



BARAGA COUNTY

2020 - 2025

**Hazard
Mitigation
Plan**



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SECTION 1: Introduction

This section provides a general introduction to the Baraga County Hazard Mitigation Plan. It consists of the following four subsections:

- Background
- Purpose
- Scope
- Authority

Background

Natural hazards, such as floods, severe winter storms, and wildfires are naturally occurring physical phenomena caused either by the rapid or slow onset of events which can have a negative effect on humans or the environment. Every year in the United States, natural hazards threaten lives and livelihoods and result in billions of dollars in damage.

Hazard mitigation is any action taken before, during, or after a disaster to eliminate or reduce the risk to human life and property from natural, technological or human-related hazards. This is accomplished through coordination of resources, programs, and authorities. When successful, mitigation will lessen the impacts to such a degree that future events will remain only incidents and not become disasters.

Mitigation is an essential part of the emergency management process. When a disaster strikes and a community responds, often the focus of repairs and reconstruction is to restore damaged property to pre-disaster conditions as quickly as possible. These efforts expedite a return to "normalcy," yet replication of pre-disaster conditions leaves the community vulnerable to the same hazards, resulting in a cycle of damage, reconstruction, and damage again. Hazard mitigation allows this cycle to be broken by ensuring that post-disaster repairs and reconstruction take place after damages are analyzed and that sounder, less vulnerable conditions are produced.

Mitigation planning allows a community to identify potential hazards, assess vulnerability/risk, and develop prioritized mitigation strategies to deal with those hazards long before an event occurs. The hazards and vulnerabilities are determined based on historical events, incidents in nearby communities, and scientific data and trends. Mitigation measures can be implemented systematically, based on assessed priorities, or, in the worst case, through repair and reconstruction after a hazard event occurs.

Baraga County is vulnerable to a wide range of natural, technological, and human-related hazards, including flooding, infrastructure failure, structural fires, winter storms, subsidence, and



Hazard Mitigation:

Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards

hazardous material spills due to transportation accidents. While the threat from hazardous events may never be fully eliminated, there is much that can be done to lessen their potential impact upon the community. The Baraga County Hazard Mitigation Plan (hereinafter referred to as “Hazard Mitigation Plan” or “Plan”) is the logical first step toward incorporating hazard mitigation principles and practices into the routine government activities and functions of Baraga County and its municipalities. At its core, the Plan recommends specific actions to combat forces of nature and protect its residents from losses to those hazards that pose the greatest risk. These mitigation actions go beyond simply recommending structural solutions to reduce existing vulnerabilities. They also include local policies on community growth and development, incentives for natural resource protection, and public education activities are examples of other actions considered to reduce Baraga County’s future vulnerabilities to identified hazards. The Plan is designed to be a living document, with implementation and evaluation procedures included to help achieve meaningful objectives and successful outcomes over time.

Disaster Mitigation Act of 2000 and the National Flood Insurance Reform Act of 2004

To reduce natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (42 U.S. Code § 5165) to invoke new and revitalized approaches to mitigation planning. Section 322 of this Act emphasizes the need for state and local government to closely coordinate on mitigation planning activities and makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance (FMA) Program, and the Pre-Disaster Mitigation (PDM) Program, all of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security.

This Plan was prepared in coordination with FEMA, the State Hazard Mitigation Office in Michigan, and the Baraga County Emergency Coordinator to ensure that it meets all applicable Disaster Mitigation Act planning requirements. The Local Mitigation Plan Review, found in Appendix G, provides a summary of FEMA’s current minimum standards of acceptability and notes the location within the Plan where each planning requirement is met.

Purpose

The general purpose of this Hazard Mitigation Plan is to:

- Protect life and property by reducing the potential for future damages and economic losses that result from natural hazards.
- Qualify for additional grant funding, such as pre-disaster mitigation.
- Quickly undertake recovery and redevelopment following future disaster events.
- Demonstrate a firm local commitment to hazard mitigation principles.
- Comply with federal and state legislative requirements for local hazard mitigation plans

Scope

Beginning in March 2019, this plan was updated as required by the State Hazard Mitigation Office and FEMA. After review of FEMA's requirements for local hazard mitigation plan updates, the Local Planning Team (LPT) reviewed and analyzed each section of the plan and determined that each section needed to be updated to some degree to meet the requirements. Changes made to each section were clearly marked until such time that it was determined that all parties agreed on the changes.

This Plan will be updated and maintained to continually address those hazards determined to be of high and moderate risk through the detailed vulnerability assessment for Baraga County (see Section 6: *Risk Assessment*). Other hazards that are considered low or negligible risk will continue to be evaluated during future updates to the Plan, but they may not be fully addressed until they are considered high or moderate risk to Baraga County. The geographic scope (i.e. planning area) for the plan includes the entire area of Baraga County.

Authority

Baraga County municipalities and townships have adopted this Hazard Mitigation Plan. Local resolutions to adopt the Plan are compiled in Appendix H.

This Plan was developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans. The Plan shall be monitored and updated on a five-year basis to maintain compliance with the following legislations:

- Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390) and by FEMA's Interim Final Rule published in the Federal Register on February 26, 2002, at 44 CFR Part 201.
- National Flood Insurance Act of 1968, as amended 42 U.S. Const 4001 et seq; and
- Michigan General Statutes: Emergency Management Act 390 of 1976

SECTION 2: Planning Process

This section of the Plan describes the mitigation planning process completed by Baraga County in preparation of the Hazard Mitigation Plan. It consists of the following nine subsections:

- Overview of Hazard Mitigation Planning
- History of Hazard Mitigation Planning Baraga County
- Preparing the 2020 Plan
- The Planning Team
- Local Planning Team (LPT) Meetings
- Involving the Public
- Involving Stakeholders

Overview of Hazard Mitigation Planning

Local hazard mitigation planning is a process of organizing community resources, developing the goals for hazard mitigation in the county, identifying and assessing local hazard risks, and determining how best to minimize/manage those risks. The process results in a hazard mitigation plan that identifies special mitigation actions that achieve both short- and long-term planning objectives for a community-based vision. Plan maintenance procedures are established for routine monitoring of implementation progress, as well as evaluation and enhancement of the Plan itself. These procedures ensure that Baraga County's Plan remains a current, dynamic, and effective planning document over time.

Mitigation planning offers many benefits to the local community such as:

- Protect public safety and prevent loss of life and injury.
- Reduce harm to existing and future development.
- Maintain community continuity and strengthen the social connections that are essential for recovery.
- Prevent damage to the community's unique economic, cultural, and environmental assets.
- Minimize operational downtime and accelerate recovery of government, organizations, and business after disasters.
- Reduce the costs of disaster response and recovery and the exposure to risk for first responders.
- Help accomplish other community objectives, such as capital improvements, green infrastructure protection, open space preservation, and economic resiliency.

Having a hazard mitigation plan will increase awareness of hazards, risk, and vulnerabilities; identify actions for risk reduction; focus resources on the greatest risks; and communicate priorities to state and federal offices.

History of Hazard Mitigation Planning Baraga County

Baraga County's first formal hazard mitigation planning efforts started in 2005 with preparation of the County's first FEMA-approved Hazard Mitigation Plan. These efforts were in response to the Federal Disaster Mitigation Act of 2000, a new requirement at the time to obtain funds through FEMA. The mitigation planning team first led the initial plan, formerly named the *Baraga County Ad-hoc Committee* and organized by the *Baraga County Emergency Measures Office*. The committee included planning professionals from the Western U.P. Planning & Development Region (WUPPDR) and representatives from the Baraga County office, road commission, and county commissioner. The final plan was adopted on February 17, 2005 by the Baraga County Board of Commissioners and the governing bodies of the supporting jurisdictions shortly after. FEMA approved the plan in Fall 2005, validating it until 2010.

In 2012, Baraga County contracted with WUPPDR again to update the 2005 plan. This plan update began with a review of the 2005 plan and gathering new information from local sources, statewide data, and university data to update the hazard risks to municipalities within the County. WUPPDR planning professionals then met with the County Emergency Coordinator and ad hoc committee to identify new projects to address existing and newly identified hazards. A public meeting was held during the planning process on August 12, 2013. The final plan was adopted by Baraga County Board of Commissioners on September 9, 2013 and subsequently adopted by the participating jurisdictions.

