned by Thompson at 1125 hours.

The next meeting of the LPT/LEPC will be at 0930 hours on 28 February 2023. Information will be sent prior to the meeting for location and Zoom access.

MEMO

To: Kalkaska County Planning Commission

From: Jennifer Neal, AICP, Community Planner
Stephanie Marchbanks, Community Planner

Date: January 25, 2023

Re: Kalkaska County Natural Hazard Mitigation Plan

Background

Kalkaska County, with assistance from Networks Northwest, is updating their 2016 Hazard Mitigation Plan. The County's Hazard Mitigation Plan must be approved by Federal Emergency Management Agency (FEMA) and adopted by the County and local jurisdictions every five years in order to be eligible for pre-disaster mitigation project grants awarded by FEMA. Mike Thompson, Emergency Management Coordinator, is leading this process with the coordination of the Local Emergency Planning Committee and the Local Planning Team (LEPC/LPT). Meetings with the LEPC/LPT have occurred regularly over the last year, and local officials, stakeholders, and residents were encouraged to participate. Steps in the planning process have included:

- Community survey distributed in November 2021
- Community profile and demographic analysis
- Historic hazards analysis and identification
- Initial strategies discussion

Meeting Purpose

As we near the end of the planning process, we look to a broader audience to review the draft plan (included) and make comments on the strategies listed in the table (also included). We will give a brief overview of the plan and provide an opportunity for comment, but primarily, we look to have a discussion regarding the strategies table. Mitigation strategies must be:

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

In response to hazards that impact "countywide," many strategies also impact all Kalkaska County jurisdictions and thus can be carried out by Kalkaska County officials or departments or partner organizations such as District Health Department #10. However, some hazards may impact local communities more than others. For example, wildfire hazards are more likely to impact communities located in the eastern part of the county. Therefore, it is essential under the fourth bullet point, that local communities provide input and ultimately support the strategies that impact their community. During FEMA's review, prior to approval, they will consider what local input as has been received and what are the identified strategies. We look to the Planning Commission to provide comment both from the perspective of Kalkaska County as a whole in regards to ongoing planning and coordination efforts, as well as your perspective as members of local communities.

KALKASKA COUNTY PLANNING COMMISSION
605 N BIRCH STREET
KALKASKA MI 49646

Wednesday, January 25th 2023

AGENDA

CALL TO ORDER:	6:00 p.m. with the Pledge of Allegiance
ROLL CALL:	Kohn Fisher, Stuart McKinnon, John West, Bob Mickevicius, Eric Hendricks, Jim Sweet
APPROVAL OF AGENDA:	January 25, 2023
NEW BUSINESS:	Hazard Mitigation Plan Presentation - Networks Northwest

OTHER/ PUBLIC COMMENT:

ADJOURNMENT:

KALKASKA COUNTY PLANNING COMMISSION
605 N BIRCH STREET
KALKASKA, MI 49646
(231) 258-3367 lhendricks@kalkaskacountyzoning.org

January 25, 2023

~~**NOT**~~ **BOARD APPROVED**
2-16-23 LH

A special meeting of the Kalkaska County Planning Commission was called to order by Chairman Stuart McKinnon at 6:00 p.m. with the Pledge of Allegiance.

Purpose: This meeting was held for the purpose of reviewing the 2023 Draft of the Hazard Mitigation Plan, getting input from community stakeholders, and any other business that may come before the Board.

ROLL CALL:

Present:
Eric Hendricks
Kohn Fisher
John West
Stuart McKinnon
Jim Sweet
Bob Mickevicius

Also Present:
Laura Hendricks, Zoning Administrator
Mike Thompson, Emergency Manager
Jennifer Neal, Networks Northwest
Stephanie Marchbanks, Networks Northwest
Multiple others (list of names to be attached in minutes binder)

APPROVAL OF AGENDA: Motion by Fisher, supported by Mickevicius to approve the agenda as presented. All present in favor, motion carried by voice vote.

NEW BUSINESS:

Hazard Mitigation Plan Presentation - Networks Northwest: Mike Thompson, Kalkaska County Emergency Manager introduced himself to the Board and public. He said Networks Northwest is tasked with updating the Hazard Mitigation Plan which has expired a couple years ago. He said even though the plan (adopted in 2016) has expired, we are still eligible to receive funding if a disaster occurs in our county. He said Network Northwest has been working on the draft 2023 plan for quite some time now, and it covers all types of disasters that could occur in our area. He thanked everyone for attending and introduced Jenni and Stephanie of Networks Northwest as they would be giving the presentation.

order to obtain pre-disaster grant funding. She said this plan after being updated, approved by the Kalkaska County Board of Commissioners, and FEMA will allow the county to be eligible for additional monies to mitigate disasters. She said the plan identifies a number of hazards that may impact the community and gives strategies to mitigate these disasters.

Jenni said the purpose of this meeting is to review the plan and gather input. She said FEMA wants to see a list of the participants to show representation from the county, village, and townships, so they are being diligent to gather input as much as possible. She said some of the information is a cross over from the old plan, but they have added a lot of new information and updated the community profile and all of the demographics. Jenni said the new plan has been a huge undertaking, and the process is being conducted differently than previous updates. She said the Michigan State Police and FEMA will review the plan first to make sure their requirements have been met. Upon approval from these entities it will go to the County and townships to adopt and approve if they choose to do so. Mike Thompson said he will go to the townships individually and they must approve the plan to receive funding. Jenni presented the proposed draft plan on the projection screen at that time, beginning on page one.

During this time the following concerns were identified:

Infrastructure - Flooding of road crossings, county wide road drainage issues. Need to get updated list and prioritize problem areas.

Economically Disadvantaged Students - Update stats. Compare to school data.

Invasive Species - Update list.

The Board recessed by call of the chair at 7:00 p.m. The meeting was called back to order at 7:14 p.m.

Other Updates:

Participation table with available organizations, names, and titles.

Data and analysis of new hazard, Hazardous materials: Fixed site incidents.

Additional discussion and support in Flooding, Tornado, and Wildfire hazard analysis.

Update strategies Table.

The Board recessed by call of the Chair at 8:00 p.m. The meeting was called back to order at 8:07 p.m.

After review of the draft plan discussion followed in regards to the next steps in the review and adoption process as follows:

Emergency Manager Mike Thompson will be going to various township meetings to gather input.

February 16th will be the next Planning Commission meeting. The Board will review the updates received so far. Anticipate input from Kalkaska County Soil Conservation District and Road Commission.

March 17th will be the final date for communities to submit changes to the plan, table, and maps. These updates are to be sent directly to Jenni or Stephanie at Networks Northwest.

March 21st will be the final Planning Commission review of the revised Hazard Mitigation Plan.

April 19th BOC Meeting, the Hazard Mitigation Plan will be submitted for adoption.

OTHER/PUBLIC COMMENT: None.

ADJOURNMENT: Motion by Hendricks, supported by Mickevicius to adjourn the meeting. All present in favor, motion carried by voice vote.

Meeting adjourned at 9:31 p.m.
Laura Hendricks, Recording Secretary

Hazard Mitigation Mtg
1-25-23

Please Print your name: + Title

Jeff Sieting	County Comm. Dist 7
BOB BALDWIN	County Comm.
Matt Brenner	RR Township trustee
Paul Erickson	Boardman Supervisor
Terry Williams	Rapid River Supervisor
Mike COX	Oliver Twp Trustee
ANNIE WALLACE	Excelsior twp clerk
Mike Sitch	K.M.H.C
JIM LEFFEW	CLEARWATER TWSP
Margaret Spann	Clearwater Township
Seth Phillips	Kal County Drain Comm.
Stephanie Marchbanks	Networks NW Comm. Planner
TRUMAN BICUM	CLEARWATER Township
Jessica Marvin	Springfield Township
Connie Farrier	Kal Kaska Memorial H.S
Dean Farrier	County Surveyor
Blair Shearer	Blue Lake twp - Supervisor
Reed Beaker	Bear Lake twp - Supervisor
Gayenell Gerhelia	Coldsprings Twp - Clerk
DAVE COMAI	B.P.C. DISTRICT 5
Jennifer Neal	Networks NW

All PC members as follows:

Stuart Mckinnon	Eric Hendricks
Kohn Fisher	Laura Hendricks - Z.A.
John West	
Jim Sweet	Mike Thompson
Bob Mickevicius	rbcfd4690@gmail
	mthompson@kalso

Recipient	Delivery	Read
'Peggy Young'	Mike Fitch	KCMHC
'Ray Hoffman'	Jim Leffew	Clearwater Twp.
'Richard Vanbeek'	Margret Spann	Clearwater Twp.
'Terry Williams' ✓	Seth Phillips	Kal Cnty Drain Comm.
'Todd Jones' ✓	Stephanie Marchbanks	Networks N.W.
'Tom Backers'	Jessica Marvin	
'Tom Gonyer'		
'Trevor Ball'		
Truman Bicum ✓		Read: 1/7/2023 11:40 AM
James Sweet ✓		Read: 1/7/2023 11:13 AM
Dean Farrier ✓		
Mike Cox ✓		
Connie Farrier ✓		

Good afternoon:

Please see the information below regarding the pending Hazard Mitigation Plan updates to be addressed with the stake holders in the county, at this meeting 1-25-2023 at 6:00 PM.

You are requested to have a representative from your Township or entity present.

Please let me know if you have any questions.

Deb Hill

From: Mike Thompson
Subject: Hazard Mitigation meeting – CHANGE OF DATE

Networks Northwest Community Development staff planners are assisting Kalkaska County with the update of their 5-Year Natural Hazard Mitigation Plan. A partial draft of the plan can be reviewed on the project webpage.

At the upcoming Kalkaska County Planning Commission meeting on Wednesday, **January 25, 2023**, at 6:00 pm, Networks Northwest staff will be discussing draft hazard mitigation strategies specific to Kalkaska County communities, and they need your input!

Networks Northwest
Talent / Business / Community

Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Re: Invasive species locations

Jennifer Neal <jennifer.neal@networksnorthwest.org> Mon, Jan 30, 2023 at 9:39 AM
To: Lindsey Bona-Eggeman <lindsey.bonaeggeman@macd.org>
Cc: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Hi Lindsey

We had a meeting in Kalkaska last week and we went over the information for invasive species. The County is very supportive of including invasive species and would like to expand the discussion to more types. I referenced much of the information you gave me, and would like to talk to you about it. Aquatic invasive species were specifically mentioned but our plan is light on the details.

Do you have any time to talk today or tomorrow? Thanks again,

Jenni

On Tue, Jan 17, 2023 at 4:28 PM Lindsey Bona-Eggeman <lindsey.bonaeggeman@macd.org> wrote:

> No spotted lantern fly yet. It's only been found in Oakland County so far.
>
> On Fri, Jan 13, 2023 at 2:51 PM Jennifer Neal <jennifer.neal@networksnorthwest.org> wrote:
>
> > Lindsey,
> >
> > This is great information! Exactly what I was looking for. I've attached the Little River Band of Ottawa Indians section on Invasive Species. We are having similar conversations with other conservation districts (Leelanau County has sent us some information, but I haven't put it together yet. But, the more information I get, the more details I can provide. I really like how you've sort of broken up the group into those you're trying to manage (but know already have a foothold) and those where you are trying to prevent the spread of new invaders. That might be an angle we should take in the plan. Has spotted lantern fly already been spotted in Antrim County?
> >
> > I am going to also attach an in kind match form which you can complete and return back to Leslie. Mark whatever time (be generous) you've spent gathering information and responding to emails on the form and your hourly rate. Your time can count towards the County's required match amount. Let me know if you have any questions.
> >
> > Thanks so much!
> >
> > On Fri, Jan 13, 2023 at 1:57 PM Lindsey Bona-Eggeman <lindsey.bonaeggeman@macd.org> wrote:
> >
> > > Do you mind sharing what other counties have created? I am happy to help. I just kind of need a framework idea. I have started to jot some ideas down. But i am all over the place, haha.
> > >
> > > When I think about invasive species here in Northern Michigan I think about the features that are of particular importance to our area. Lake Michigan shoreline and dune system, inland lakes and streams, Northern forest systems, fruit production, and tying back to all the latter is tourism and its economic impacts.
> > > With many invasive species in our area, the genie is out of the bottle and we lack the resources and tools to really be effective at management.
> > > A large emphasis is and should be placed on preventing new invaders that could have pretty devastating consequences, such as Spotted Lantern Fly. A big component of what we try to do is outreach and awareness education. Teaching people how to prevent the spread and movement of invasive species as well as teaching them what should and shouldn't be in an area is going to be our number one tool in preserving the ecological and economic health of our region.
> > > Threats of invasive go like this:
> > > 1. Displace native species that are an integral part of ecosystem function and potentially disrupt the food chain. This is the case with many terrestrial invasive species. They take over sites and create monoculture creating poor habitats for wildlife. As well as displacing critical or threatened native species.
> > > 2. Economic Impacts- Invasive species can have impacts on tourism if a waterbody is totally mussel infested or taken over by an aquatic invasive plant. Impacts on the fruit and winery production due to invasive pests, such as spotted lantern fly. Winery and fruit production issues can impact tourists. Forest pests killing a majority of trees in a forest have huge economic impacts.
> > > 3. Human Health- Some of the species we manage and are on the lookout for can impact human health, such as, wild parsnip or giant hogweed
> > > Antrim County - These are our top 5 but are not inclusive of all the species we watch for and help manage.
> > > We are concerned about the presence of invasive phragmites, *phragmites australis* on waterways and in areas that can facilitate its spread. Phragmites impact the riparian habitat for birds and mammals that nest and feed along shorelines. It creates a monoculture that chokes and shades out important riparian plants. It can impact a homeowner's access and view of a water body.
> > > Purple loosestrife, *Lythrum salicaria* poses similar impacts on habitat quality and utilization. Less impact on homeowners.

Japanese Knotweed, Giant knotweed and Bohemian knotweed, *Polygonaceae,* can be a concern to homeowners, and municipalities because of these plants' ability to grow into a structure's foundation, through sidewalks and road surfaces. These plants can also be spread by root fragments and stem sections. It can create monocultures that shade out desirable vegetation, creating poor habitats for native species. This is of particular concern along water bodies and has been shown to be extremely detrimental to waterways in the Eastern US.
Black Swallow Wort- This is toxic to animals and unfortunately is toxic to the monarch butterfly.
Oriental Bittersweet is a vine plant that can strangely a tree and causes tree mortality. This impacts ecosystem health and economic health that is associated with trees' health.

In regards to Autumn olive. It is very widespread in Michigan. It was planted for wildlife for many many years. It is spread by birds and is recolonizing old farm fields. For which we have many! We have found out that its value to wildlife is actually relatively low (low in protein and other nutrients compared to our natives). It also is known for its nitrogen-fixing abilities. With that being said it's not something that we are putting a high priority on because even if we did we couldn't make a dent. but we have knowledge and information to help guide people in managing it themselves. We have a number of woody invasives like this here: honeysuckle, buckthorn. They are all problematic in fallow fields and roadsides, places where the canopy has been opened and allowed them to thrive.

We have spotted knapweed and leafy spurge but for the most part people don't manage them

Habitat-specific management- We are looking at high-quality natural areas in the CAKE and those tend to be around coastal dunes (eg Lake Michigan) and waterways, riparian areas (eg Skegemog Natural Area). In those situations, we are planning to manage for the resource (aka that natural area) and restoration therefore we will remove and control anything that is not supposed to be there.

Aquatic Invasives (AIS)- We have a few of these already (genie in the bottle situation, super hard to manage AIS once it's in a waterway) New Zealand Mudsnail was found in Shanty Creek in 2021. There is nothing we can do to control it but we have an obligation to not spread it around further. (que education and outreach)
Prevention is the most important thing with AIS and early detection is important but often too late.

On Fri, Jan 13, 2023 at 1:25 PM Jennifer Neal <jennifer.neal@networksnorthwest.org> wrote:

> Hi Lindsey,
>
> There are a couple different sections to the plan that we are talking about. I think what Leslie is referring to is the strategies table and how to implement the plan. We've done about what we can there and general strategies are fine. There is an earlier section that provides the analysis about why the hazard is a hazard. Based on what Leslie shared with me and the discussions we've had so far, we are pretty light on details. We have some good examples of how invasive species have impacted other counties and what they are doing to manage them. In turn, this information helps make the case for why invasive species are a hazard and should be included in the plan. Does this make sense? Leslie was specific about mentioning Autumn Olive, but I really have no idea what to say about it and why it's a challenge for Antrim County. Just one example because I know there are many others that you are dealing with.
>
> Thanks so much :)
>
> On Fri, Jan 13, 2023 at 12:58 PM Lindsey Bona-Eggeman <lindsey.bonaeggeman@macd.org> wrote:
>
> > Hi Jennifer, When Leslie and I spoke she mentioned that she was going to keep it sort of general with goals and objectives and reference the partners that work on the issues. Has that changed? To be honest with you some of the information you are asking for with how long things have been here I don't have the answer for. I am just trying to better understand what is needed and valuable to provide.
> > -Lindsey
> >
> > On Wed, Jan 11, 2023 at 3:33 PM Jennifer Neal <jennifer.neal@networksnorthwest.org> wrote:
> >
> > > Hi Lindsey,
> > >
> > > I'm working with Leslie Meyers to update the Antrim County Natural Hazards Plan. I think she already asked you to review some of the language we have in the plan. I'm wondering if you could give me four or five direct impacts or examples of how invasive species are affecting Antrim County? Leslie has asked specifically about Autumn Olive - what is it doing or what are you worried about? Some others might Japanese knotweed destroying roads and Cypress Spurge being ingested by livestock (both Missaukee County). Or if you have specific locations where invasive species are a major concern that would be really helpful. The more specific the better (how long it's been there, how much to remove it, what and how to remove it, etc.)
> > >
> > > Thanks so much,
> > >
> > > Jenni
> > >
> > > --

January 31, 2023

Dear Planning Commissioner,

Thank you for attending the presentation and discussion of the Kalkaska County Hazard Mitigation Plan on January 25, 2023. Per your request, Stephanie Marchbanks and I have prepared a revised draft plan and strategies table to be sent to all local jurisdictions in Kalkaska County. The plan revisions include, but are not limited to:

- Update of the participation table with available organizations, names, and titles
- Added MI School Data for economically disadvantaged students (2011-12, 2021-22)
- Added data and analysis of new hazard, Hazardous Materials: Fixed Site Incidents
- Additional discussion and support in Flooding, Tornado, and Wildfire hazard analysis
- Invasive Species hazard analysis rewrite
- Update Strategies Table

The plan and accompanying documents will be sent through electronic mail to all local officials. The plan and accompanying documents will also be available on the Networks Northwest project website. The plan will be available for local review and comment until March 17, 2023. The plan will be submitted to the County Planning Commission for final review on March 21, 2023 before being released for public comment. Following the comment period, a public hearing will be scheduled during a subsequent meeting of the County Board of Commissioners.

Upon completion, the plan will be submitted to FEMA for review and approval. To be eligible for pre-disaster mitigation project grants awarded by FEMA, participating jurisdictions must contribute to the creation of the plan and adopt the completed plan. **Please submit all comments and proposed changes to Mike at mthompson@kalso.org or Jennifer Neal at Jennifer.neal@networksnorthwest.org no later than March 17, 2023.**

Sincerely,

Jennifer Neal, AICP
Community Planner

Networks Northwest
Talent / Business / Community

Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Fwd: Proposed changes to Haz. Mit. Plan

2 messages

Jennifer Neal <jennifer.neal@networksnorthwest.org> Wed, Mar 15, 2023 at 9:01 AM
To: Mike Thompson <mthompson@kalso.org>, Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

FYI-

---------- Forwarded message ---------
From: **Laura Hendricks** <LHendricks@kalkaskacounty.org>
Date: Wed, Mar 15, 2023 at 8:44 AM
Subject: Proposed changes to Haz. Mit. Plan
To: Jennifer Neal <jennifer.neal@networksnorthwest.org>

Hi Jennifer,

Please see attached, proposed changes from the 3-8-23 Planning Commission meeting.

Laura Hendricks

Kalkaska County Zoning Administrator

605 N Birch Street

Kalkaska, MI 49646

(231) 258-3367 lhendricks@kalkaskacounty.net

--
Jennifer Neal, AICP
Community Planner
Mobile: 231.709.3204
jennifer.neal@networksnorthwest.org

Networks Northwest
2240 Mitchell Park Dr., Suite B
Petoskey MI 49770

Scan20230314164715.pdf
16075K

Jennifer Neal <jennifer.neal@networksnorthwest.org> Wed, Mar 15, 2023 at 9:06 AM
To: Laura Hendricks <LHendricks@kalkaskacounty.org>
Cc: Mike Thompson <mthompson@kalso.org>, Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Morning Laura,

I've looked briefly through these changes. I see a bit of pattern with the comments and I wonder if maybe Stu can elaborate on the concerns behind discussing vulnerable populations? This is a pretty big requirement of FEMA's and I think we should probably modify the language rather than delete it. If I know more about the thoughts behind it I can tailor the language to the County's specifications.

That being said, I'm going to be working on the strategies table from now until the meeting (yours and others), so I won't be able to incorporate these changes before the PC meeting next week. I just wanted to let you know, and hopefully I can get some more clarity about them at the meeting.

Thanks so much,

Jenni

[Quoted text hidden]

Stk-PC 3-8-23 Need heading & page #'s

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE									WHERE - Affected Locations or Groups	WHO - Responsible Parties	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Hazardous Materials; Fixed Site Incidents						1	2	3	4
Preparation and Awareness	1	Incorporate the County Hazard Mitigation Plan's strategies into elements of County and local master plans.	X	X	X	X	X	X	X	X		Countywide	Kalkaska County, all townships, and Village of Kalkaska	A, B	Ongoing		X	X	X	X
	2	Continue to pursue interdepartmental cooperation and coordination of police, fire, rescue and EMS services to achieve community-wide coverage availability.	X	X	X	X	X	X		X		Countywide	County Sheriff and EM; local fire/EMS	A, B, C	Ongoing		X			
	3	Identify and promote resources that provide extreme weather and emergency notifications including RAVE, IPAWS, social media outlets, and radio channels	X	X	X	X	X	X		X		Countywide	County EM	A, B	Ongoing					X
	4	Continue and expand public education/outreach efforts, such as drills, exercises, programs, brochures, NOAA weather radio distribution, and website/social media information, to aid in preparedness and resilience for hazard events.	X	X	X	X	X	X	X	X		Countywide	County EM, DHD #10, MDNR	A, B, C			X	X		X
	4a	Continue the preparedness practice of conducting the annual statewide tornado drill.		X									County EM	A, B, C	Annually		X			X
	4b	Conduct public education and awareness activities such as programs, brochures, and online information, regarding flood mitigation efforts, wildfire prevention efforts, and preparedness for extreme temperature events	X	X	X	X	X			X		Countywide	County EM, local fire Depts./First Responders, MDNR, ARC	A, B, C						X
	4c	Continue to promote participation in Storm Spotter Training via partnership with the NWS.		X								Countywide	County EM	A, B, C	Annually					X
	5	Support the Kalkaska Commission on Aging's reduced cost snow plowing, meal delivery service, friendly visitor, and service with love programs.	X	X	X	X	X			X		Countywide	Kalkaska County Commission on Aging	A, D	Ongoing		X			
	6	Monitor and document persistent flood areas including areas of repetitive loss				X						Countywide	Kalkaska County, local governments	A, B, C, T						
	7	Incorporate green infrastructure and floodplain management best practices into the planning and development process				X						Countywide	Kalkaska County Dept. of Building Codes	A, B						
	8	Assess local fire suppression access points and equipment and pursue improvements as needed.			X							Countywide	County EM, KCRC, Local fire departments; MDNR Wildfire Mgmt., Local governments	A, B, C			X			X
	9	Continue to provide information to local communities that may benefit from participation in the Firewise USA® program.			X			X				Countywide	County EM, Local Fire Depts./First Responders, MDNR, Local Governments	A, B, C, M			X			X
	10	Continue to create Incident Action Plans for outdoor recreation sites including campgrounds and county parks.	X	X	X	X	X			X		Countywide	County, MDNR, Private Campgrounds	A			X			X
	11	Review and update event Incident Action Plans annually	X	X	X	X	X	X		X		Countywide		A						
	12	Ensure that County residents, particularly vulnerable populations, have access to healthy, affordable food options.						X	X	X		Countywide	County Dispatch keeps a list of vulnerable persons to check up on	A, D, F,			X	X	X	X
	12a	Consider involvement in MSUE's School Gardens Program (https://www.canr.msu.edu/community_food_systems/school-gardens/) and continue provision of the Kalkaska County 4-H Junior Master Gardener Program partnership with schools for grades K-6						X	X	X		Countywide	School districts	A, DD, FF				X	X	X
	12b	Utilize the dedicated space the county has for community garden use.						X	X	X		Village of Kalkaska	Kalkaska County	A, B						
	12c	Continue acceptance of WIC Project Fresh, Senior Project Fresh, SNAP/EB-T, Communities in Schools vouchers at the Kalkaska Farmers Market								X		Countywide	Kalkaska Farmers Market	FF	Annually; May - December					

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE									WHERE - Affected Locations or Groups	WHO - Responsible Parties	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Hazardous Material; Fixed Site Incidents						1	2	3	4
Delete	Preparation and Awareness	~~Continue to provide and improve food assistance programs and emergency food programs to help communities prepare for unanticipated pandemics, but also increase year-round food accessibility.~~	X	X	X	X	X			X		Countywide	NMCAA; KAIR food pantry; School Districts (school meal programs); churches	A, D, F, FF	Ongoing		X			
		Food rescue programs, involving public/private partnerships between farms, restaurants, hotels and other venues of large food production, can partner with local food pantries and schools to make good food more widely available.	X	X	X	X	X			X		Countywide	NMCAA; KAIR food pantry; School Districts (school meal programs); churches	A, D, F			X			X
		Continue to manage invasive species with treatment programs and promoting public awareness of invasive species management							X			Countywide	Kalkaska County, KCD, CAKE-CISMA	A, Z, DD, FF, GG, II, JJ, KK, LL, MM, NN, OO						
		Continue programs and services offered by the DHD #10 and/or MDHHS				X				X		Countywide	DHD#10; MDHHS	A, E	Ongoing		X	X	X	X
		Continue to coordinate with the MDHHS for guidance via their State Pandemic Plan and information about new or emerging disease threats.								X		Countywide	DHD #10, MDHHS; County EM	A, E,	Ongoing		X			X
add "emergency" before Shelter + Safe rooms	Shelters	Maintain an accurate inventory of emergency shelter sites (overnight vs. daily use types) within the service area; review annually and update as needed.	X	X	X	X	X			X		Countywide	County EM; American Red Cross	A, B, C	Annually		X			
		Provide local governments or public/private organizations information on funding sources for the installation of generators to enhance capabilities of emergency shelter locations.	X	X	X	X	X			X		Countywide	County EM; Local Fire Depts.; Senior Centers; Municipal Offices	A, W				X		X
		Review emergency shelter locations and consider additional sites as needed including "safe rooms"	X	X		X	X					Countywide	County Building Dept., EM; local govts; private and public site managers	A, W			X	X		
		Provide emergency shelter location information at all outdoor recreation sites.	X	X	X	X	X			X		Countywide	Kalkaska County	A, W						X
		Maintain procedures to create quarantine areas in group living quarters, such as overnight shelters or assisted living facilities.								X		Countywide	ARC, DHD #10, Assisted living facilities	A, W	Ongoing		X			
delete i.e. statement	Buildings & Infrastructure	Continue enforcement of the County Building Code, Soil Erosion and Sedimentation Code, and District Health Dept. Code for new construction through the permitting process.	X	X		X	X			X		Countywide	County Building Dept.; ACD; DHD#10	A, E			X			
		Consider revising zoning code requirements in high fire-risk areas to include wildland fire risk mitigation practices ~~(i.e. provide a 25 foot cleared space/defensible space between houses and other structures.)~~			X							Countywide	County Building Department, local governments	B, M, N			X			X
		Continue enforcement of the zoning standards for areas of land within these Michigan Designated Natural River systems: Boardman and Upper Manistee River				X						All Townships EXCEPT Rapid River and Clearwater Townships.	MDNR Natural Rivers Program Permitting Staff; Local Township Boards	B, OO						
		Implement strategic action plan for Rugg Pond Dam				X						Rapid River Township	Kalkaska County, KCD, Rapid River Township	A, B, W			X			
		Investigate funding sources for maintenance repairs to the Youngs Dam in Boardman Twp.				X						Boardman Township	Boardman Township	A, B				X		
		Continue to pursue opportunities for brownfield and blight clean-up activities, including demolition and clearance of vacant, condemned structures, to remove actual and potential sources of land, water and air contamination.	X	X	X	X				X		Countywide	Village of Kalkaska	A, B	Ongoing		X	X	X	X
		Promote the availability of low-cost residential weatherization and home improvement programs.	X	X	X	X	X			X		Countywide	NMCAA	D, G				X		X
		Evaluate the need for a potential reduced-cost program to install air conditioning in the homes of low-income senior citizens.			X		X			X		Countywide	Kalkaska County Commission on Aging	D, G				X		
		Pursue FEMA hazard mitigation assistance grants as appropriate (i.e., culvert/bridge replacement, storm sewer retrofitting, storm water management, dry flood-proofing of structures; structure elevation; property acquisition, for structure demolition or relocation; nature-based solutions.)	X	X	X	X	X	X	X	X		Countywide	Kalkaska County, KCRC, local governments	V, W				X	X	
		Inventory and prioritize improvements for flood prone locations				X						Countywide	KCRC, Drain Commissioner	W			X	X		