Preparing the 2020 Plan

Hazard mitigation plans are required to be updated every five years to remain eligible for certain State and Federal mitigation and public assistance funding. In preparation of the 2020 Hazard Mitigation Plan update, Baraga County and WUPPDR determined the best approach would be for WUPPDR to apply to be a subrecipient of grant funding to assist the County to update its plan. WUPPDR followed the mitigation planning process as recommended by FEMA (Local Mitigation Planning Handbook, March 2013) and the Michigan State Police.

44 CFR Requirement

201.6(c)(1): The plan shall include documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

This section of the Plan provides a description of the process that was used to develop the 2020 plan update. For information about how previous versions of this plan were developed previous versions of this plan should be reviewed.

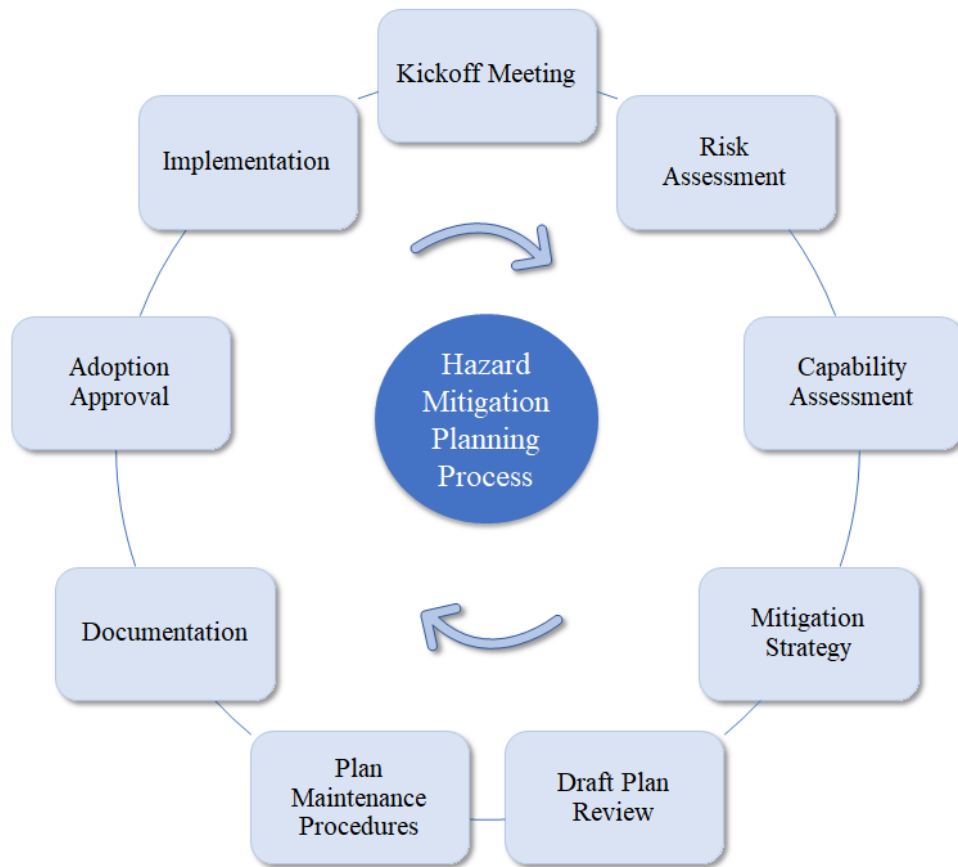
Plan update and review procedures were established in the previous versions of this plan and were used, in addition to the requirements discussed above, to prepare the 2020 update. These procedures provide the general guidelines for updating and reviewing the plan on a five-year basis. These steps also state that the plan will be evaluated for effectiveness and appropriateness by addressing the following questions:

- A. Do Hazard Mitigation Plan goals and objectives continue to address current and expected conditions?
- B. Has the nature or magnitude of risks changed?
- C. Do current resources meet the need and are they appropriate for Hazard Mitigation Plan implementation?
- D. Are there any implementation problems that impede the action plan?
- E. What implementation outcomes have been completed?
- F. Have other agencies, organization, and jurisdictions participated as proposed in the previous plan?

These questions were considered and addressed by the local planning team during the 2020 plan update process. Each section of the updated plan includes information on the plan was reviewed and updated with the identified results.

The planning process included several steps that were completed over the course of several months. These steps, (**Figure 2.1**) resulted in outcomes that make up the Plan. These elements have been integrated into this document and are further explained here for introductory purposes.

Figure 2.1: Hazard Mitigation Planning Process



The *Community Profile*, located in Section 3, provides a general overview of Baraga County and includes information on relevant topics such as geography, transportation, environment, population, demographics, housing, infrastructure, and land use. Specifics about declared disasters in the county can also be found.

The *Risk Assessment* (Section 6) summarizes the hazards identified (Section 4: *Hazard Identification*) and analyzed (Section 5: *Hazard Analysis*) in Baraga County. It also assesses the overall risk to hazards in the county. For hazards that impact individual jurisdictions, the Risk Assessment aims to identify the vulnerabilities that are found in those jurisdictions. Additionally, this section prioritizes and ranks countywide hazards from high to low risk.

Section 7: *Hazard Mitigation* determines the capability of a local jurisdiction to implement a comprehensive mitigation strategy and identify potential opportunities to establish or enhance mitigation policies, programs, or projects. Capabilities are detected by identifying existing strengths and weaknesses with ongoing government activities that have a direct impact on the community's vulnerability to hazards. This helps to identify what gaps or shortfalls need to be addressed and which positive mitigation measures already in place should continue to be supported. Coupled with the *Risk Assessment*, the *Capability Assessment* helps identify and target meaningful mitigation actions for incorporation in the Mitigation Strategy portion of the Hazard Mitigation Plan. Together, The *Community Profile*, *Risk Assessment*, and *Capability Assessment* help to determine the Hazard Mitigation Plan goals.

Mitigation Strategies, also found in Section 7, consist of a comprehensive strategy that looks to develop overarching goals addressing hazard mitigation, economic, environmental and social factors. *Mitigation Action Plans* (Section 8) were created for the county and some specific jurisdictions. The action plans identify specific plans for actions to reduce or eliminate the impacts from hazards. Both Section 7 and 8 work to make the Hazard Mitigation Plan comprehensive by identifying long-term and short-term goals that will influence day-to-day decision making and project implementation.

The maintenance schedule for the plan is embedded in Section 7 and 8. It describes in detail the procedures as a final action item for Baraga County to keep the hazard mitigation plan relevant and up to date.

The Planning Team

The Baraga County's Emergency Management Coordinator convened a Local Planning Team (LPT) to guide the development of the plan update. While remaining consistent with the initial plan developed, it was important to reach out to more stakeholders to get a representative sample of critical facility staff, local officials, emergency personnel, and citizens. The LPT coordinated together on all aspects of the plan development process. Additional participation and input from county residents and other identified stakeholders were sought through the distribution of surveys and the facilitation of a public meeting.

Jurisdictional Involvement

All municipalities in Baraga County (**Table 2.1**) have participated in the development of the 2020 Baraga County Hazard Mitigation Plan as required for pre-disaster federal mitigation funds under Section 104 of the Disaster Mitigation Act of 2000 (42 U.S. Const. 5165). These same jurisdictions also participated in the 2005, and 2012 Plan updates.

Table 2.1: Participating Local Units of Government and Representatives

Jurisdiction	Representative	Title
Baraga County	Jeff Hubbard	Emergency Management Coordinator
Village of Baraga	LeAnn LeClaire	Village Manager
Village of L’Anse	Bob LaFave	Village Manager
Keweenaw Bay Indian Community	Dione Price	Environmental Specialist
Arvon Township	Lori Johnson	School Principal
Baraga Township	Amy Isaacson	Township Supervisor
Covington Township	Lowella Eskel	Township Treasurer
L’Anse Township	Pete Magaraggia	Township Supervisor
Spurr Township	Mike Hosey	Township Supervisor

Baraga County Local Planning Team

The participants listed in **Table 2.2** represent the members of the Baraga County Local Planning Team who participated in the development of the Plan. The planning process was led at the county level by the Baraga County Emergency Coordinator. WUPPDR provided a team of planners and a Geographic Information Systems coordinator to facilitate all LPT meetings.