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE									WHERE - Affected Locations or Groups	WHO - Responsible Parties	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Hazardous Material: Fixed Site Incidents						1	2	3	4
Buildings & Infrastructur	30a	Holles Drive NW, east of Baggs Road				X						Clearwater Township	KCRC, Drain Commissioner	W				X		
	30b	Rapid City Road NW near Zimmerman Road NW				X						Clearwater Township	KCRC, Drain Commissioner	W				X		
	30c	Hillcrest Boulevard, south side of Bear Lake				X						Bear Lake Township	KCRC, Drain Commissioner	W				X		
	30d	Arwood trail NW				X						Clearwater Township	KCRC, Drain Commissioner	W				X		
	30e	Twin Lake Road between Big and Little Twin Lakes				X						Blue Lake Township, Coldsprings Township	KCRC, Drain Commissioner	W				X		
	30f	Lake Drive NE at base of hill from Maple Grove Drive NE				X						Excelsior Township	KCRC, Drain Commissioner	W				X		
	31	Inventory and prioritize improvements for problematic culverts or bridges that need reconstruction or replacement to improve water and habitat quality, as well as reduce occurrence of localized flooding.				X						Countywide	KCRC, MDOT	A, B			X	X	X	
	31a					X												X	X	
	31b					X												X	X	
	32	Continue to require Point of Sale evaluations, where no sale of a parcel containing an on-site water supply and/or on-site sewage disposal system may take place until conditions are met.				X				X		Countywide	County, DHD#10	A, B, E				X	X	
Utilities & Technology	33	Continue work amongst the utility companies (GLE, Consumers E.), the Kalkaska County Road Commission & MDOT to clear vegetation (particularly diseased or dead trees, i.e., from Emerald Ash Borer infestations) along various road and utility right-of-ways to minimize power outages and road blockages from storm damage.	X	X	X				X			Countywide	KCRC, MDOT, Great Lakes E., Consumers Energy	A, O, P	Ongoing		X		X	
	34	Continue to maintain effective communications practices between electric utility companies and County Emergency Management regarding power restoration. (County EM to post and promote the electrical outage map on social media account.)	X	X	X	X	X					Countywide	Consumers Energy or Great Lakes Energy and the County Emergency Mgmt.	A, O, P	Ongoing					X
	35	Investigate opportunities to bury overhead utilities, such as during new construction or in areas regularly prone to power outages.	X	X	X		X					Countywide	Consumers Energy or Great Lakes Energy	A, O, P, Q,			X	X		
	36	Maintain Continuity of Operations (COOP) plans ~~and alternative "remote work" schedules~~.								X		Countywide	County and Local Government Agencies; Public Schools	A, O, P, Q,	Ongoing		X			
	37	Continue to expand availability of high-speed internet service to allow for widely available remote work/learning.								X		Countywide	Local service providers; Connected Nation MI	A, O, P, Q,	Ongoing		X	X		X
Environment & Natural Resources	38	~~Continue to utilize and promote the~~ technical assistance, outreach and education pertaining to invasive species management (monitoring, treatment & removal) provided by non-profit and government agencies.							X			Countywide	KCD, CAKE-CISMA, CRA, MI EGLE, MDNR, MDARD, MSUE	A, B, Z, DD, EE, FF, GG, HH, II, JJ, KK, LL, MM, NN	Ongoing		X		X	X
	38a	Continue to provide invasive species management services with reduced-cost services for landowners.							X			Countywide	KCD, USDA-NRCS, MAEAP	DD, FF, GG	Ongoing				X	X
	38b	Continue to conduct annual routine invasive species surveying and monitoring to identify new emergent invasive species (*such as Cypress Spurge or Leafy Spurge*) before they get established and spread in the county.							X			Countywide	KCD, CAKE-CISMA, CRA, Bear Lake Improvement Board	DD, FF, GG			X		X	X
	38c	Continue participation in EGLE's annual Great Lakes Aquatic Invasive Species "Landing Blitz" event at public boat launches, emphasizing the need to Clean, Drain, Dry boats whenever they come out of the water, and Dispose of any unwanted bait in the trash.							X			Countywide	KCD, CAKE-CISMA	Z	Ongoing				X	X
	38d	Promote MSUE's "Clean Boats, Clean Waters" comprehensive aquatic invasive species boater outreach program; apply for grant funding to communicate aquatic invasive species prevention information through outreach materials and in-person educational events to boaters.							X			Public boat launches are located in all communities except the Village of Kalkaska, Excelsior Township and Boardman Township.	County Recreation, KCD, local governments	DD	Annually		X		X	X
	38e	Continue to promote EGLE's "NotMISpecies" webinars and resources on invasives control and management							X			Countywide	KCD, CAKE-CISMA	BB	Ongoing				X	X

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE									WHERE - Affected Locations or Groups	WHO - Responsible Parties	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Hazardous Material; Flood Site Incidents						1	2	3	4
Environment & Natural Resources	38f	Investigate alternative, effective and less expensive invasive species control measures, such as livestock grazing.							X			Countywide	KCD, CAKE-CISMA	AA, DD, EE, FF, GG, HH					X	
	39	Support management of natural areas and restoration and removal of species that are not supposed to be there							X			Clearwater Township, Countywide	KCD, CAKE-CISMA	AA, DD, EE, FF, GG, HH	Ongoing		X		X	X
	40	Install temporary or permanent boat-washing facilities at other water access sites to reduce the spread of invasives.							X			Lake Skegemog, Torch Lake, Fife Lake	Kalkaska County, KCD, CAKE-CISMA	Z, AA, EE, FF, GG			X		X	X
	41	Identify existing and potential new locations for boot and/or equipment cleaning facilities at popular trailheads (non-motorized, equestrian, and ORV/Motorcycle) and on logging trails to reduce the spread of invasives species.							X			Countywide	MDNR, KCD, CAKE-CISMA, GTRLC	Z, AA, EE, FF, GG			X		X	X
	42	Consider adoption of local ordinances that regulate activities to prevent the introduction of or the contribution to the spread of invasive species, such as prohibiting the use of invasive species in landscaping and/or vegetative riparian buffers, and ~~permit~~ treatment of existing infestations.							X			Countywide	Local governments	B, FF, GG			X		X	X
	43	Continue implementation of MDNR Forestry Management Plans that outline mitigation efforts for invasive species.	X	X	X	X	X	X	X			MDNR Lands	MDNR	A, B, FF, GG	Ongoing		X		X	
	44	Continue to conduct wildfire management such as prescribed burns and surface fuels management projects (this also encourages regeneration of native plant species).			X				X			Countywide	MDNR	A, B, C	Ongoing		X		X	
	45	Continue efforts to regularly clean up river and lake debris, as well as clean out plugged culverts (due to beaver activity, sediment deposits, invasive species, etc.)				X						Countywide	Local Volunteers, MDNR, non-profit groups, schools	A, B, FF, GG	Ongoing				X	X
	46	Identify and prioritize sites for open space protection/preservation, green infrastructure and/or stormwater management, especially in areas prone to flooding or erosion.		X		X	X		X			Countywide	Kalkaska County, local governments, KCD	A, B, FF, GG					X	
	47	Encourage identified flood prone areas be used for open space		X		X						Countywide	Kalkaska County, local governments, KCD	A, B, FF, GG					X	
	48	Develop an interconnected system of trailways that link communities, parks, and existing trails				X	X		X	X		Countywide	Kalkaska County, local governments, KCD, GTRLC, MDNR	A, B, FF, GG			X	X	X	X
	49	Investigate the potential to continue groundwater monitoring for contamination in the vicinity of the Kalkaska County PBB Cattle Burial site.								X	X	Garfield Twp.	MDNR, EGLE, Kalkaska County, Garfield Twp.	A, B, Z					X	X

Change to allow

See * for possible changes - Pgs 1-4 - the rest is ok so far based on partial PC input.

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE: Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Hazardous Material: Fixed Site Incidents	WHERE - Affected Locations or Groups	WHO - Responsible Parties	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE: 1	2	3	4
Preparation and Awareness	1	Incorporate the County Hazard Mitigation Plan's strategies into elements of County and local master plans.	X	X	X	X	X	X	X	X		Countywide	Kalkaska County, all townships, and Village of Kalkaska	A, B	Ongoing		X	X	X	X
Moved From	2	Continue to pursue interdepartmental cooperation and coordination of police, fire, rescue and EMS services to achieve community-wide coverage availability.	X	X	X	X	X	X		X		Countywide	County Sheriff and EM; local fire/EMS	A, B, C	Ongoing		X			
5	3	Identify and promote resources that provide extreme weather and emergency notifications including RAVE, IPAWS, social media outlets, and radio channels	X	X	X	X	X	X		X		Countywide	County EM	A, B	Ongoing					X
4	4	Continue and expand public education/outreach efforts, such as drills, exercises, programs, brochures, NOAA weather radio distribution, and website/social media information, to aid in preparedness and resilience for hazard events.	X	X	X	X	X	X	X	X		Countywide	County EM, DHD #10, MDNR	A, B, C			X	X		X
5a	4a	Continue the preparedness practice of conducting the annual statewide tornado drill.		X									County EM	A, B, C	Annually		X			X
4	4b	Conduct public education and awareness activities such as programs, brochures, and online information, regarding flood mitigation efforts, wildfire prevention efforts, and preparedness for extreme temperature events	X	X	X	X	X			X		Countywide	County EM, local fire Depts./First Responders, MDNR, ARC	A, B, C						X
	4c	Continue to promote participation in Storm Spotter Training via partnership with the NWS.		X								Countywide	County EM	A, B, C	Annually					X
Ch. 5 6, 7	5	Support the Kalkaska Commission on Aging's reduced cost snow plowing, meal delivery service, friendly visitor, and service with love programs.	X	X	X	X	X			X		Countywide	Kalkaska County Commission on Aging	A, D	Ongoing		X			
10	6	Monitor and document persistent flood areas including areas of repetitive loss				X						Countywide	Kalkaska County, local governments	A, B, C, T						
Ch. 7 11	7	Incorporate green infrastructure and floodplain management best practices into the planning and development process				X						Countywide *	Kalkaska County Dept. of Building Codes	A, B	? Dept. → Zoning/Soil					
? Respon. Parties	8	Assess local fire suppression access points and equipment and pursue improvements as needed.			X							Countywide	County EM, KCRC, Local fire departments; MDNR Wildfire Mgmt., Local governments	A, B, C		Erosion	X			X
Ch. 9 13	9	Continue to provide information to local communities that may benefit from participation in the Firewise USA® program.			X			X				Countywide	County EM, Local Fire Depts./First Responders, MDNR, Local Governments	A, B, C, M			X			X
Ch. 10 14	10	Continue to create Incident Action Plans for outdoor recreation sites including campgrounds and county parks.	X	X	X	X	X			X		Countywide	County, MDNR, Private Campgrounds	A			X			X
	11	Review and update event Incident Action Plans annually	X	X	X	X	X	X		X		Countywide		A						
	12	Ensure that County residents, particularly vulnerable populations, have access to healthy, affordable food options.						X	X	X		Countywide	County Dispatch keeps a list of vulnerable persons to check up on	A, D, F,			X	X	X	X
	12a	Consider involvement in MSUE's School Gardens Program (https://www.canr.msu.edu/community_food_systems/school-gardens/) and continue provision of the Kalkaska County 4-H Junior Master Gardener Program partnership with schools for grades K-6						X	X	X		Countywide	School districts	A, DD, FF				X	X	X
A	12b	Utilize the dedicated space the county has for community garden use.						X	X	X		Village of Kalkaska	Kalkaska County	A, B						
A	12c	Continue acceptance of WIC Project Fresh, Senior Project Fresh, SNAP/EB-T, Communities in Schools vouchers at the Kalkaska Farmers Market								X		Countywide	Kalkaska Farmers Market	FF	Annually; May - December					

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE										WHERE - Affected Locations or Groups	WHO - Responsible Parties	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Hazardous Material: Fixed Site Incidents							1	2	3	4
Preparation and Awareness	12d	Continue to provide and improve food assistance programs and emergency food programs to help communities prepare for unanticipated pandemics, but also increase year-round food accessibility.	X	X	X	X	X			X		Countywide	NMCAA; KAIR food pantry; School Districts (school meal programs); churches	A, D, F, FF	Ongoing		X				
	12e	Food rescue programs, involving public/private partnerships between farms, restaurants, hotels and other venues of large food production, can partner with local food pantries and schools to make good food more widely available.	X	X	X	X	X			X		Countywide	NMCAA; KAIR food pantry; School Districts (school meal programs); churches	A, D, F			X				X
	13	Continue to manage invasive species with treatment programs and promoting public awareness of invasive species management							X			Countywide	Kalkaska County, KCD, CAKE-CISMA	A, Z, DD, FF, GG, II, JJ, KK, LL, MM, NN, OO							
	14	Continue programs and services offered by the DHD #10 and/or MDHHS				X				X		Countywide	DHD#10; MDHHS	A, E	Ongoing		X	X	X	X	
	15	Continue to coordinate with the MDHHS for guidance via their State Pandemic Plan and information about new or emerging disease threats.								X		Countywide	DHD #10, MDHHS; County EM	A, E,	Ongoing		X				X
Shelters	16	Maintain an accurate inventory of emergency shelter sites (overnight vs. daily use types) within the service area; review annually and update as needed.	X	X	X	X	X			X		Countywide	County EM; American Red Cross	A, B, C	Annually		X				
	17	Provide local governments or public/private organizations information on funding sources for the installation of generators to enhance capabilities of emergency shelter locations.	X	X	X	X	X			X		Countywide	County EM; Local Fire Depts.; Senior Centers; Municipal Offices	A, W				X			X
	18	Review shelter locations and consider additional sites as needed including "safe rooms"	X	X		X	X					Countywide	County Building Dept., EM; local govts; private and public site managers	A, W			X	X			
	19	Provide emergency shelter location information at all outdoor recreation sites.	X	X	X	X	X			X		Countywide	Kalkaska County	A, W							X
	20	Maintain procedures to create quarantine areas in group living quarters, such as overnight shelters or assisted living facilities.								X		Countywide	ARC, DHD #10, Assisted living facilities	A, W	Ongoing		X				
Buildings & Infrastructure	21	Continue enforcement of the County Building Code, Soil Erosion and Sedimentation Code, and District Health Dept. Code for new construction through the permitting process.	X	X		X	X			X		Countywide	County Building Dept.; ACD; DHD#10	A, E			X				
* Responsible Parties	CH 22 JH	Consider revising zoning code requirements in high fire-risk areas to include wildland fire risk mitigation practices (i.e., provide a 25 foot cleared space/defensible space between houses and other structures.)			X							Countywide	County ~~Building Department~~, local governments ? Zoning Dept.	B, M, N			X				X
	A 23	Continue enforcement of the zoning standards for areas of land within these Michigan Designated Natural River systems: Boardman and Upper Manistee River				X						All Townships EXCEPT Rapid River and Clearwater Townships.	MDNR Natural Rivers Program Permitting Staff; Local Township Boards	B, OO							
	24	Implement strategic action plan for Rugg Pond Dam				X						Rapid River Township	Kalkaska County, KCD, Rapid River Township	A, B, W			X				
	A 25	Investigate funding sources for maintenance repairs to the Youngs Dam in Boardman Twp.				X						Boardman Township	Boardman Township	A, B				X			
	26	Continue to pursue opportunities for brownfield and blight clean-up activities, including demolition and clearance of vacant, condemned structures, to remove actual and potential sources of land, water and air contamination.	X	X	X	X				X		Countywide	Village of Kalkaska	A, B	Ongoing		X	X	X	X
	27	Promote the availability of low-cost residential weatherization and home improvement programs.	X	X	X	X	X			X		Countywide	NMCAA	D, G				X			X
	28	Evaluate the need for a potential reduced-cost program to install air conditioning in the homes of low-income senior citizens.			X		X			X		Countywide	Kalkaska County Commission on Aging	D, G				X			
	29	Pursue FEMA hazard mitigation assistance grants as appropriate (i.e., culvert/bridge replacement, storm sewer retrofitting, storm water management, dry flood-proofing of structures; structure elevation; property acquisition, for structure demolition or relocation; nature-based solutions.)	X	X	X	X	X	X	X	X		Countywide	Kalkaska County, KCRC, local governments	V, W				X	X		
e	A 30	Inventory and prioritize improvements for flood prone locations				X						Countywide	KCRC, Drain Commissioner	W			X	X			