Table 2.2: Baraga County Local Planning Team

Name	Agency/Jurisdiction
Jeff Hubbard	Baraga County Emergency Coordinator
Nathan Lahti	Baraga County Memorial Hospital
Rick Johnson	Baraga County Sheriff
Harold Miron	Baraga County Road Commission
Douglass Mills	Baraga County Road Commission
Dione Price	Keweenaw Bay Indian Community
Bob LaFave	Village of L’Anse
Kevin Rajala	Michigan State Police - Calumet

Local Planning Team Meetings

The preparation of the Plan required a series of meetings for facilitating discussion and initiating data collection efforts with local officials. The meetings also prompted continuous input and feedback from local officials throughout the drafting stages of the Plan.

Below is a summary of the key meetings for the Local Planning Team. Copies of the agendas, sign-in sheets, and handout materials for all meetings can be found in Appendix F.

First Local Planning Team Meeting

The first meeting of the Local Planning Team was held on May 22, 2019, during which the mitigation plan update process was presented. The intent of this meeting was to educate team members and guests about the planning process and requirements according to the law. The meeting also served to initiate the preliminary data collection efforts for the risk and capability assessment tasks associated with the development of the Plan.

Second Local Planning Team Meeting

The second Local Planning Team meeting was held on November 4, 2019. The meeting began with a detailed presentation by WUPPDR on the findings of the Risk Assessment and Capability Assessment. By providing the county and municipal officials with a more thorough understanding of hazard risks in their communities, along with the varied levels of capabilities available to address them, the audience was prepared for the next step in the update process: to review the expired mitigation planning goals, and list specific mitigation actions designed to reduce future impacts of the identified hazards.

To summarize, the following general findings were presented and discussed at the second LPT meeting.

Risk Assessment Findings:

- The top 5 hazards in Baraga County based on the quantitative prioritized risk assessment are: (1) Shoreline Flooding and Erosion, (2) Snowstorms and Blizzards, (3) Public Health Emergencies, (4) Invasive Species, and (5) Structural Fires.

Capability Assessment Discussion

- In Baraga County, Arvon Township, Village of Baraga, L'Anse Township, and Village of L'Anse actively participate in the National Flood Insurance Program (NFIP).
- The Village of L'Anse and Arvon Township have adopted and implement/enforce a comprehensive plan, building codes, and zoning ordinances.
- The Village of L'Anse and Baraga Township have prepared and adopted a Stormwater Management Plan.

Review of Existing Mitigation Plan Goals, Objectives, and Actions

The existing goals from the 2013 Baraga County Hazard Mitigation Plan were presented to the Local Planning Team during the second meeting focusing on mitigation strategies. The committee agreed that these goals were chosen for good reason and still captured what Baraga County means to accomplish. The goals are listed in Section 8 of this plan.

Prior to the meeting, each municipality was asked to send updates on their current mitigation actions from 2013, and to develop any new actions that should be included in the plan. The group spent time brainstorming ideas and discussing these possible new actions.

Involving the Public

Public participation is one of the fundamental components of Baraga County's community-based mitigation planning process. Individual citizen involvement provides the Local Planning Team with a greater understanding of local concerns and ensures a higher degree of mitigation success by developing community buy-in from those directly affected by the hazards in the region. Public awareness is a key part of the overall mitigation strategy aimed at making communities safer from the potentials risks that hazard effects.

For the 2020 plan update, public input was sought using multiple methods: (1) public and governmental/institutional surveys; (2) posting the draft on the WUPPDR website, and at the county clerk's office; and (3) at public meetings with opportunity for comments prior to adoption.

Baraga County encouraged more open and widespread public and stakeholder participation through the publication of newspaper advertisements, draft comment period, and public meeting to receive comments. Local officials and institutions were also engaged to fill out a different survey to glean information about their respective organizations.

These media advertisements and survey tools provide local units of government, residents, businesses, academic organizations, and other private interests in Baraga County the opportunity to be involved and offer input throughout the planning process.

Summary of Public Participation Survey

The 2020-2025 Baraga County Hazard Mitigation Public Survey received 16 responses. All jurisdictions in Baraga County were represented except for Spurr Township and the Village of Baraga. A majority (9 people) said that they or someone in their household experienced a hazard in the last 5 years. Most had experienced flooding (4 people) while the second most common hazard experienced was blizzard. Respondents were also asked whether they had taken actions to make their home or community more resistant to hazards. Over half of them (9 people) said yes. Additional responses pertained to property located in the floodplain, flood frequency, flood insurance, and effective ways to receive hazard emergency information. A summary of the public survey results is available for review in Appendix E.

Summary of draft locations

A list of locations where the draft plan was located is available in Appendix E

Summary of Public Meeting and Comments Received

A summary of public meetings and comments received are available in Appendix E.

Involving Stakeholders

A range of stakeholders were invited and encouraged to participate in the Baraga County Hazard Mitigation Plan by joining the Local Planning Team meetings. The invitations were sent to the following individuals:

- Jeff Hubbard, Baraga County Emergency Management Coordinator
- James Soli, Arvon Township
- Nick Lindemann, Baraga Township
- Mike Bianco, Village of L'Anse
- Gary Wadaga, Bay Ambulance EMS
- Bill Menge, Baraga County Commissioner
- Douglass Mills, Baraga County Road Commission
- Harold Miron, Baraga County Road Commission
- Rick Johnson, Baraga County Sheriff
- Randy Danison, Michigan State Police – Calumet Post
- Mike Hosey, Spurr Township
- Nathan Lahti, Baraga County Memorial Hospital
- Thomas Chosa, Keweenaw Bay Indian Community
- Dione Price, Keweenaw Bay Indian Community
- Patrick Osterman, Baraga County Equalization

SECTION 3: Community Profile

This section of the Hazard Mitigation Plan provides a general overview of Baraga County. It consists of the following seven subsections:

- Geography, Environment, and Land Use
- Population and Demographics
- Housing and Infrastructure
- Employment and Industry
- Police, Fire, and Emergency Services
- Critical Facilities and Cultural Assets
- Disaster Declarations

Geography, Environment, and Land Use

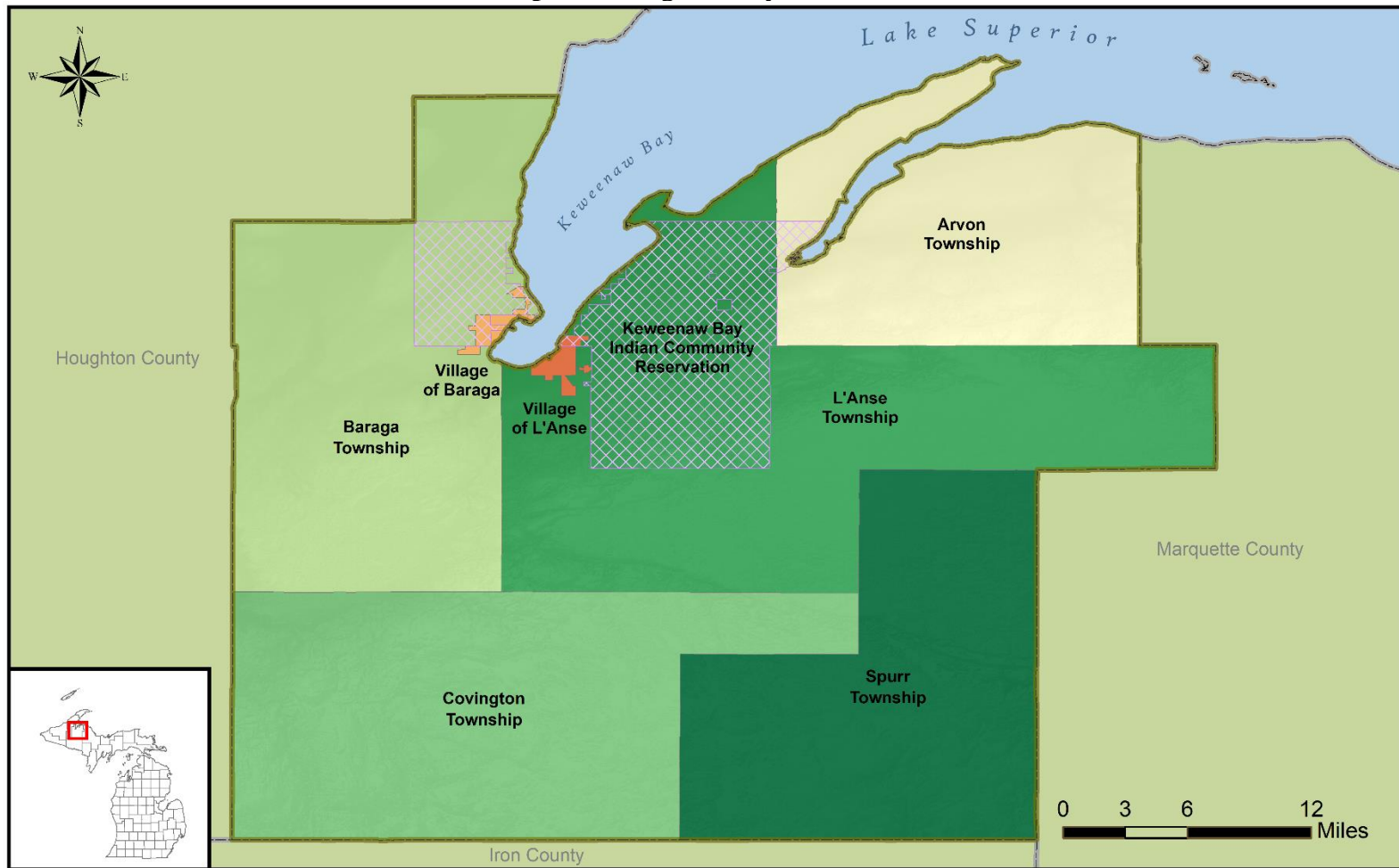
Baraga County is in the northwestern part of Michigan's Upper Peninsula (U.P.) on L'Anse Bay, which is in the lower part of Keweenaw Bay on the Lake Superior shoreline. The county was organized in 1875 and named after Father Frederic Baraga, the Bishop of northern Michigan in 1853. The Village of L'Anse serves as the county seat. **Map 3.1** shows a map of Baraga County with the location of its municipal jurisdictions.