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE									WHERE - Affected Locations or Groups	WHO - Responsible Parties	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Hazardous Material; Fixed Site Incidents						1	2	3	4
Buildings & Infrastructure	30a	Holles Drive NW, east of Baggs Road				X						Clearwater Township	KCRC, Drain Commissioner	W				X		
	30b	Rapid City Road NW near Zimmerman Road NW				X						Clearwater Township	KCRC, Drain Commissioner	W				X		
	30c	Hillcrest Boulevard, south side of Bear Lake				X						Bear Lake Township	KCRC, Drain Commissioner	W				X		
	30d	Arwood trail NW				X						Clearwater Township	KCRC, Drain Commissioner	W				X		
	30e	Twin Lake Road between Big and Little Twin Lakes				X						Blue Lake Township, Coldsprings Township	KCRC, Drain Commissioner	W				X		
	30f	Lake Drive NE at base of hill from Maple Grove Drive NE				X						Excelsior Township	KCRC, Drain Commissioner	W				X		
	31	Inventory and prioritize improvements for problematic culverts or bridges that need reconstruction or replacement to improve water and habitat quality, as well as reduce occurrence of localized flooding.				X						Countywide	KCRC, MDOT	A, B			X	X	X	
	31a					X												X	X	
	31b					X												X	X	
	32	Continue to require Point of Sale evaluations, where no sale of a parcel containing an on-site water supply and/or on-site sewage disposal system may take place until conditions are met.				X				X		Countywide	County, DHD#10	A, B, E				X	X	
Utilities & Technology	33	Continue work amongst the utility companies (GLE, Consumers E.), the Kalkaska County Road Commission & MDOT to clear vegetation (particularly diseased or dead trees, i.e., from Emerald Ash Borer infestations) along various road and utility right-of-ways to minimize power outages and road blockages from storm damage.	X	X	X				X			Countywide	KCRC, MDOT, Great Lakes E., Consumers Energy	A, O, P	Ongoing		X		X	
	34	Continue to maintain effective communications practices between electric utility companies and County Emergency Management regarding power restoration. (County EM to post and promote the electrical outage map on social media account.)	X	X	X	X	X					Countywide	Consumers Energy or Great Lakes Energy and the County Emergency Mgmt.	A, O, P	Ongoing					X
	35	Investigate opportunities to bury overhead utilities, such as during new construction or in areas regularly prone to power outages.	X	X	X		X					Countywide	Consumers Energy or Great Lakes Energy	A, O, P, Q,			X	X		
	36	Maintain Continuity of Operations (COOP) plans and alternative "remote work" schedules.								X		Countywide	County and Local Government Agencies; Public Schools	A, O, P, Q,	Ongoing		X			
	37	Continue to expand availability of high-speed Internet service to allow for widely available remote work/learning.								X		Countywide	Local service providers; Connected Nation MI	A, O, P, Q,	Ongoing		X	X		X
Environment & Natural Resources	38	Continue to utilize and promote the technical assistance, outreach and education pertaining to invasive species management (monitoring, treatment & removal) provided by non-profit and government agencies.							X			Countywide	KCD, CAKE-CISMA, CRA, MI EGLE, MDNR, MDARD, MSUE	A, B, Z, DD, EE, FF, GG, HH, II, JJ, KK, LL, MM, NN	Ongoing		X		X	X
	38a	Continue to provide invasive species management services with reduced-cost services for landowners.							X			Countywide	KCD, USDA-NRCS, MAEAP	DD, FF, GG	Ongoing				X	X
	38b	Continue to conduct annual routine invasive species surveying and monitoring to identify new emergent invasive species (*such as Cypress Spurge or Leafy Spurge*) before they get established and spread in the county.							X			Countywide	KCD, CAKE-CISMA, CRA, Bear Lake Improvement Board	DD, FF, GG			X		X	X
	38c	Continue participation in EGLE's annual Great Lakes Aquatic Invasive Species "Landing Blitz" event at public boat launches, emphasizing the need to Clean, Drain, Dry boats whenever they come out of the water, and Dispose of any unwanted bait in the trash.							X			Countywide	KCD, CAKE-CISMA	Z	Ongoing				X	X
	38d	Promote MSUE's "Clean Boats, Clean Waters" comprehensive aquatic invasive species boater outreach program; apply for grant funding to communicate aquatic invasive species prevention information through outreach materials and in-person educational events to boaters.							X			Public boat launches are located in all communities except the Village of Kalkaska, Excelsior Township and Boardman Township.	County Recreation, KCD, local governments	DD	Annually		X		X	X
	38e	Continue to promote EGLE's "NotMISpecies" webinars and resources on invasives control and management							X			Countywide	KCD, CAKE-CISMA	BB	Ongoing				X	X

		KALKASKA COUNTY HAZARD MITIGATION STRATEGIES	HAZARD TYPE									WHERE - Affected Locations or Groups	WHO - Responsible Parties	HOW - Resources	WHEN - Timeframe (Years)	PRIORITY TYPE (High, Med, or Low)	STRATEGY TYPE			
			Severe Winter Weather	T-Storm, High Winds, Hail, Tornado, Lightning	Wildfire	Flooding and Erosion	Extreme Temperatures	Drought	Invasive Species	Public Health Emergency	Hazardous Material: Fixed Site Incidents						1	2	3	4
Environment & Natural Resources	38f	Investigate alternative, effective and less expensive invasive species control measures, such as livestock grazing.							X			Countywide	KCD, CAKE-CISMA	AA, DD, EE, FF, GG, HH					X	
	39	Support management of natural areas and restoration and removal of species that are not supposed to be there							X			~~Clearwater Township,~~ Countywide	KCD, CAKE-CISMA	AA, DD, EE, FF, GG, HH	Ongoing		X		X	X
	40	Install temporary or permanent boat-washing facilities at other water access sites to reduce the spread of invasives.							X			~~Lake Skegemog, Torch Lake, Fife Lake~~ Countywide	Kalkaska County, KCD, CAKE-CISMA	Z, AA, EE, FF, GG			X		X	X
	41	Identify existing and potential new locations for boot and/or equipment cleaning facilities at popular trailheads (non-motorized, equestrian, and ORV/Motorcycle) and on logging trails to reduce the spread of invasives species.							X			Countywide	MDNR, KCD, CAKE-CISMA, GTRLC	Z, AA, EE, FF, GG			X		X	X
	42	Consider adoption of local ordinances that regulate activities to prevent the introduction of or the contribution to the spread of invasive species, such as prohibiting the use of invasive species in landscaping and/or vegetative riparian buffers, and permit treatment of existing infestations.							X			Countywide	Local governments	B, FF, GG			X		X	X
	43	Continue implementation of MDNR Forestry Management Plans that outline mitigation efforts for invasive species.	X	X	X	X	X	X	X			MDNR Lands	MDNR	A, B, FF, GG	Ongoing		X		X	
	44	Continue to conduct wildfire management such as prescribed burns and surface fuels management projects (this also encourages regeneration of native plant species).			X				X			Countywide	MDNR	A, B, C	Ongoing		X		X	
	45	Continue efforts to regularly clean up river and lake debris, as well as clean out plugged culverts (due to beaver activity, sediment deposits, invasive species, etc.)				X						Countywide	Local Volunteers, MDNR, non-profit groups, schools	A, B, FF, GG	Ongoing				X	X
	46	Identify and prioritize sites for open space protection/preservation, green infrastructure and/or stormwater management, especially in areas prone to flooding or erosion.		X		X	X		X			Countywide	Kalkaska County, local governments, KCD	A, B, FF, GG					X	
	47	Encourage identified flood prone areas be used for open space		X		X						Countywide	Kalkaska County, local governments, KCD	A, B, FF, GG					X	
	48	Develop an interconnected system of trailways that link communities, parks, and existing trails				X	X		X	X		Countywide	Kalkaska County, local governments, KCD, GTRLC, MDNR	A, B, FF, GG			X	X	X	X
	49	Investigate the potential to continue groundwater monitoring for contamination in the vicinity of the Kalkaska County PBB Cattle Burial site.								X	X	Garfield Twp.	MDNR, EGLE, Kalkaska County, Garfield Twp.	A, B, Z					X	X

7 Affected locations

Laura S

See asterisks (*) to show possible update/amendments on pages 3, 4, 5, 10, 11, 59 + 61. The rest are okay so far. May have input from one PC member who could not make the meeting.

Kalkaska County, Michigan
Natural Hazard Mitigation Plan

2023

DRAFT DATED
1/31/2023

FEMA LETTER OF APPROVAL

ACKNOWLEDGEMENTS

The Kalkaska County Natural Hazard Mitigation Plan is prepared for Kalkaska County, Michigan and all the jurisdictions within it. Each jurisdiction is invited to be a continuing participant in future regular review and updates of the Plan. This plan is the culmination of an interdisciplinary and interagency planning effort that required the participation, technical assistance and expertise of individuals within the following agencies and organizations:

Participating Entity	Representative	Title
Kalkaska County Board of Commissioners	Truman Bicum	District 1 Commissioner (Coldwater Twp.)
	Bob Baldwin	District 2 Commissioner (Coldsprings Township and Rapid River Township)
	Kohn Fisher	District 3 Commissioner (Bear Lake Township, Blue Lake Township, Excelsior Township, Oliver Township and a portion of Orange Township)
	James Sweet	District 4 Commissioner (Garfield and Springfield Twps.)
	Dave Comai	District 5 Commissioner (Boardman Township and a portion of Orange Township)
	Craig Corbett	District 6 Commissioner (Kalkaska Twp.)
	Jeff Sieting	District 7 Commissioner (Village of Kalkaska & a portion of Kalkaska Twp.)
Kalkaska County Planning Commission	Stuart McKinnon	Chairman, Rapid River Township Planning Commission Chair and Zoning Board of Appeals Chair
	Robert A. Mickevicius	Commissioner
	John West	Commissioner
	Eric Hendricks	Commissioner; Orange Twp. Clerk
Kalkaska County	Mike Thompson	Emergency Management Coordinator
	John S. Rogers	Manager, Road Commission
	Mike Cox	Road Commissioner; also serves on COA and Hospital boards
	Patrick Whiteford	Sheriff
	Dave Wagner	Undersheriff
	Sgt. Scott Griffith	Sheriff's Department
	Dean Farrier	County Surveyor
	Laura Hendricks	County Zoning
	Seth Phillips	Drain Commissioner
Bear Lake Township	George (Bud) Banker	Supervisor
	Bob Dixon	Trustee
Blue Lake Township	Greg Brierley	Fire
Boardman Township	Paul Erickson	Supervisor; County Road Commission liaison and Hospital Board rep.
	John Miltenberger	Fire

	Dave Witek	Trustee
Participating Entity	**Representative**	**Title**
Clearwater Township	Jim Leffew	Twp. Planning Commissioner
	Margret Spann	Deputy Clerk
	Greg Bradley	Fire
Coldsprings Township	Rick Delanery	Trustee
	Eugene Headley	Fire
	Gayenell Gentelia	Clerk
Excelsior Township	Annie Wallace	Clerk
	Richard VanBeek	Supervisor
	Norman Groner	Trustee
	Eugene Headley	Fire
Garfield Township	Todd Jones	Supervisor
Kalkaska Township	Michael Winter	Supervisor
	David E. Wolfe Jr.	Trustee
	Derek Hogerheide	Fire Chief
	Ryan Brewer	Fire
Oliver Township	Mike Cox	Trustee
*	~~Sonja Dunham~~ Alexa Szymchack	Clerk
	Deborah Bishop	Treasurer
*	~~Alexa Szymchack~~	Trustee Mike Fisher
Orange Township	~~Erik~~ Hendricks Eric	Clerk
Rapid River Township	Terry Williams	Supervisor
	Valerie Hansen	Clerk
	Matthew Brenner	Trustee
	David McKinnon	Trustee
Springfield Township	Thomas Gonyer	Supervisor
	Scott Tinker	Fire
Village of Kalkaska	Lt. Aaron Popa	Village Manager/Chief of Police
Antrim County	Leslie Meyers	Emergency Manager
Crawford County	Doug Pratt	Emergency Manager
Kalkaska Memorial Health Center	Teresa Smith	
	Connie Farrier	Service Line Director, Support Services
* Should be Hospital	Mike Fitch	
Kalkaska Public Transportation Authority	Mike Tinkle	
	Tracy Fisher	
	Harry Shipp	
Kalkaska Public Schools *	~~John Rogers~~ Rachael Birgy	~~Vice~~ President
	Rick Heitmeyer	Superintendent
American Red Cross	Megan Powers	
District Health Department #10	Bret Haner	

Kalkaska Commission on Aging	Jodi Magee	
Participating Entity	**Representative**	**Title**
Kalkaska Conservation District *	Mark Randolph	
Charlevoix Antrim Kalkaska Emmet-Cooperative Invasive Species Management Area	Lindsey Bona-Eggeman	Program Coordinator
Michigan Department of Health and Human Services	Donna Wednieski	
Michigan State Police – Dept. of Emergency Mgmt. & Homeland Security	F/LT Scott McManus	Houghton Lake #72 Post
	F/Lt Mike DeCastro	District 7 District Coordinator
	Mike Sobocinski	Local Mitigation Planner
Michigan Township Association	Sharon A Schultz	District 6

Prepared by Kalkaska County Office of Emergency Management
with assistance from:

Networks Northwest
Talent / Business / Community

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

TABLE OF CONTENTS

I. INTRODUCTION

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

Mitigation allows repairs and reconstruction to be completed after an incident occurs in such a way that does not just restore the damaged property as quickly as possible to pre-disaster conditions. It also ensures that such cycles are broken, that post-disaster repairs and reconstruction take place after damages are analyzed, and that sounder, less vulnerable conditions are produced. Through a combination of regulatory, administrative, and engineering approaches, losses can be limited by reducing susceptibility to damage. When successful, hazard mitigation will lessen the impact of a disaster on people, property, the environment and economy, and continuity of services through the coordination of available resources, programs, initiatives, and authorities.

A *hazard*, in the context of this plan, is an event or physical condition that has potential to cause fatalities; injuries; damage to personal property, infrastructure, or the environment; agricultural product loss; or interruption of business or civic life. The Kalkaska County Natural Hazard Mitigation Plan focuses on *natural* hazards such as heat, drought, wildfires, flooding, thunderstorm with wind, high winds, hail, extreme winter weather, and invasive species. An exception is that it will also consider these technological and human-related hazards: dam failure and public illness outbreak.

The main objective of the Kalkaska 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 the county to protect the health, safety, and economic interests of the residents and businesses through planning, awareness, and implementation.

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

Since the 2016 Plan's adoption period, the county and municipalities have achieved the following key endeavors to address their previously identified mitigation strategies; a detailed list is included in the Appendix.