The total area of Baraga County is 901 square miles that consist of lake border plains, highlands, upland plains, and hilly updates. Land elevations vary between 600 and 2000 feet. Mount Arvon, Michigan's highest point at 1,979 feet, is in central L'Anse Township. Nearby Mt. Curwood, which was believed to be the highest peak for years, is about 12 inches shorter. Baraga County also has approximately 65 miles of Great Lakes shoreline along the Keweenaw and Huron Bays despite being not even 40 miles at its widest east to west boundary.

The climate of Baraga County can vary depending on proximity to Lake Superior and varying degrees of "lake effect." Along Keweenaw Bay, the lake makes for less extreme temperatures than many other areas of the county and the Upper Peninsula. In Herman, located inland in L'Anse Township, the coldest month is January, with an average daily minimum temperature of 3.5 degrees. The warmest month is July, with an average daily maximum temperature of 76.0 degrees. Total annual precipitation is 37.24 inches in Herman, with the greatest amount occurring in July and the least in February. The average seasonal snowfall in Herman is 219.6 inches, with the greatest amount occurring in January. At least 5 inches of snow is on the ground 141.2 days a year.

The moderating effect of the lake is experienced in spring and summer months when the cool water tends to level out temperature extremes and reduces the likelihood of frost. Another effect of the lake is the formation of considerable cloudiness when cold air passes over the lake in late fall and early winter. This causes early and heavy snow possibilities, referred to as the "lake effect". Both these effects lessen as one moves away from Lake Superior.

Map 3.1: Baraga County Jurisdictions



Local Units of Government
Baraga County, Michigan

Boundary data was derived from Michigan's Open Data Portal and the Bureau of Indian Affairs; DEM was derived from elevation data available through the USGS; Created by WUPPDR April 2019

Village		Township		American Indian Reservation					
	Baraga		Arvon		Covington		Spurr		Keweenaw Bay Indian Community (KBIC)
	L'Anse		Baraga		L'Anse				



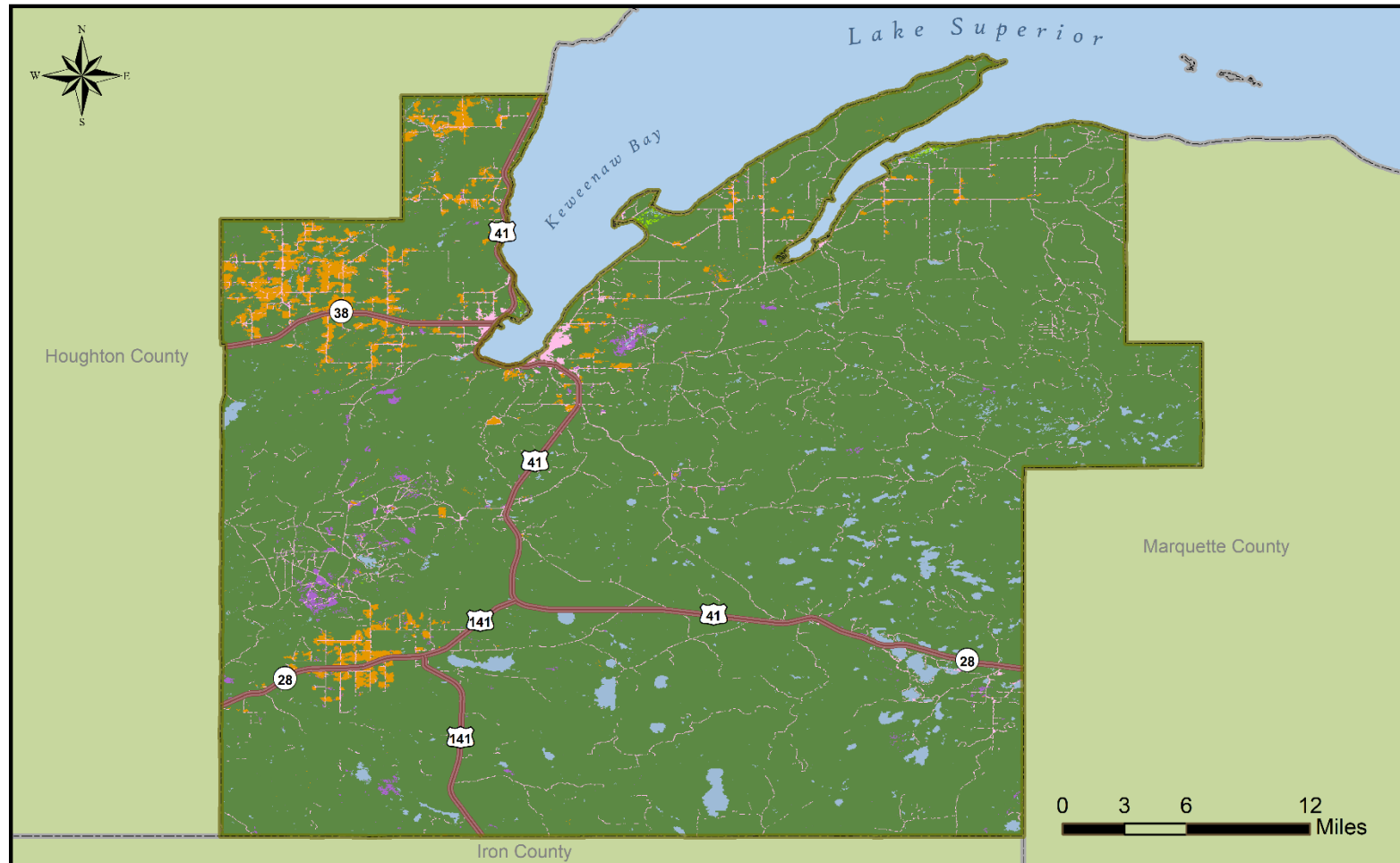
The USDA NRCS Baraga County soil survey reveals that the county has about 127 different kinds of soil. The soils vary widely in texture, natural drainage, slope, and other characteristics. Because of steep slopes, stoniness, and rockiness, many soils are best suited to woodland. The subsoil in most of the moderately well drained soils has a restrictive layer that limits the use of forestry equipment and residential development. About 20 percent of the county is covered in poorly drained mineral soils and very poorly drained organic soils.