- Progress working with utility companies to bury power lines to reduce the likelihood of power outage
- Continued efforts by the County Building Department to enforce the Building Code and promote safety for mobile homes.
- Continued acquisition of fire suppression equipment for wildfire management
- Coordination with state departments and local fire departments to manage prescribed burns.

Section VI of this plan provides a list of hazard mitigation strategies for each natural hazard identified. 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 2016 plan and their current status. Mitigation strategies are intended to be action items completed during the 5-year timeframe in which the plan is active.

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

Natural Hazards Mitigation Planning Goals

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

II. PLANNING PROCESS

The Stafford Act, as amended by the Disaster Mitigation Act of 2000, shifted the Federal Emergency Management Agency's (FEMA) scope of work to promoting and supporting prevention, or what is referred to as hazard mitigation planning. FEMA requires government entities to have a natural hazards mitigation plan in place and updated on a 5-year cycle as a condition for applying for grant funding related to natural hazard mitigation and remediation. Kalkaska County has a history of mitigation planning and adopted past Natural Hazard Mitigation Plans in 2007 and 2016. The adoption of the 2022 plan will reaffirm the eligibility of the county, as well as those local municipalities who participated in the planning process and adopted the county's plan, for federal funding.

The update of the County's plan was led by the Natural Hazards Task Force comprised of the County's Local Emergency Planning Committee (LEPC). Team members consist of first responders and local, regional, and state public entities that ensure the readiness of County entities by recommending equipment purchases, training and exercises, and public education on preparedness issues. Networks Northwest staff assisted with the creation of the updated plan by providing meeting facilitation, conducting an online survey, and writing the plan. The Task Force generally met on a quarterly basis, in-person and via Zoom, at the Kalkaska County Annex Building located at 890 Island Lake Road. All meetings were open to the public. The public was notified by posting at the County Building, Michigan Department of Transportation office, and the Kalkaska County Annex Building. The following is an outline of events for the development of the 2023 Kalkaska County Natural Hazard Mitigation Plan:

- An online public survey was made available from November 8, 2021 to February 20, 2022 to obtain input on community experience, concerns and priorities regarding natural hazard mitigation in Kalkaska County. The following table indicates the organizations who participated in the survey. A copy of the survey results are appended.

American Red Cross
Antrim County Emergency Manager
Bear Lake Township
Blue Lake Township
Boardman Township
Clearwater Township
Coldsprings Township
District Health Dept. #10
Excelsior Township
Garfield Township
Kalkaska Commission on Aging
Kalkaska Conservation District
Kalkaska County Board of Commissioners
Kalkaska County Office of Emergency Management
Kalkaska County Public Transportation
Kalkaska County Road Commission
Kalkaska County Sheriff's Office
Kalkaska Township
MDNR Forest Fire Supervisor
Michigan State Police
Rapid River Township
Village of Kalkaska

- LEPC meetings where the Natural Hazard Mitigation Plan update work was discussed:
  - May 25, 2021
  - July 1, 2021
  - August 24,2021

- November 22, 2021
- February 22, 2022
- August 23, 2022
- November 22, 2022

- Networks Northwest staff also participated in the following community meetings to explain the Hazard Mitigation Plan update process and request public input:
  - March 16, 2022 – Kalkaska County Fire Chief's Meeting (in person at the Village of Kalkaska Fire Dept.)
  - April 18, 2022 – Kalkaska County Michigan Township Association (MTA) quarterly meeting (in person at the Kalkaska Commission on Aging building).
  - April 26, 2022 - Public Input Session via Zoom with local officials to obtain input for the hazard analysis portion of the plan
  - January 25, 2023 - Kalkaska County Planning Commission

Additionally, county and regional agencies that share borders with Kalkaska 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, Antrim County Emergency Operations Director
- Doug Pratt, Crawford County Emergency Manager
- Jon Deming, Otsego County Emergency Management Director
- Vanessa Varner, Roscommon County Emergency Management Director
- Linda Hartshorne-Shafer, Missaukee County Planning and Emergency Management Director
- ~~Travis Baker, Wexford County Emergency Management Coordinator~~Randy Boike, Wexford County Emergency Management Coordinator
- Gregg Bird, Grand Traverse County Emergency Management Coordinator
- Robert Carson, Regional Director of Community Development, Networks Northwest

During development of the plan, all Kalkaska County municipalities were provided the opportunity to participate in the online community survey as well as comment on plan drafts and other related materials. The draft plan was published openly on the Kalkaska County Emergency Management webpage, as well as the project page on Networks Northwest's website. The public was encouraged to review the draft plan 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 Managers) 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~~…~~ communications with the Kalkaska County Drain commissioner regarding specific flood prone locations. This information was provided and used in development of the plan, including the ~~risk assessment and community profile~~hazard analysis and strategies ~~sections~~.

Additionally, the public was notified through a published notice in the *Kalkaska Review* on ~~###~~ 2023 ~~that the County's~~ draft Natural Hazard Mitigation Plan and the opportunity to provide feedback at the public hearing held on _____.

Below are images of the websites for the available draft plan and a copy of the published notice to the public.

Website Images
Source: Kalkaska County Emergency Management webpage DATE
Source: Networks Northwest webpage DATE

* after March 21 Review & accept Public Hearing??

III. COMMUNITY PROFILE

Land Use/ Land Cover

Kalkaska County is located in Northwest Lower Michigan, and is bordered by Antrim County to the north, Otsego County to the northeast, Crawford County to the east, Roscommon County to the southeast, Missaukee County to the south, Wexford County to the southwest, and Grand Traverse County to the west. Major transportation routes through Kalkaska County include US-131, traversing the northwest section of the County; M-66, running north and south; and M-72 running east and west. Refer to Appendix A for a map of the county's main roads, water bodies and jurisdictions.

Kalkaska County consists of 570.3 square miles of land area and is the 54th largest county in Michigan.[1] The county is divided into twelve townships and the Village of Kalkaska.

The largest concentration of people and businesses in the county are in the communities of the Village of Kalkaska and surrounding Kalkaska Township, and along the highway corridors of M-66, M-72 and US-131. The Camp Grayling Joint Maneuver Training Center is located in the eastern half of Kalkaska County. It is the largest National Guard training facility in the United States.

Located over a geological formation known as the Salina-Niagaran Reef, Kalkaska County sits 7,000 feet above one of the most successful oil producing basins in the state. Kalkaska County is generally classified as hill-land, plains and upland plains. Level to gently rolling hills and slopes cover the mid-section of the County. Hills and ridges run through the east half and northwest section with elevations from 1,000 to 1,400 feet above sea level.

Kalkaska County is a prime recreational area within the State, as reflected in its over 273 miles of rivers and streams and more than 86 lakes. Totaling over 6,000 acres, or 2 percent of the County, several of the State's most recognizable rivers flow through its borders, including the Manistee, Boardman, Rapid, and Torch Rivers. 37%, or 212.6 acres of the county lie within the Grand Traverse Bay watershed. Accompanying rivers and lakes are wetland areas which are important to the biological diversity of plant and animal species living there. There are nearly 55,000 acres of wetlands in the County providing a distinctive network of natural areas (Table).

Foremost among the lakes are Log, Bear, Starvation, Twin, Crawford, Manistee, and Torch. Highly popular with permanent and seasonal residents alike, much of the County's residential activity has occurred along their edges and borders. These areas are under heavy growth pressure as new homes are being built near these areas and/or seasonal homes become year-round homes. Therefore special attention to building placement and allowed uses is critical.

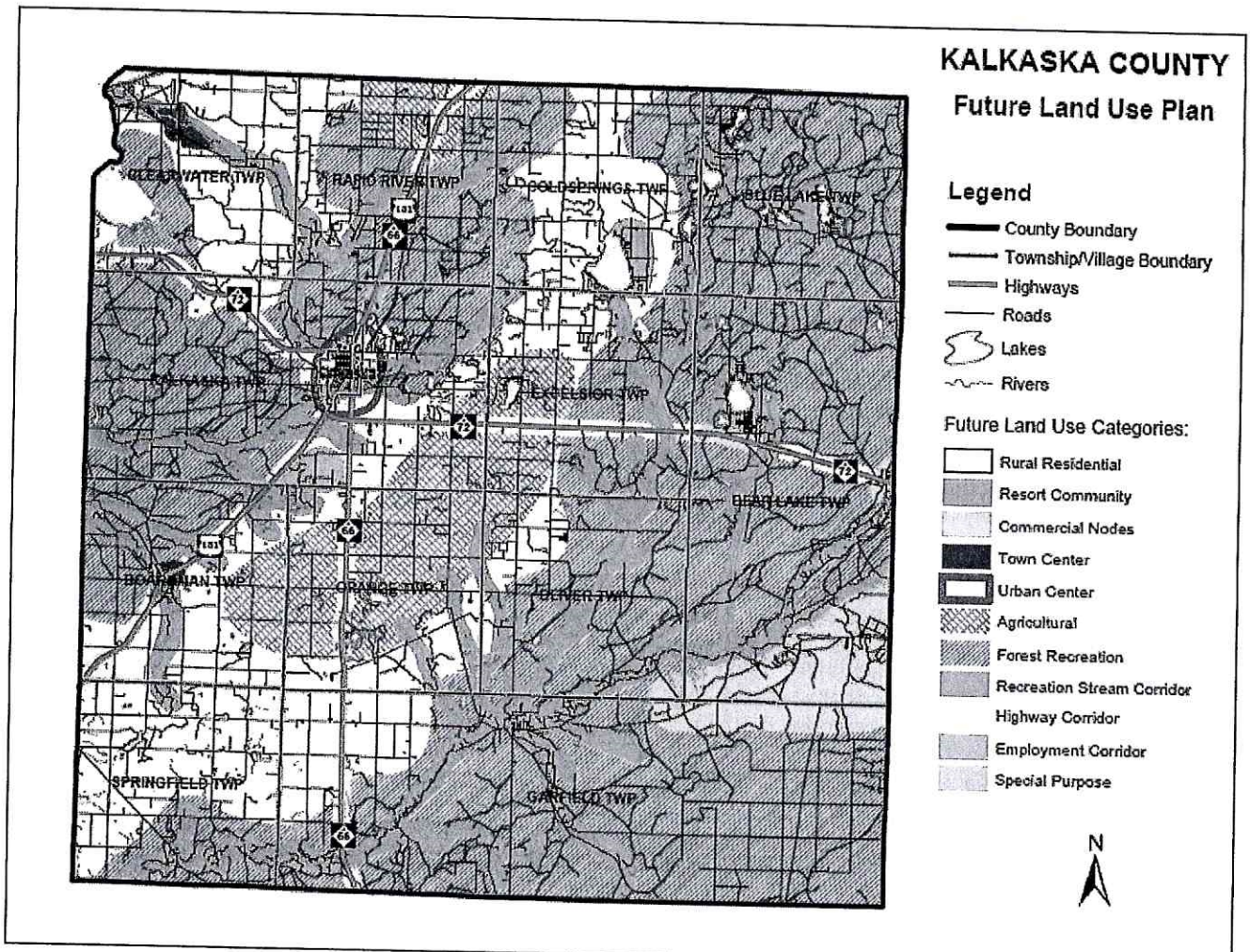
Forestland in Kalkaska County is bountiful. Originally, the County was covered with heavy timber, primarily maple. Logging in the late nineteenth century cleared most of the timberland, leaving infertile soils and the landscape bare from clear-cutting. Much of the forest-covered land is protected by the State as part of the State Forest system.

In 2017, the Kalkaska County Planning Commission prepared the *2016-2021 Kalkaska County Master Plan*. The Plan is a policy guide for decision-making for future land use, infrastructure, and public service decisions within Kalkaska County. Figure 1 provides the Future Land Use Plan for the county, indicating the location of desired land uses in the next 20 years. The "Special Purpose" land use category indicates land owned by the Federal Government, for military use of Camp Grayling (which continues into westerly adjoining Crawford County). Forested areas are concentrated in Blue Lake Township, Bear Lake Township, Garfield Township, and Kalkaska Township. These areas are intended to stay forested areas.

* insert after first sentance! In 2022 the Kalk. County Planning Comm. began working on the 5 year MP Update 2022-2027.

[1] US Census Bureau, https://data.census.gov/cedsci/profile?g=0500000US26079

Figure 1: Future Land Use Plan Map



Map showing desired land uses in 20 years.

According to the 2017 USDA Census of Agriculture, the county had 27,137 acres of land in farms, with a total of 225 farms that had an average size of 121 acres. Compared to the 2012 Agriculture Census, there were 224 farms and 25,819 acres of land in farms. This represents a 5% increase in the acreage and average size of farms since the 2012 USDA Census of Agriculture. About 92% of the market value of agricultural products sold in the county is from crops, with a 2017 market value of $7,683,000. Forage (hay/haylage), harvested vegetables, potatoes, wheat for grain, and cultivated Christmas trees comprised the top five crops in acreage in the county. Kalkaska County ranks 55 out of 83 counties in the State of Michigan for the sale of agricultural crops.

Approximately 52.2% of the some 405,700.37 acres in the county are forested, accounting for 211,888.30 acres. While development in the county has remained fairly steady in the past decade, it has been noted that the type of new development is changing. Commercial development has slowed, but residential development remains in high demand. Housing of all types and prices is needed, but market studies indicate a need for smaller units and building types known as "missing middle housing". 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.

There are approximately 54,979.27 acres of wetlands in the county, some 13.6% of the total land area. These wetlands are primarily located along the Boardman River, Manistee River, and the Rapid River. Wetlands contribute significantly to water quality by acting as filters of storm water in addition to sustaining forest growth and providing habitat for wildlife.

Hazardous Materials: Fixed Site Incidents
New section; review carefully

According to FEMA, a hazardous material is any solid, liquid, or gas that can harm people, other living organisms, property, or the environment. They may be naturally occurring but are also increasingly man-made or brought more into human contact by our activities. Chemical manufacturers and industrial sites are sources for many such materials. When spilled or otherwise accidentally released at these facilities, known as a fixed site location, they pose a risk to quickly spread and create harm to the public.

Some hazardous material releases may impact food or water supply chains for large regions or even the entire state. An example would include the persistent chemical commonly known as PFAS (Per- and polyfluoroalkyl substances). Such releases may be treated as a transmittable public health emergency because of their ability to spread to significant portions of the entire state (see the associated chapter). While these may have been local releases at one time, their aggregate or long-term effect has moved beyond that of a typical acute hazardous materials release.

Location
The Kalkaska PBB Cattle Site, located at the northwest corner of 8 Point Road and Pine Road in Garfield Township, is a Land Use Restriction site according to the Department of Environment, Great Lakes, and Energy.) This site is the burial location of the contaminated livestock from the 1973 incident where polybrominated biphenyls (PBBs) were accidently mixed with animal feed. As a result of the burial of the contaminated livestock, the site presumably contains hazardous substances in excess of the concentrations developed as the unrestricted residential criteria under Section 20120a(1)(a) or (17) of the NREPA.

A Declaration of Restrictive Covenant (Restrictive Covenant) ~~was~~ been recorded with the Kalkaska County Register of Deeds on August 10, 2018 for the purpose of protecting public health, safety, and welfare, and the environment by prohibiting or restricting activities that could result in unacceptable exposure to environmental contamination present at the property. The Michigan Department of Natural Resources is the current owner of this property. A copy of the Restrictive Covenant is included in the Appendix.