Land in Baraga County (**Map 3.2**) is dominated by forests with residential, commercial, and industrial development primarily focused in and around the Villages of Baraga and L'Anse as well as small towns throughout the County. Numerous rural camps, waterfront homes and agricultural areas also dot the landscape. Land use within the County is directed by up-to-date zoning ordinances based on master plans in L'Anse Village and Township. The other townships have older zoning ordinances that were not created under the Michigan Zoning and Planning Enabling Acts of 2006 and 2008, respectively. The Village of Baraga has no zoning in place. The Keweenaw Bay Indian Community directs use of tribal lands within the County.

Over 80 percent of the land in Baraga County is covered with forests, mainly upland hardwood. Half of the timberland is owned by the forest industry, 21% is publicly owned, and 26% is in private hands. The eastern edge of the Ottawa National Forests lies along the western boundary of Baraga County. In addition, about 70,000 acres in the western part of the county are part of the Copper Country State Forest. Over 7,700 acres are in state parks or recreation areas. Baraga State Park, on Highway U.S. 41 a quarter mile south of Baraga, and Craig Lake State Park, near Three Lakes in southeast Baraga County, are popular vacation spots. A segment of the North Country National Scenic Trail runs east-west across the entire county. The rugged McCormick Wilderness covers nearly 17,000 acres and offers seventeen lakes, waterfalls on the Yellow Dog River, northern hardwood and lowland conifer forest, and rocky outcrops.

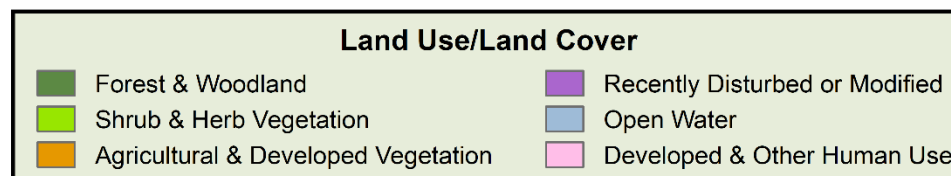
Baraga County has 636 miles of rivers and streams and over 10,000 acres of inland lakes, 38 of which are greater than 50 acres in size. The largest are Ned Lake (816 acres), Prickett Lake (810 acres), Vermilac Lake (622 acres), and King Lake (508 acres). The major rivers in the county are the Sturgeon, Huron, Peshekee, Silver, Net, Falls, Slate, and Ravine Rivers. These rivers are part of larger watersheds, such as the Michigamme River and Brule River watersheds (**Map 3.3**). Most flow northward to Lake Superior. A few in the southern part of the county flow southward to Lake Michigan. Most of the riverbeds are rocky with numerous boulders. Waterfalls are common on rivers in Baraga County. The longest river is the Sturgeon River, which flows over 80 miles within the count. It begins as a small stream in the Peshekee Uplands and leaves the northwestern part of the county as a broad, meandering stream with a wide floodplain in neighboring Houghton County.

Map 3.2: Land Use/Cover in Baraga County

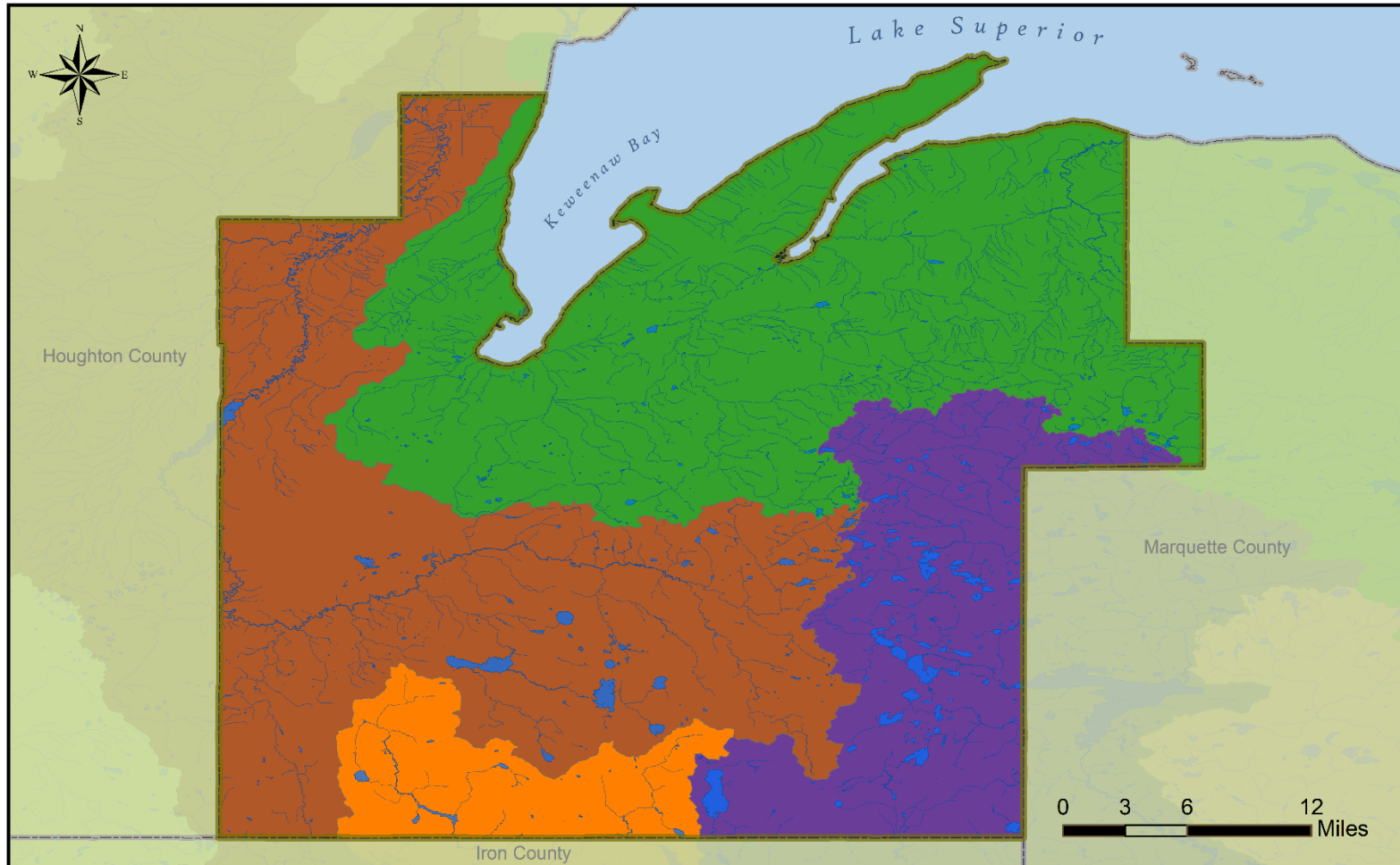


Land Use/Land Cover Baraga County, Michigan

Boundary data was derived from Michigan's Open Data Portal; Land Use/Land Cover data downloaded from the USGS; Created by WUPPDR April 2019



Map 3.3: Watersheds in Baraga County



**Watersheds
Baraga County, Michigan**

Boundary and watershed data was taken from Michigan's Open Data Portal; Created by WUPPDR June 2020

Watershed/Basin	
■ Brule*	■ Michigamme*
■ Dead-Kelsey	■ Sturgeon

*Drains to Lake Michigan
All other watersheds drain to Lake Superior



Population and Demographics

Baraga County is comprised of five townships, and two incorporated villages. In addition, it is home to the Keweenaw Bay Indian Community and L’Anse Reservation which encompasses nearly one-third of Baraga County. The county also has many smaller communities that developed around logging, farming, and transportation centers, including Alberta, Arnheim, Assinins, Aura, Covington, Herman, Pelkie, Pequaming, Skanee, Three Lakes, Watton, and Zeba.

The Villages of Baraga and L’Anse are the county’s population center. From 2012 to 2017, Baraga County’s population decreased by 2.8%, from 8,808 to 8,580. Population distribution is influenced largely by the Keweenaw Bay Indian Community and the Baraga Maximum Correctional Facility, which opened in 1993 with capacity for 616 maximum security and 240 minimum security prisoners. **Table 3.1** summarizes the population changes for municipalities from 1960 to 2017.

Table 3.1: Municipal Populations for Baraga County, 1960-2017

Municipality	U.S. Census (Decennial)					American Community Survey (estimates)		
	1960	1990	2000	2010	1960-2010 Change	2012	2017	2012-2017 Change
Arvon Township	307	422	482	450	46.6%	295	334	13.2%
Baraga Township	2,311	2,832	3,542	3,815	65.1%	4,096	3,719	-9.2%
Covington Township	839	651	569	476	-43.3%	431	526	22.0%
L’Anse Township	3,501	3,818	3,926	3,843	9.8%	3,829	3,748	-2.1%
Spurr Township	193	231	227	276	43.0%	157	253	61.1%
Baraga Village	991	1,231	1,285	2,053	107.2%	2,802	2,575	-8.1%
L’Anse Village	2,397	2,151	2,107	2,011	-16.1%	2,165	2,179	0.6%
L’Anse Reservation*							3,564	
Baraga County	7,151	7,954	8,746	8,860	23.9%	8,808	8,560	-2.8%

*Population only captured for 2014-2018 ACS Estimate¹; Source: U.S. Census and ACS

¹ My Tribal Area. <https://www.census.gov/tribal/>

Since the last hazard mitigation plan update, Baraga Township, Village, and County have all seen a slight decrease in population while Arvon Township, Covington Township, Spurr Township, and L’Anse Village all had population increases.

According to the American Community Survey for 2017, the median age for persons in Baraga County is 43.4 years. Nearly 20% of the county population is comprised of persons that are 65 years old and over. Poverty rates for persons within Baraga County are estimated at 14.4%. People identifying as white constitute 78.0% of the Baraga County, followed by Black, or African Americans making up 16.8%. **Table 3.2** displays the most recent estimates for demographic data on race distribution for Baraga County according to American Community Survey 2017.

Table 3.2: Race and Ethnicity Percentages in Baraga County, 2017²

Race	People	Percent
White	6,307	73.5
Black	1,374	16.0
American Indian/Alaska Native	410	4.8
Asian	42	0.5
Pacific Islander	3	0.04
Other Race	31	0.4
Two or More Races	413	4.8
Total Latinx Population (<i>ethnicity</i>)	128	1.5

Housing and Infrastructure

In 2017, there were 5,278 housing units in Baraga County, a 0.6% increase from 2012. Of these, 3,009 are inhabited, 2,507 are owner occupied (83.3%) and 502 are renter occupied (16.7%). The average household size for the county is 2.2 persons. Median home values in Baraga County in 2017 were \$93,100 for owner-occupied units, a 12.0% increase from 2012.

Schools

Schools are some of the largest institutions in the county and could potentially see great impacts from the hazards discussed in this plan. Baraga County is comprised of three separate school districts, which are all part of the Copper Country Intermediate School District. Baraga Area Schools serves the western half of the county, and L’Anse Area Schools serves the eastern half. The Arvon Township School District operates only an elementary school. Older students in Arvon are transported to the L’Anse and Baraga schools. **Table 3.3** shows the school districts, grade levels, number of students, and number of instructors at each of the schools in Baraga County.

The Keweenaw Bay Indian Community operates the Ojibwa Community College in Baraga, L’Anse, and Pelkie. The College was developed upon the principle that American Indian students deserve an educational system that is responsive to their needs and concerns. Its basic

² Data based on the 2013-2017 American Community Survey 5-year Estimates.

purpose is to provide an educational program in which students experience success and enhance their self-image, dignity, and independence while preparing for their chosen career paths.

Table 3.3: Public Schools in Baraga County, 2018-2019³

School District/School Name	Location	Grades	Students	Instructors
L’Anse Area Schools				
L’Anse Area School	L’Anse	K-12	605	46
Baraga Area Schools				
Philip LaTendresse School	Baraga	K-5	130	9
Baraga Area High School	Baraga	6-12	218	24
Arvon Township School District				
Skanee School	Skanee	K-6	10	2

Public Works

The Baraga County Road Commission is responsible for county roadways but does not plow state and federal highways in winter. The Villages of L’Anse and Baraga have departments of public works for maintenance and development of transportation and other infrastructure within their boundaries. Townships also have staff for maintenance of facilities and utilities. All such agencies are resources for implementation of related mitigation actions.

Water and Wastewater Facilities

Many Baraga County residents live in rural areas that are not serviced by public sewer and/or water. The contamination of individual wells and failure of individual septic systems presents a potential for public health emergencies. Properly locating, constructing, maintaining, and monitoring groundwater wells is critical to the prevention of waterborne illnesses. The Western U.P. Health Department – Environmental Health Division evaluates proposed well locations and issues well construction permits for residential lots and small businesses.

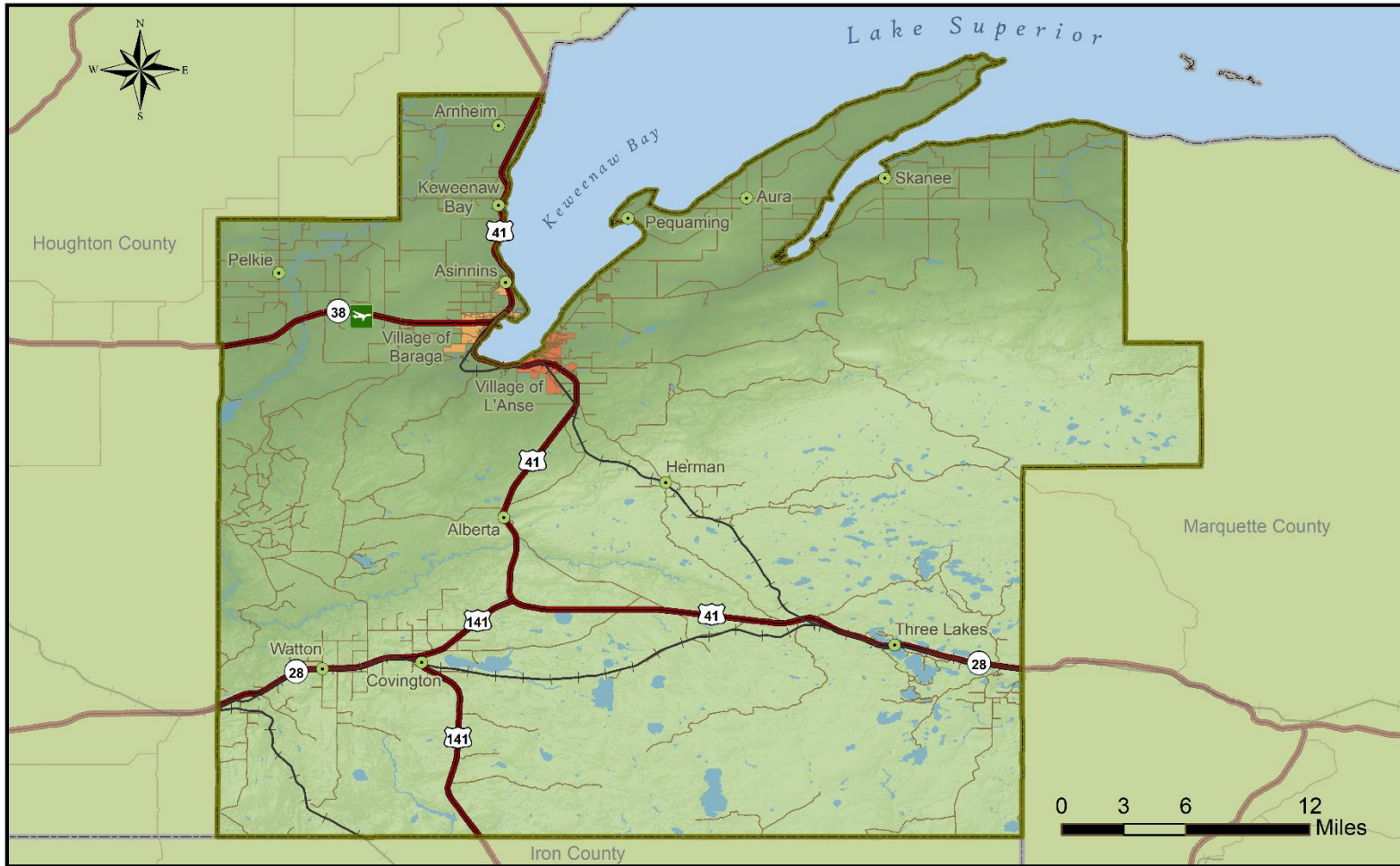
Public water and wastewater facilities in Baraga County are variable across jurisdictions. The source for the Village of L’Anse is Keweenaw Bay. The plant only treats surface water. Water is pumped from the bay to a facility where it is filtered and treated. The Village uses about 200,000 gallons of water per day and sells water to a few customers in L’Anse Township. The plant was established around 1994 by the Village. During the plant operating hours, the plant staff is constantly monitoring the treatment process to assure a supply of safe, potable water.