Extent and Previous Occurrences
The MI Department of Environmental Quality began monitoring groundwater around the burial site in 1977. The site had been selected because it was three miles from the nearest river and a natural underground clay layer above the water table would impede any contamination that escaped the lined pit. The department stopped monitoring in 2015 because of "minimal likelihood of movement" of PBB off the site, according to Nick Swiger of the DEQ. One monitoring well in the shallow aquifer registered a low-level PBB detection in 1984, but nothing before or since.[12]

Probability of Future Events and Vulnerability Assessment
During the development and review process of this Hazard Mitigation Plan update, a need was expressed to continue groundwater monitoring around this site of contamination as a measure to safeguard against human and animal exposure to potential PBB-contaminated groundwater emanating from this site.

[12] https://www.bridgemi.com/michigan-environment-watch/forty-years-ago-michigan-had-one-worst-mass-poisonings-us-history September 26, 2018. Bret Walton, Michigan Environment Watch.

V. Goals and Objectives

The mission of the Kalkaska 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

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

- Enforce and/or incorporate natural hazards mitigation provisions in building code standards, ordinances, and procedures; and into the county's comprehensive master plan
- 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 review local roads, bridges, dams, and related transportation infrastructure for natural hazards vulnerability

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

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

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

- 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 mitigating 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 Kalkaska 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: RAVE Mobile Alert System; IPAWS (Integrated Public Alert and Warning System - FEMA's national system for local alerting that provides authenticated emergency and life-saving information to the public through mobile phones using Wireless Emergency Alerts, to radio and television via the Emergency Alert System, and on the National Oceanic and Atmospheric Administration's Weather Radio.)

Radio warning system: RAVE

Tornado/Severe Weather Systems: RAVE / IPAWS

Flood warning system: RAVE / IPAWS

This may be okay as "Management Department"

*Manager and Plan.

*Do we have emergency shelters?

Kalkaska County Emergency Management Department maintains contracts with # of the # local fire stations in the county so that they may be utilized as temporary shelters in the event of an emergency. Those # are:

Emergency Shelter Site Name	Generator?	Street Address	City	ZIP

Hazard Mitigation Strategies are grouped according to type. Types include: Awareness & Preparation, Shelters, Building & Development, Utilities & Technology, and Environment & Natural Resources. The table also includes: a description of each strategy; what natural hazards they address; where the strategy applies; who is responsible for implementing the strategy; how the strategy will be implemented (what resources are available to apply the strategy); when the strategy could feasibly begin; the level of priority; and what type of strategy it is.

The resources for how the strategies may be implemented are listed below:

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, campgrounds, 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 discussed during public input sessions. There may be additional locations of vulnerable populations that are not listed.

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. Kalkaska County is home to abundant forest lands, inland lakes and streams, and all of the wildlife within that are integral to the identity of the community. While natural resources are abundant they are vulnerable to all types of hazards. Northwest Lower Michigan is also home to many sensitive wildlife populations that require specific climates and habitats to survive. Damaged, destroyed, or changing natural environments may decrease the chances for certain species' survival.

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 15 is a summary of critical infrastructure points in Kalkaska County:

A number of counties and communities opened shelters to aid those without power or heat. This event accounted for $250,000 in property damages.

Table 17: Kalkaska County Historic Extreme Winter Weather Events

Event Type	Total Events	Property Damage	Crop Damage	Event Years
Winter Storm	51	$40,000	-	1997-2022
Heavy Snow	55	$250,000	-	1996-2018
Ice Storm	4	-	-	2001, 2002, 2005, 2008
Lake-Effect Snow	20	-	-	2006-2019
Blizzard	6	-	-	1978*, 1997, 1998, 1999, 2002, 2019
Winter Weather	1	-		2006
TOTAL	**137**	**$290,000**	**$0**	-

Source: NOAA: National Centers for Environmental Information

Probability of Future Events and Vulnerability Assessment

Since 1996, Kalkaska County has had 136 extreme winter weather events. This averages to about to about 5 events every year. The probability of an extreme winter weather 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. Northwest Michigan was hit by a killing freeze in April 2012. While this event did not occur in Kalkaska County, an event of this type could in the future. Areas where this did occur reported millions of dollars in crop damages. If this event occurred in Kalkaska County, the agriculture economy would be devastated.

During the winter months, the population is largely made up of the base permanent residents. However, there is increasing demand from seasonal residents to purchase property and retire or work remotely northern Michigan. New residents, especially those locating in remote areas, increase the chance of risk to life and property during severe weather events. Long-time permanent residents rely on their network of family, friends, and neighbors to lend a hand when it's needed. New residents may not have a ready-made network are more vulnerable if they need assistance.

Winter-related events cause difficult driving conditions and in the event of an emergency, can make travel increasingly difficult for emergency personnel who may be more frequently dispatched to rural areas. The Kalkaska County population, like much of northern Michigan, is spread throughout remote, rural areas. Townships located in northern and eastern portions of the county are sparsely populated, but older and also remote from major services in the western portion of the county. Blue Lake Township, Bear Lake Township, and Garfield Township are also, respectively, the oldest (Blue Lake Township is the oldest) communities in Kalkaska County. Elderly residents are the most likely persons to have a disability, and therefore, are the most vulnerable to extreme winter weather events.

Stu-PC change as follows: that draw a large number of visitors

depend on the county population, seasonal activity, and the spread of development. During the warm or summer months, the base population expands by an estimated 139% to include both the seasonal short-term population. Residents and visitors are attracted to both rural areas and the village center. Mobile home parks, campgrounds, institutions (schools, places of worship, etc.), and annual events ~~such as the Kalkaska County Agricultural Fair that draw a large number of visitors~~ to outdoor recreation areas 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.

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

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 below. If a thunderstorm produces hail that is 1 inch in diameter (quarter size) or larger, it is considered to be a severe thunderstorm.

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 size of hail reported in Kalkaska County has been 1.75 inches. According to the scale, hailstones of this size are slightly larger than a golf ball.

Previous Occurrences
Since 1955, Kalkaska County had 16 hailstorms reported to NOAA (Table 20). Five of the 16 events were reported to have the largest hail size recorded, 1.75 inches. There are no reported property/crop damages, injuries or deaths attributed to hail.

Table 20: Kalkaska County Hail Events, 1982-2021

Begin Location	Begin Date	Magnitude
Kalkaska County	10/28/1963	1.75
Kalkaska County	7/17/1981	1
Kalkaska County	10/15/1989	1.5
Boardman Township	7/8/1996	1.75
Boardman Township	6/9/2000	1
Village of Kalkaska	5/15/2001	0.75
Village of Kalkaska	9/11/2004	0.75
Orange Township	6/3/2006	0.88
Garfield Township	6/28/2006	0.88
Oliver Township	6/14/2008	0.75
Boardman/Springfield Townships	6/15/2008	1.75
Kalkaska Township	5/20/2013	1.75
Garfield Township	8/2/2015	1
Clearwater Township	7/8/2016	1
Blue Lake Township	7/8/2016	1.75
Excelsior Township	7/8/2016	1.5

Source: NOAA: National Centers for Environmental Information

The most recent events on July 8, 2016 occurred in several locations including Blue Lake, Clearwater, and Excelsior Townships. This event caused hail from 1 inch to 1.75 inches in size. The event narrative is as follows:

Powerful thunderstorms developed over Lake Michigan late in morning of the 8th, ahead of an incoming cold front. These storms produced very large hail, and some damaging winds, as they swept across northern Michigan. Approximately 60 percent of the cherry crop in northwest lower Michigan was damaged by the severe thunderstorms.

Probability of Future Events and Vulnerability Assessment
With 16 events reported in the past 67 years, Kalkaska County has a 24% 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. Manufactured homes and campground populations 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.

Table 25: Tornado Events, 1950-2021

Location	Date	Event	Magnitude	Deaths	Injuries	Property Damage
KALKASKA CO (North)	7/3/1974	Tornado	F1	0	0	$ 2,500.00
Springfield Township	6/15/1976	Tornado	F1	0	0	$ 25,000.00
Springfield Township/ Orange Township	7/23/1976	Tornado	F2	0	5	$ 25,000.00
South Boardman	7/17/1994	Tornado	F0	0	0	$ -
Kalkaska Township/ Coldsprings Township/ Rapid River Township	5/31/1998	Tornado	F1	0	0	$ -
Kalkaska Township	6/25/1998	Tornado	F0	0	0	$ -
CROFTON	10/18/2007	Tornado	EF2	1	1	$ 1,100,000.00
DARRAGH	9/1/2014	Tornado	EF1	0	0	$ 160,000.00
TOTAL				1	6	$ 1,312,500.00

Source: NOAA: National Centers for Environmental Information

The event narrative for the October 18, 2007 tornado is as follows:

The Kalkaska tornado was the first killer tornado in Northern Lower Michigan in over 30 years. It touched down just south of Crofton, and tracked north-northeast, lifting just after crossing the Kalkaska County Airport. A home was damaged in a subdivision just south of Crofton. The most substantial damage, as well as the fatality, occurred near the intersection of US-131 and Crofton Road. A large metal warehouse was damaged, a single wide mobile home was destroyed, and several stick-built homes received moderate to severe damage. The fatality and injury occurred inside the mobile home. A 29 year old man was pulled from the mobile home, but passed away at a nearby hospital. Numerous large trees were also uprooted. The damage became more sporadic to the northeast, until another pocket of concentrated damage at the Kalkaska County Airport. Several hangars and small planes were damaged, as were several homes in the area. Sheet metal from one of the hangars was deposited near the Kalkaska Middle School. Winds were estimated at 120 mph, making it an EF2.

Probability of Future Events and Vulnerability Assessment

Since there have been eight tornadoes events reported in the last 72 years, the data shows that there is a 11% chance a tornado would occur every year. While the chance for a tornado is low, if an event occurs, there is potential for a high magnitude tornado to touch down. Many of the reported historic events have caused property damage.

There are no operable tornado sirens in Kalkaska County. There is one former tornado warning siren in the Village of Kalkaska, but has only been used as a fire siren for over the past 30 years. Tornado sirens are not considered effective warning systems for tornadoes because of their limited audible range. Kalkaska County currently utilizes the mass emergency notification system "RAVE", which will provide notifications to cellular and landline phones in the area.

Similar to thunderstorms and severe wind events, populations without access to permanent, sturdy shelter are most vulnerable to tornado events. This includes mobile home parks, campgrounds, recreation areas, and large outdoor gatherings. Appendix maps out the vulnerable populations in Kalkaska County.

Persons with a disability or elderly persons ~~are also~~ could be more vulnerable. Tornados can occur suddenly with very little warning, and it may be difficult for these populations to find adequate shelter in a hurry.

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 affects 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.

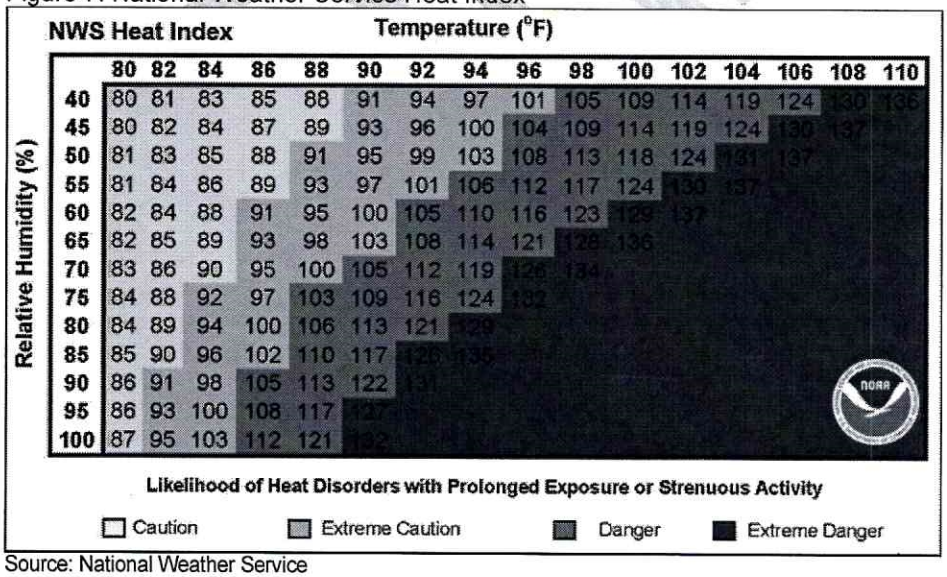
In the United States, approximately 700 people die each year as a result of severe cold temperature-related causes according to the 2019 Michigan Hazard Analysis, with a significant number of deaths occurring due to illnesses or disease that are negatively impacted by severe cold weather, such as stroke, 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.

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 Kalkaska County is at risk to the occurrence and impacts from extreme temperatures.

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

Previous Occurrences
There have been two reported events of extreme heat and four reported events of extreme cold/wind chill. One of the extreme cold events was also a Governor Declared Disaster on January 29, 2019. No direct harm has occurred to human life and no damages to property or crops have been reported.

Table 27: Extreme Heat and Cold Related Events

LOCATION	DATE	EVENT	DEATHS	INJURIES	PROPERTY DAMAGES	CROP DAMAGES
KALKASKA (ZONE)	8/1/2001	Heat	0	0	0	0
KALKASKA (ZONE)	6/30/2018	Excessive Heat	0	0	0	0
KALKASKA (ZONE)	2/4/2007	Extreme Cold/Wind Chill	0	0	0	0
KALKASKA (ZONE)	1/6/2014	Extreme Cold/Wind Chill	0	0	0	0
KALKASKA (ZONE)	2/19/2015	Extreme Cold/Wind Chill	0	0	0	0
KALKASKA (ZONE)	1/29/2019	Extreme Cold/Wind Chill	0	0	0	0
TOTAL			**0**	**0**	**$0.00**	**$0.00**

Sources: NOAA: National Centers for Environmental Information; MSP 2019 Michigan Hazard Mitigation Plan

The Governor Declared Disaster on January 29, 2019 event narrative is as follows:

Another blast of arctic air impacted northern Michigan, behind a departing area of low pressure. Lake effect snow, gusty winds, blowing and drifting snow, and very low wind chills, combined to produce an abundance of winter weather hazards in northern Michigan. Wind chills bottomed out at 25 to 35 below zero in most of northern Michigan. Snowfall amounts of 5 to 7 inches were reported from Good Hart, Brethren, Boyne City, and Indian River.

Probability of Future Events and Vulnerability Assessment
There is an 8.3% chance an extreme heat event would occur every year. Similarly, there is an 18.2% chance an extreme cold event would occur every year.

Extreme heat and cold events are more likely to impact unsheltered populations. The county's homeless population is especially vulnerable. Seasonal emergency shelters are essential services for the community. The *Northwest Lower Michigan Coastal Resilience Atlas* written by the Land Information Access Association completed a Heat Vulnerability Assessment[5] of coastal communities. A community's vulnerability is their exposure to the hazard (determined by tree canopy and impervious surface coverage) + their sensitivity. Sensitivity is determined by the folowing factors:

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

As mentioned before, townships located in northern and eastern portions of the county are sparsely populated, but older, and also remote from major services in the western portion of the county. Blue Lake Township, Bear Lake Township, and Garfield Township are also, respectively, the oldest (Blue Lake Township is the oldest) communities in Kalkaska County. Elderly residents are the most likely persons to have a disability, and therefore, are the most vulnerable to extreme temperature events.