Roads

Transportation networks are vital to Baraga County – not only for local transportation but for encouraging tourism and service industry. Baraga County is crossed by four major highways, numerous county roads, and many miles of two track roads. (**Map 3.4**) Highway U.S. 41 enters on the eastern edge of Baraga County and travels north to and through the Villages of L’Anse and Baraga into Houghton County. Highway M-28 takes a westerly route from U.S. 41 towards

³ MI School Data. Student Enrollment Counts and Staffing Information. www.mischooldata.org

Map 3.4: Baraga County Transportation



Transportation Baraga County, Michigan

Boundary data was derived from Michigan's Open Data Portal; DEM was derived from elevation data available through the USGS; Created by WUPPDR March 2019



southern Houghton County, and US-141 branches off M-28 in the center of the county, traveling south into Iron County. M-38 leaves the Village of Baraga and heads westerly towards Houghton and Ontonagon Counties. These main highways are all heavily traveled transportation routes. U.S. 41 to M-28 is also a primary route for Canadian traffic through the Upper Peninsula. The remainder of Baraga County is accessed via numerous county and forest roads.

The county also contains many miles of seasonal roads with a number in southern Baraga County being built and maintained by the U.S. Forest Service. Each incorporated community owns and maintains the local street networks within its limits. Highways in Baraga County are maintained by the Michigan Department of Transportation.

Rail

Canadian National (formerly Wisconsin Central) is the only line still providing destination rail service to Baraga County. The railroad enters on the east from Marquette County, and the tracks end at the Village of Baraga. The far southwest corner of the County is crossed by the Lake Superior line on its way to industrial areas of Ontonagon County

Ports

While there is no major port in the county, Baraga county is directly connected to Lake Superior via Keweenaw Bay. Historically in the village of L'Anse the Ford lumber mill brought in lake carriers for product transport; they are at certainty able to accommodate larger ships. However, this is not a registered port. Baraga County hosts private and recreational marinas and docks for small boats and watercraft.

Airports

No commercial airports are located within the boundaries of Baraga County. Prickett-Grooms Field Airport (6Y9) is in Sidnaw, just west of Baraga County in Duncan Township. The airport has a turf runway, offers no services, and is closed during the winter months. It is used for general aviation, commercial flights without scheduled passenger service, and air taxi service.

Houghton County Memorial Airport (CMX), the closest with scheduled passenger service, offers two daily flights to and from Chicago on United Airlines via SkyWest Airlines. This airport is in Hancock about 40 miles north of Baraga and L'Anse. The airport also offers parking; hangars; fuel, airframe, and power service; and flight instruction. Sawyer International Airport, in Marquette County, offers service to Detroit on Delta Airlines and service to Chicago via American Airlines (Envoy). This airport is located approximately 80 miles driving distance southeast of Baraga and L'Anse.

Transit

Indian Trails Inc. is a charter bus company that partners with Greyhound Bus to service Baraga County. Indian Trails offers daily trips with transfers in Escanaba to a regional network of destinations that connect to Amtrak or Greyhound.

Baragaland Senior Citizens Center operates a bus line serving local demand response pickups, long-distance flex route transit, and non-emergency medical appointment transport to senior

citizens and persons with disabilities in the county. Demand-response pickups are provided within Baraga, L’Anse, Aura, Covington and Skanee 8-10 times/month.

Paula’s Taxi services Baraga and L’Anse, with regular rides to Houghton County Airport and any requested destination.

Employment and Industry

In 2017, the median household income for Baraga County was \$42,757 and median worker income was \$26,477⁴. The state unemployment rate for 2017 was 7.4%, and for Baraga County the rate was 6.0%. 14.4% of people in Baraga County are reportedly below the federal poverty level.

According to the 2016 American Community Survey, the top employment industries in the county are healthcare and social assistance, manufacturing, and retail trade. There are four industrial parks in the County, with all the county’s sizable employers concentrated in the villages of Baraga and L’Anse. The Ojibwa Resort & Casino complex and Keweenaw Bay Indian Community are by far the county’s largest employer, with over 510 employees. The opening of the Baraga Maximum Security Correctional Facility in 1993 and currently employs 300 persons, making it the second-largest employer. The CertainTeed Corporation, which manufactures ceiling tiles, is in L’Anse and employs 160 workers.

Health care and educational services account for an additional 400 jobs, at the county hospital, long term care facility and the two school districts. Agriculture, though only a small part of the total economy, is still an important part of the community fabric in the county. Most farms raise cattle and/or produce hay. Aside from the casino, tourists are drawn to Baraga County by the historical sites and natural resources that provide opportunities to hunt, fish, hike, ski and snowmobile. Numerous hotels, restaurants and shops cater to these tourists. **Table 3.4** provides as overview of employment in Baraga County for 2016 by economic sector.

⁴ U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates – Baraga County

Table 3.4: Employment by Sector for Baraga County, 2016

Employment Sector	Percentage
Healthcare & Social Assistance	14.9
Manufacturing	14.0
Retail Trade	12.6
Public Administration	9.1
Educational Services	8.0
Accommodation & Food Service	6.3
Other services, except public administration	5.9
Construction	5.3
Finance & Insurance	4.1
Agriculture, Forestry, Fishing, Hunting	3.8
Real Estate, Rental & Leasing	2.7
Arts, Entertainment, Recreation	2.0
Professional, Scientific, Tech Services	2.6
Transportation & Warehousing	2.1
Utilities	1.6
Information	1.3
Wholesale Trade	1.3
Mining, Quarrying, Oil, Gas Extraction	0.9
Admin Support, Waste Management Services	0.8

Source: ACS

Police, Fire, and Emergency Services

Police, fire, and other emergency agencies are vital community resources not only for emergency response but for implementation of mitigation actions.

Police

Baraga County is serviced by several police organizations, both state and local. Michigan State Police District 8, which covers the entire Upper Peninsula, has headquarters in Marquette County. Eighth District Post 87 is located along U.S. 41 in Calumet and patrols the County's highways.

The Baraga County Sheriff's Department is located on U.S. 41 in L'Anse. The Village of Baraga has its own police department on Hemlock Street, while the Village of L'Anse has its own police department located downtown. Tribal police patrol reservation roads from their headquarters on Beartown Road in Baraga.

The Baraga Maximum Correctional Facility, which opened in 1993, is a multiple level facility for males, with a capacity of 616 maximum security (level V) and 252 minimum-security (level I) prisoners. The prison capacity is 896. The maximum-security prisoners are housed in individual cells within a secured, double fenced perimeter that includes motion detection systems and five-gun towers. The minimum-security prisoners are housed in cubicles for six within a separate fenced perimeter. Perimeter security measures include an interior electronic stun fence,

an electronic and microwave detection system, camera monitoring, and 24-hour patrol vehicle alert response.

Fire

There are seven separate volunteer fire departments that serve Baraga County (**Table 3.5**). Additionally, The Department of Natural Resources has a Field Office in Baraga to provide wildfire management and education about fire prevention to the area.

Table 3.5: Fire Departments in Baraga County

Fire Department	Location	Service Area		Staff*
		Sq. Miles	Population	
Baraga FD	Baraga	85	3,867	17
L’Anse FD	L’Anse	276	4,086	40
Pelkie, VFD	Pelkie	93	2,000	14
Keweenaw Bay FD	Pelkie	50	600	16
Covington Twp FD	Covington	200	450	14
Arvon VFD	Skanee	124	400	22
Aura VFD	L’Anse	86	1,000	10

**Staff includes paid and part-time staff and volunteers.*

Medical

Baraga County Memorial Hospital is a critical access and long-term care hospital, located in L’Anse. The hospital has 15 acute care beds and 9 swing beds. The full medical staff is 11, with 11 physicians on active staff and 26 physicians on courtesy/consulting. The hospital offers surgical services, a 24-hour physician-staffed (on-call) emergency room, laboratory and imaging services, medical rehabilitation, cancer and cardiac services, home care, ophthalmology, orthopedic surgery, and health education. Additionally, it offers family and pediatric services. The clinic also provides retail pharmacy and a conference center.