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

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 Kalkaska 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 Kalkaska County, the District Health Department 10 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. State of Michigan reports, as of November 29, 2022, there are 4,353 cumulative cases of COVID-19 and 68 deaths in the county. Those in the 70 year age group and older have the most deaths of any age range.

manuals and plans

Staff PC check for accuracy

Are there other entities - or CDC only?

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 District Health Department 10 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.

and/or health

Sta-PC

EMPs (Electromagnetic Pulse)
oversight dept. of homeland security
some preparedness - food, water in pantry.
should we include in plan?
Electro magnetic Pulse Shielding mitigation

Steps - large plan manual

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

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

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

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

A vulnerability assessment can be found in the two-page report: *Climate Change in the Great Lakes Region* by GLISA. The report identifies key challenges from climate change such as:

- **Public Health**
  - Increased risk of heat waves and increased humidity may amplify the number of heat-related deaths and illnesses.
  - More storm activity and flooding, resulting in increased point- and non-point source pollution, will likely increase watershed contamination and water-borne illnesses, while warmer surface waters amplify the risk of toxic algal blooms and fish contamination.
- **Tourism and Recreation**
  - *Winter recreation/tourism are likely to suffer* due to reduced snow cover and shorter winters. Reduced lake ice cover and enhanced evaporation may lead to increased lake-effect snowfall in the near-term, but rising temperatures will cause more winter precipitation to fall as rain as opposed to snow across the region by late century.
  - Increasing temperatures and a longer summer season may *increase the demand for lake and beach use.*
  - Overall, *summer tourism may grow before temperature rise becomes unfavorable* for outdoor recreation.
  - *The fishing industry* (commercial and recreation) is likely to be impacted by the *decline of coldwater species of fish, such as lake trout and whitefish.*

- **Natural Environment**

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 mitigating 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 Kalkaska 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: RAVE Mobile Alert System; IPAWS (Integrated Public Alert and Warning System - FEMA's national system for local alerting that provides authenticated emergency and life-saving information to the public through mobile phones using Wireless Emergency Alerts, to radio and television via the Emergency Alert System, and on the National Oceanic and Atmospheric Administration's Weather Radio.)

Radio warning system: RAVE

Tornado/Severe Weather Systems: RAVE / IPAWS

Flood warning system: RAVE / IPAWS

Kalkaska County Emergency Management Department maintains contracts with # of the # local fire stations in the county so that they may be utilized as temporary shelters in the event of an emergency. Those # are:

Emergency Shelter Site Name	Generator?	Street Address	City	ZIP

Hazard Mitigation Strategies are grouped according to type. Types include: Awareness & Preparation, Shelters, Building & Development, Utilities & Technology, and Environment & Natural Resources. The table also includes: a description of each strategy; what natural hazards they address; where the strategy applies; who is responsible for implementing the strategy; how the strategy will be implemented (what resources are available to apply the strategy); when the strategy could feasibly begin; the level of priority; and what type of strategy it is.

The resources for how the strategies may be implemented are listed ~~below:~~ in, hat mitigation strategies??

What is the below info?
not in the right place

Networks Northwest
Talent / Business / Community

Jennifer Neal <jennifer.neal@networksnorthwest.org>

Updated Kalkaska Participation

1 message

Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org> Wed, Mar 15, 2023 at 4:39 PM

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

OK031523

The updated Kalkaska participation table is highlighted in pink on the "All Participation" tab. This includes folks from the survey that were left out before and participation via email and at the January 25 PC meeting.

The District 6 County Commissioner, Craig Crambell, is in red text because he has not actually participated yet; I would assume he will though later on.

In reviewing the comments on the marked up draft from Laura:
- The Clerk and Trustee for Oliver Township should remain as is, just with "former" indicated next to their title.
- "Kalkaska Memorial Health Center" - that is the official name of the organization, per their website and what people put on their in-kind forms. I don't think it should be "hospital".
- Kalkaska Public Schools - John Rogers should remain, with "former" next to his title.

Other suggested changes were incorporated into the revised table.

Also, please add the following survey participants to the list on page 9 of the plan: Kalkaska County EMS and Kalkaska County Clerk/Administrator

Stephanie Marchbanks
Community Planner
Networks Northwest

Desk: 231.439.5247
Mobile: 231.590.0930
stephanie.marchbanks@networksnorthwest.org

Networks Northwest
Talent / Business / Community
2240 Mitchell Park Dr., Suite B
Petoskey MI 49770

On Tue, Mar 14, 2023 at 2:43 PM Jennifer Neal <jennifer.neal@networksnorthwest.org> wrote:

> Good afternoon Laura and Mike,
>
> I have attached the revised Hazard Mitigation Plan based on the edits you sent, Laura. I have a few questions and comments:
>
> - Mike, Stephanie and I need to get together and go through the participation table. I saw your comments, but we need to double check against our records to keep people who have participated, but are maybe no longer in those roles. So minimal changes have been made to this section, just FYI.
> - Is the County's Master Plan complete? Is there an updated Future Land Use Map I can use? This was a circle in the edits you sent so maybe you wanted to use the updated version?
> - There were a few more circles in your edits and I'm not quite sure what they meant. If you want to look through this updated version and make sure I caught everything I would appreciate it.

Kalkaska County Emergency Management
Mike Thompson – Emergency Management Coordinator
890 Island Lake Dr.
Kalkaska, MI 49646

mthompson@kalso.org
office – 231.258.3319 ext. 2229
cell – 231.384.1362

PUBLIC NOTICE

SPECIAL MEETING OF THE KALKASKA COUNTY
LOCAL PLANNING TEAM AND
LOCAL EMERGENCY PLANNING COMMISSION

16 MARCH 2023
0930 HOURS

Location:
Conference Room
Annex Building
890 Island Lake Rd.
Kalkaska, MI 49646

ENCOURAGING ZOOM PARTICIPATION:

Join Zoom Meeting
https://us06web.zoom.us/j/89421318675?pwd=eDJ3b0c2T0RXV0wxN3ZFUkNYUmdLUT09

Meeting ID: 894 2131 8675
Passcode: 265915
One tap mobile
+13126266799,,89421318675#,,,,*265915# US (Chicago)
+16465588656,,89421318675#,,,,*265915# US (New York)

Dial by your location
+1 312 626 6799 US (Chicago)
+1 646 558 8656 US (New York)
+1 646 931 3860 US
Meeting ID: 894 2131 8675
Passcode: 265915

Find your local number: https://us06web.zoom.us/u/ku0gnQwpr

Kalkaska County LPT/LEPC Agenda

16 March 2023

0930 hours

Use the following link to join the meeting via Zoom

Join Zoom Meeting

https://us06web.zoom.us/j/89421318675?pwd=eDJ3b0c2T0RXV0wxN3ZFUkNYUmdLUT09

Meeting ID: 894 2131 8675
Passcode: 265915
One tap mobile
+13126266799,,89421318675#,,,,*265915# US (Chicago)
+16465588656,,89421318675#,,,,*265915# US (New York)

Dial by your location
+1 312 626 6799 US (Chicago)
+1 646 558 8656 US (New York)
+1 646 931 3860 US

Meeting ID: 894 2131 8675
Passcode: 265915
Find your local number: https://us06web.zoom.us/u/ku0gnQwpr

1. Introductions
2. Approval of Agenda
3. Review of November 2022 notes
4. Old Business
    a. Natural Hazards Mitigation Plan – presented by Jennifer Neal and/or Stephanie Marchbanks, Community Planners, Networks Northwest, via Zoom
5. New Business
    a. 2023-2024 meeting schedule
6. Member reports
7. Public comment
8. Adjournment

Notes from Kalkaska County LEPC Meeting Via Zoom 03/16/2023

Attendees:

- Mike Thompson - County Emergency Management Coordinator
- Doug Pratt – New County EMC (beginning next week)
- Greg Brierley – Fire Chief for Blue Lake Township
- Kohn Fisher – County BOC
- Lisa Anderson – Kalkaska Commission on Aging Community Support Specialist
- Annie Wallace – Excelsior Township Clerk
- Seth Phillips – County Drain Commissioner
- Jim _?
- Jennifer Neal – Networks Northwest
- Stephanie Marchbanks – Networks Northwest

- The County Master Plan is from 2023-2027 – make that change in the plan.

- Mike Thompson indicated that action items from the 2016 HM Plan were, to his knowledge, not incorporated into any county or local level planning/policy documents. We need to check to see if the current County Master Plan goals/objectives reflect any alignment with prior 2016 HM plan action items. Mike said for certain action items, such as improving outreach with fire safety, preparedness, and preparation, he has had discussions with local and state fire departments, as well as sharing information from the national Firewise USA program with local communities.

- Seth Phillips has a contact with EGLE regarding any updated interest in flood mapping for the communities – he will provide any updates on this as they are provided to him. Flooding in the county is mostly seasonal, in small, localized areas that are often in remote locations (valleys, ice dams along rivers, etc.) There is a concern that NFIP insurance would be too expensive for many of the property owners in these areas, and that NFIP mapping could lower property values.

- Mention in the plan that the Manistee Lake Improvement Board and Manistee Lake Association (Coldsprings/Excelsior Townships) have been working on managing eurasian water milfoil for many years. In the past they utilized a weevil but it is not available anymore. They currently rely on spot treating with selective herbicides. The milfoil is always present, almost impossible to fully get rid of, but it has been reduced and is being managed. Special assessment districts for lakeshore properties are the primary way to fund these efforts. The MLIB is also receiving a boat cleaning station with assistance from the Kalkaska Conservation District – they

received an EGLE grant. They want to continue to keep new invasives out the lake, such as starry stonewort, mud snails, and rusty crayfish.

- Mention in the plan that the invasive species Didymo (or “rock snot”) was identified in the Manistee River (flows through Bear Lake, Oliver, Garfield, and Springfield Townships) in 2022.

- Jenni to reach out to Mike Cox at the Road Commission regarding scheduled /potential road improvements – suggested that he is emailed plan draft documents and/or specific questions for him to bring up for discussion at the next Road Commission Board Meeting.

Shelter List updates:

- Blue Lake Township has a generator now.

- Excelsior Township has a generator and a stove, fridge, cots and blankets

- Coldsprings Township might be getting a generator in the future with county ARPA funds.

- Mike Thompson to provide details on any ARC overnight shelter site information that can be included in the plan.

Networks Northwest
Talent / Business / Community

Jennifer Neal <jennifer.neal@networksnorthwest.org>

FW: missed meeting

Mike Thompson <mthompson@kalso.org> Thu, Mar 16, 2023 at 11:21 AM
To: Jennifer Neal <jennifer.neal@networksnorthwest.org>

Dangit!! Sorry again, Jenni

From: Jim Leffew <jleffew.plan.clearwater@gmail.com>
Sent: Thursday, March 16, 2023 10:46 AM
To: Mike Thompson <mthompson@kalso.org>
Subject: missed meeting

Hi Mike,

I regret that I was unable to log in to zoom today. missing the Hazard Mitigation meeting.

I had a couple items I wanted to bring forward, simple mistakes.

1. Table 3 page 14, Antrim County is listed twice, and there are conflicting numbers.

2. Page 9 in the 6th paragraph about the formost lakes. Just wanted to point out that the largest lake in the county was omitted, Lake Skegamog, and also wondered if it would be worthy of mentioning that both Torch Lake and Skegamog have connecting waterways to Lake Michigan. Seems important.

Thank you for all the hard work by everyone on this project.

Jim Leffew

Clearwater Township Planning Commission

231 409-2161

Networks Northwest
Talent / Business / Community

Jennifer Neal <jennifer.neal@networksnorthwest.org>

FW: missed meeting

Mike Thompson <mthompson@kalso.org> Thu, Mar 16, 2023 at 12:13 PM
To: Jennifer Neal <jennifer.neal@networksnorthwest.org>

Blue Lake does have a generator. COA does not have a generator yet….I believe it is on order

[Quoted text hidden]

March 16, 2023

Dear Planning Commissioner,

Since we last met on January 25, 2023, Networks Northwest has received the following communications and comments regarding the update the Kalkaska County Natural Hazard Mitigation Plan.

- Commissioner comments received February 17, 2023
- Stephanie's review of participation table. See attached email.
- Commissioner comments received March 15, 2023
- Rapid River Township comments received March 15, 2023. See attached document.
- Clearwater Township (Jim Leffew – Planning Commission) comments received March 16, 2023. See attached email.
- Kalkaska County LPT/LEPC comments received March 16, 2023.Summary as follows:
    - Discuss other ways the 2016 Hazard Mitigation Plan has been implemented or incorporated into other plans and policies (page 7)
    - Change 2022 to 2023-2027 Master Plan (page 12)
    - Flood hazard analysis (page 35) – Seth Phillips in contact with EGLE for localized mapping. Flood concerns are countywide, but seasonal and localized, often in remote locations. And there is a concern that NFIP insurance would be too costly for property owners.
    - Invasive species analysis (page 51) – Seth Phillips working with Manistee Lake Improvement Board and Manistee Lake Association to manage Eurasian watermilfoil. The MLIB has grant funding to purchase and install a boat wash station in 2023. The MLIB is also actively working to prevent new invasive species: starry stonewort, New Zealand mudsnail, the red swamp crayfish, and the rusty crayfish.
    - Corrections to shelter list (page 62):
        - Blue Lake Township has a generator
        - Coldsprings Township may be getting a generator
        - Excelsior Township has a generator
        - COA may be getting a generator

Sincerely,

Jennifer Neal, AICP
Community Planner

County Planning Commission

The Rapid River Township Board held their regular meeting on March 14, 2023, at the Rapid River Township Hall, 1010 Phelps Road, Kalkaska, MI, for the review of the county's Hazard Mitigation Plan Draft dated 1-31-23.

The Township Planning Commission reviewed the Plan and made two recommendations to the Township Board for their approval. The Township Board reviewed the two recommendations and agreed with the Township Planning Commission's recommendations for your review and insertion into the Final Draft as follows:

#1 page 47 Third paragraph, second to last sentence: remove the words "elderly" and "low income," and insert the word "all."

#2 Under Hazard Mitigation Strategies List: remove line #28 in entirety.

The vote of the Township Board was unanimous in support of these changes.

Thank you in advance for your consideration of these concerns.

Terry Williams

Terry Williams
Supervisor, Rapid River Township

Networks Northwest
Talent / Business / Community

Interim Board Chair: **Bill Kennis**

Chief Executive Officer: **Terry Vandercook**

March 17, 2023

Dear Kalkaska County Local Government Representative,

Many of you attended the presentation and discussion of the Kalkaska County Hazard Mitigation Plan at the January 25, 2023 Kalkaska County Planning Commission meeting – thank you for your participation! Networks Northwest has prepared a revised draft plan and strategies table for your review. The plan revisions include, but are not limited to:

- Added MI School Data for economically disadvantaged students (2011-12, 2021-22)
- Added data and analysis of new hazard, Hazardous Materials: Fixed Site Incidents
- Additional discussion and support in Flooding, Tornado, and Wildfire hazard analysis
- Invasive Species hazard analysis rewrite
- Update of Mitigation Strategies and Priorities section
- Added Implementation section

The final draft plan, and associated strategies, resources, and maps, are available for public review and comment. These can be viewed online at the project webpage: https://www.networksnorthwest.org/community/natural-hazard-mitigation/kalkaska-county.html

Your participation in the review of this plan is also a Federal Emergency Management Agency (FEMA) requirement to be eligible for federally-funded pre-disaster hazard mitigation grant opportunities for five years. Many of the hazard mitigation strategies have a county-wide application, but some are site-specific. Please review the plan and materials carefully to verify your community is in support of the material provided or requests changes to the draft.

A public hearing for the plan will be held on Wednesday, April 19, 2023 at 5:30 PM. The meeting location is the Kalkaska County Administration Building, 605 N. Birch St., Kalkaska, Michigan. Upon review of the plan, the Board shall recommend it be sent to Michigan State Police Homeland Security Division for review and then on to FEMA for their final approval. Once FEMA has approved the plan, it will be brought before the County and all local government boards for adoption.

A copy of this letter will be shared with all local officials through electronic mail. 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.

Sincerely,

Jennifer Neal, AICP
Community Planner, Networks Northwest

KALKASKA COUNTY PLANNING COMMISSION
605 N BIRCH STREET
KALKASKA MI 49646

Wednesday, March 21st 2023

AGENDA

CALL TO ORDER: 6:00 p.m. with the Pledge of Allegiance

ROLL CALL: Kohn Fisher, Stuart McKinnon, John West, Bob Mickevicius, Eric Hendricks, Jim Sweet

APPROVAL OF AGENDA: March 21, 2023

PUBLIC COMMENT & COMMUNICATIONS concerning items not on agenda:

CORRESPONDENCE:

CALL FOR CONFLICT:

CALL FOR CONFLICT WITH ANY BOARD MEMBERS:

OLD BUSINESS: Hazard Mitigation Plan proposed amendments:

OTHER/PUBLIC COMMENT:

ADJOURNMENT:

KALKASKA COUNTY PLANNING COMMISSION
605 N BIRCH STREET
KALKASKA, MI 49646
(231) 258-3367 lhendricks@kalkaskacounty.org

~~NOT~~ **BOARD APPROVED**
4-20-23 LH

MARCH 21, 2023

A special meeting of the Kalkaska County Planning Commission was called to order by Board Secretary Kohn Fisher at 6:01 p.m. with the Pledge of Allegiance.

ROLL CALL: Present: Bob Mickevicius
James Sweet
Kohn Fisher
John West
Stuart McKinnon (Arrived at 6:05 p.m.)

Absent: Eric Hendricks

Also Present: Laura Hendricks, Zoning Administrator
Jim Leffew
Margret Spann

APPROVAL OF AGENDA: Motion by Mickevicius, supported by Sweet to approve the agenda of March 21, 2023 as presented. All present in favor, motion carried by voice vote.

PUBLIC COMMENT & COMMUNICATIONS concerning items not on the agenda: None.

CORRESPONDENCE: Laura said there is a gentleman who wants to have a public cemetery on property he owns in Coldsprings Township. She said the property is zoned Agricultural-Residential and this use is allowed subject to special use permit in that district. She said she also had an inquiry regarding a family cemetery and she is not sure if it would need to meet the requirements of the ordinance, or just go through the state. Discussion followed. Stuart said he knows someone he can ask and he will let Laura know what he finds out.

CALL FOR CONFLICT: None.

CALL FOR CONFLICT WITH ANY BOARD MEMBERS: None.

OLD BUSINESS: Hazard Mitigation Plan proposed amendments: Stuart reviewed some proposed changes with Jennifer Neal of Networks Northwest and the Board, as he did not attend the last meeting when the Hazard Mitigation Plan was reviewed. He also submitted two changes proposed by Rapid River Township. Mr. Leffew from Clearwater Township attended

this meeting and also noted a proposed change. These were submitted to Networks Northwest for final review and submittal to the Board of Commissioners (BOC) on April 19, 2023.

OTHER PUBLIC COMMENT: None.

ADJOURNMENT: Motion by Mickevicius, supported by Fisher to adjourn the meeting. All present in favor, motion carried by voice vote.

Recording Secretary Laura Hendricks
Meeting adjourned at 9:00 p.m.

Kalkaska County Clerk
Deborah L. Hill
Clerk of Board of Commissioners
46th Circuit Court Clerk

Kalkaska County Board of Commissioners
Public Notice

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

Kalkaska County is in the process of updating its Hazard Mitigation Plan in accordance with the Disaster Mitigation Act of 2000.

Meeting Information:

There will be a public meeting following the public review period on April 19, 2023. The meeting will be at the Kalkaska County Administration Building, 605 N. Birch Street, Kalkaska, MI 49646 at 5:30 PM. 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 Kalkaska County's website and Network Northwest's website.

Deborah Hill
Kalkaska County Clerk
Posted: 3-22-2023

Networks Northwest
Talent / Business / Community

Jennifer Neal <jennifer.neal@networksnorthwest.org>

Kalkaska County Hazard Mitigation Plan

3 messages

Jennifer Neal <jennifer.neal@networksnorthwest.org> Tue, Apr 11, 2023 at 9:42 PM
To: bhaner@dhd10.org

Hi Bret,

We had a question come up at the Kalkaska County Planning Commission and they would like it if you verified the information. It is in regards to the discussion about Public Health Emergencies and the response to the Covid-19 pandemic. Here is how the sentence reads. The underlined portion is the part we want to verify with you.

" In Kalkaska County, the District Health Department 10 works with local, state, and federal agencies to prepare for and respond to public health threats. It developed comprehensive emergency preparedness manuals and plans capable of responding to a variety of emergency situations with funds from the Centers for Disease Control. "

Let me know your thoughts. Thanks so much,

Jenni

--
Jennifer Neal, AICP
Community Planner
Mobile: 231.709.3204
jennifer.neal@networksnorthwest.org

Networks Northwest
2240 Mitchell Park Dr., Suite B
Petoskey MI 49770

Bret Haner <bhaner@dhd10.org> Wed, Apr 12, 2023 at 8:55 AM
To: Jennifer Neal <jennifer.neal@networksnorthwest.org>

Hi Jenni,

That underlined statement isn't specifically for Covid, but yes, that is accurate in terms of DHD #10 responding to public health emergencies. Funding for public health emergency preparedness is provided by the CDC (federal) and given to state health departments (in our case that's MDHHS). MDHHS then passes some of that funding on to local health departments. That local funding is then used for emergency preparedness staff time, plan development, training, exercising, and response. DHD #10 has developed a wide variety of plans/procedures, over the years, that cover things like active shooter response, mass clinic coordination, and Ebola traveler monitoring.

Below, I have listed out several public health incidents/emergencies that DHD #10 has responded to in the past. Those are examples of what is meant by "a variety of emergency situations" in the sentence you underlined.

1. 2005 Katrina evacuee planning (state/fed. mandated activity)
2. 2008 Mason flooding (county EOC activated)
3. 2009 H1N1 flu pandemic (internal incident command activated)
4. 2013 Newaygo flooding (county EOC activated)

5. 2014 Grayling environmental poisoning investigation (internal incident command activated)

6. 2015 Ebola outbreak traveler monitoring (state/fed. mandated activity)

7. 2016 Grayling sewage plant spill (assistance/coordination provided)

8. 2018 Hepatitis A outbreak (internal incident command activated)

9. 2019 Covid pandemic (internal incident command activated)

Let me know if you have other questions.

Bret Haner, MA

Emergency Preparedness Coordinator

District Health Department #10

14485 Northland Dr.

Big Rapids, MI 49307

231-305-8647

From: Jennifer Neal <jennifer.neal@networksnorthwest.org>
Sent: Tuesday, April 11, 2023 9:42 PM
To: Bret Haner <bhaner@dhd10.org>
Subject: Kalkaska County Hazard Mitigation Plan

[Quoted text hidden]

Jennifer Neal <jennifer.neal@networksnorthwest.org> Wed, Apr 12, 2023 at 9:07 AM
To: Bret Haner <bhaner@dhd10.org>

Bret,

Thank you so much for your quick reply. I appreciate your comments and will share them with the Planning Commission. I'll check the language of the section and make sure it aligns with what you've shared here.

If there is anything else you'd like to add, please feel free to let me know. Best,

Networks Northwest
Talent / Business / Community

Jennifer Neal <jennifer.neal@networksnorthwest.org>

Hazard Mitigation Plan

Laura Hendricks <LHendricks@kalkaskacounty.org> Fri, Apr 14, 2023 at 10:05 AM
To: Jennifer Neal <jennifer.neal@networksnorthwest.org>

Good Morning Jenni,

The PC Subcommittee had just a few changes, mostly in regards to Electromagnetic Pulses (EMP's). On page 50 change the heading "Space Weather" to "Electromagnetic Pulses (EMPs) Natural or Manmade." Also in the Strategies Table in the Heading change from "Space Weather: Solar Geomagnetic Storms" to "Electromagnetic Pulses (EMPs)" and in #18 in the Preparation and Awareness Section, add the words " Electromagnetic Pulses (EMPs)" after the word "and."

On page 51 at the bottom of the page add "and/or health" after the word "immune" and delete the words "and low income."

Please see attached, and let me know the status of the changes as soon as you can.

Please and Thank you. Have a great day and enjoy the sunshine!

Laura

Scan20230414093502.pdf
4867K

Kalkaska County Board of Commissioners
Special Meeting Minutes
April 19, 2023
(UNAPPROVED)

Meeting called to order by Chair Fisher at 5:30 PM, Commissioner Chambers, Administration Building, 605 N Birch Street, Kalkaska, MI. 49646. Present Commissioners Bob Baldwin, Dave Comai (arrived at 5:56 PM), Craig Crambell (arrived at 5:55 PM), Kohn Fisher, Jeff Sieting, James Sweet and Chief Deputy County Cristy Matley. Absent Commissioner Truman Bicum.

Public Input: None

(John Starr present)

(Jeremy entered ZOOM at 5:37 PM)

Purpose of Meeting:

Chair Fisher called for review and/or approval of proposed Hazard Mitigation Plan and Public Comment. Also present Jennifer Neal, Networks Northwest.

Stuart McKinnon, Chair of Planning Commission: McKinnon addressed the Board noting amendments were reviewed for the 4-19-2023 meeting; areas of concern were on page 50 to change headed to EMP rather than solar weather, request to use both terms; page 51 add 'and or help', delete low income. McKinnon noted need for further detail on definitions and history, preparedness resources.

Discussion with Neal; Baldwin inquired as to concerns with EMP vs chemical/biological attacks; Neal noted Health Departments have biological plans. Continued discussion.

Consensus Neal to review and include the EMP information; to set another Special Meeting the 2nd week of May if Neal can provide the draft with the man-made hazards.

Motion by Baldwin for Networks Northwest to send the completed Kalkaska County Hazard Mitigation Plan with all required changes to the MSP for initial review and to FEMA for final review and approval before 5-31-23. Supported by Sieting. Roll call vote: Baldwin, yes; Sieting, yes; Sweet, yes; Fisher, yes. 4 yeas. 0 nays. 3 absent. **Carried**.

McKinnon noted need for review of final draft with additional amendments before the next meeting.

Public Input: None

Motion by Sieting to adjourn at 6:04 PM. Supported by Sweet. 6 yeas. 0 nays. 1 absent. **Carried**.

Respectfully submitted:

_____	_____
Cristy Matley, Chief Deputy County Clerk and Clerk of Board of Commissioners	Kohn Fisher, Chair of Kalkaska County Board of Commissioners

These minutes are not official until they are approved at the next Regular Board of Commissioners meeting.

Networks Northwest
Talent / Business / Community

Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Boardman Township NFIP

3 messages

Jennifer Neal <jennifer.neal@networksnorthwest.org> Tue, Apr 11, 2023 at 12:23 PM
To: "paul.erickson82@live.com" <paul.erickson82@live.com>
Cc: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>, Douglas Pratt <dpratt@kalso.org>

Hi Paul,

Thank you for participating in the Hazard Mitigation Process for Kalkaska County. Boardman Township is a participating community in the NFIP program. As part of the plan update, FEMA is asking additional questions about your NFIP participation. Could you please answer the following questions?

1. We have you down for an Emergency program, is that correct? Could you elaborate about what this means?
2. Your implementation method: How local floodplain management regulations are implemented and enforced in Special Flood Hazard Areas.
3. Appointed Designee: How the designee or agency that is appointed to implement the addressed commitments and requirements of the NFIP.
4. Implementation of Damage Provisions: How participants implement the substantial improvement/substantial damage provisions of their floodplain management regulations after an event.

Please do not hesitate to contact me if you have any questions. Best regards,

Jenni

--
Jennifer Neal, AICP
Community Planner
Mobile: 231.709.3204
jennifer.neal@networksnorthwest.org

Networks Northwest
2240 Mitchell Park Dr., Suite B
Petoskey MI 49770

Jennifer Neal <jennifer.neal@networksnorthwest.org> Wed, May 17, 2023 at 1:29 PM
To: "erickson82@yahoo.com" <erickson82@yahoo.com>
Cc: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>, Douglas Pratt <dpratt@kalso.org>, Mike Thompson <mthompson@kalso.org>

Hello,

Thank you for the call. Here is the previous email I sent. Feel free to give me a call if you have any questions.

Also here is the link to the FEMA project funding I mentioned. The County and MSP would help you determine next steps.

https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

Best,

Jenni
[Quoted text hidden]

Jennifer Neal <jennifer.neal@networksnorthwest.org> Fri, May 19, 2023 at 10:54 AM
To: Stephanie Marchbanks <stephanie.marchbanks@networksnorthwest.org>

Morning,

I spoke with Paul, and my notes from our conversation are in blue below. If you have further questions Paul may be reached at (231) 564-2203.

On Tue, Apr 11, 2023 at 12:23 PM Jennifer Neal <jennifer.neal@networksnorthwest.org> wrote:

> Hi Paul,
>
> Thank you for participating in the Hazard Mitigation Process for Kalkaska County. Boardman Township is a participating community in the NFIP program. As part of the plan update, FEMA is asking additional questions about your NFIP participation. Could you please answer the following questions?
>
> 1. We have you down for an Emergency program, is that correct? Could you elaborate about what this means? -- They are unfamiliar with this.
> 2. Your implementation method: How local floodplain management regulations are implemented and enforced in Special Flood Hazard Areas. -- Zoning Administrator, but probably not familiar with process or responsibility. Would look to the County for support and expertise --
> 3. Appointed Designee: How the designee or agency that is appointed to implement the addressed commitments and requirements of the NFIP. -- Zoning Administrator and County Building Deptartment --
> 4. Implementation of Damage Provisions: How participants implement the substantial improvement/substantial damage provisions of their floodplain management regulations after an event. --County Emergency Manager, County Building Department --
>
> Overall, he is not concerned about flooding, except for dam failure. My thought is this community probably doesn't need to be NFIP.
>
> Jenni
>
> --
> **Jennifer Neal, AICP**
> **Community Planner**
> Mobile: 231.709.3204
> jennifer.neal@networksnorthwest.org
>
> Networks Northwest
> 2240 Mitchell Park Dr., Suite B
> Petoskey MI 49770
> [Quoted text hidden]