There are two extended care facilities in the county. Baraga County Home Care & Hospice in L’Anse offers palliative care, home health aides, counseling, medical social services, medical supply, nursing and physician services, occupational and physical therapy, and speech pathology services. The Dr. Louis and Anne Guy Bayside Village was established to provide elderly home care in Baraga County. Bayside Village houses 59 beds, which cover nursing home needs in the county not addressed by the hospital directly. The 9 swing beds available at the Baraga County Memorial Hospital offer skilled nursing care until a nursing home bed opens at Bayside Village.

Ambulance service is provided by Bay Ambulance, Inc. in Baraga and Covington Ambulance. Pelkie and Keweenaw Bay First Responders are also available for emergencies.

Office of Emergency Measures

The Baraga County Office of Emergency Management offers emergency preparedness and disaster education and awareness. From its office at the Sheriff’s Department in L’Anse, the OEM ensures interagency coordination before, during, and after disasters or emergencies, whether it is a small water main break or a catastrophic event.

Siren Coverage

Baraga County has two sirens in the County located in Covington Township and the Village of L'Anse. The sirens are currently used for fire dispatch but not for community warning.

Critical Facilities and Cultural Assets

Even a slight chance of exposure to hazards, such as flooding, is too great a threat to the delivery of services offered by the maintenance and operation of a community's critical facilities. A critical facility provides services and functions essential to a community, especially during and after a disaster. Examples of critical facilities requiring special consideration include:

- Police stations, fire stations, critical vehicle and equipment storage facilities, and emergency operations centers needed for flood response activities before, during, and after a flood
- Medical facilities, including hospitals, nursing homes, blood banks, and health care facilities (including those storing vital medical records) likely to have occupants who may not be sufficiently mobile to avoid injury or death during a flood
- Schools and day care centers, especially if designated as shelters or evacuation centers
- Power generating stations and other public and private utility facilities vital to maintaining or restoring normal services to flooded areas before, during, and after a flood
- Drinking water and wastewater treatment plants
- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials

For a critical facility to function, building systems and equipment must remain operational. Furthermore, it must be supplied with essential utilities (typically power, water, waste disposal, and communications, but occasionally natural gas and steam). The loss of municipal utilities has prevented some critical facilities from functioning during and immediately after major floods, and in some cases, loss of municipal water and waste disposal has prevented facilities from operating for weeks after an event. A list of all critical facilities in Baraga County are in **Table 3.6**.

In addition, this section has been modified to include cultural assets of importance to Baraga County. Understanding and inventorying the important and visited locales of Baraga County provides a more thorough understanding of assets to the community that go beyond basic infrastructure. This section not only highlights tourism potential and important economic development projects for the future, but also shows the community's rich history, culture, and vitality.

Table 3.6: Critical Facilities in Baraga County

Facility Name	Location	Est. Value
Emergency Services		
Arvon Volunteer Fire Department	Skanee	
Aura Volunteer Fire Department	L’Anse	
Baraga Fire Department	Village of Baraga	
Covington Fire Department	Covington	
Keweenaw Bay Fire Department	Pelkie	
L’Anse Fire Department	L’Anse	
Pelkie Volunteer Fire Department	Pelkie	
Baraga Police Department	Village of Baraga	
Baraga Tribal Police	Village of Baraga	
Village of L’Anse Police Department	L’Anse	
Village of L’Anse Sheriff Department	L’Anse	
Michigan State Police	L’Anse	
National Guard	Village of Baraga	
Bay Ambulance	Village of Baraga	
Equipment Storage Facilities		
L’Anse Village Garage	L’Anse	
Medical Facilities		
Baraga County Memorial Hospital	L’Anse	
Bayside Village Nursing Home	L’Anse	
Keweenaw Tribal Medical Center	Village of Baraga	
Baraga County Home Care & Hospice	L’Anse	
Daycare Centers/Schools		
L’Anse High School	L’Anse	
Keweenaw Bay Ojibwa Community College	Village of Baraga	
Sacred Heart School	L’Anse	
School	Village of Baraga	
KBIC Pre-Primary Education Center	Baraga	
KBOCC Daycare Center	L’Anse	
Pelkie School	Pelkie	
L’Anse Child Development Center	L’Anse	
L’Anse Great Explorations & Preschool	L’Anse	
June Forest Child Development Center	Village of Baraga	
Baraga Great Explorations	Village of Baraga	
Waste/Utility/Drinking Water/Wastewater Services		
Baraga Water Plant	Village of Baraga	
Baraga Waste Lagoon	Village of Baraga	
Water Treatment Plant	L’Anse	
Baraga Water Plant	L’Anse	
Zeba Water Tower	Zeba	

KBIC Zeba Pumphouse	Zeba	
Light and Water Office	L’Anse	
Other Notable/Vulnerable Structures		
Pricket Dam	Pelkie	
Ford Dam	Alberta	
KBIC Radio Station Tower	L’Anse	
Green Hill Manor	L’Anse	
Four Seasons Inn	Village of Baraga	
Best Western	Village of Baraga	
KBIC Natural Resource Department	L’Anse	
MTU Forestry	Alberta	
Baraga Ojibwa Casino	Village of Baraga	
Baraga Prison	Village of Baraga	
DNR Office	Village of Baraga	
Baraga Public Works	Village of Baraga	
Michigan Department of Transportation	L’Anse	
Baraga County Road Commission	L’Anse	
MPSCS 800 MHz Tower		
MPSCS 800 MHz Tower		

Cultural Assets

Baraga County has several historic sites that tell the story of the area and provide a variety of recreational and educational opportunities to residents and visitors alike. Many of the sites have been recognized by the State and federal governments, and others are locally recognized historic sites. Some notable historic sites in Baraga County include:

- Ford Historic Sawmill and Museum – Located south of L’Anse on U.S. 41 at Alberta, the town site was built in 1935 to provide lumber for use in the production of Ford autos, but its real purpose, in Henry Ford’s eyes, was to serve as a model for self-sufficient village industries. Today interpretive displays and photos document the operation in its heyday.
- Hanka Homestead – Located 6.5 miles off Highway U.S. 41 in Arnheim, this nationally recognized historic farm was built in 1894 by Finnish immigrant Herman Hanka in the 1880 style of architecture.



Ford Sawmill in Alberta, MI, 1930s (Source: Baraga County Historical Musuem)

- *L'Anse Township Park* – Two miles east of L'Anse on the Skanee Road, this park was originally named after James Oliver Curwood, a prolific writer in the 1920s and 30s. Curwood wrote adventure novels that were inspired while staying in his cabin in the Huron Mountains. The cabin is now located at the park, along with exhibits honoring the lumber trade of the 1900s.
- *Pequaming* – Located north of L'Anse by following Pequaming Road to the end and turning left at Ford Drive, the town of Pequaming was home to Henry Ford's sawmill, which produced wood siding and floorboards for the "woodie." Much of the town is private; however, sites such as Ford's summer home are refurbished and open to guests.
- *Pinery Indian Cemetery* – As far back as anyone can remember, Pinery Indian Cemetery in L'Anse has been a burial ground. Some of the gravestones that are marked date back to the 1840s. It is located one and a half miles east of L'Anse along Indian Cemetery Road. It is sacred land an important part of Ojibwa history.
- *Assinins* – Located 2.5 miles north of the Village of Baraga, Assinins, which means "Little Stone" in Ojibwemowin, is named after the first Chief baptized by Father Baraga. Assinins is located on the L'Anse Reservation of the Keweenaw Bay Indian Community and includes a historic schoolhouse, scenic overlook, hiking trail, and one of the Upper Peninsula's oldest cemeteries.
- *Baraga County Courthouse* – Located on a hill in downtown L'Anse, this 1880 building is refurbished and serves as the County office building. It is on the National Historic Register.
- *L'Anse Township Hall* – Located in downtown L'Anse, the hall dates to the turn of the century and features a pictorial history of people, events, and places throughout Baraga County.
- *Baraga Museum* – Located in Baraga and opened in 1995, this museum houses a unique display of County artifacts. The museum also houses the County birth and death records and the Bishop Baraga Collection.



Baraga County Courthouse in L'Anse, MI, 1940s (Source: Baraga County Historical Museum)

Disaster Declarations

Since 1965, Baraga County has experienced a total of seven presidential disaster declarations, shown in **Table 3.8**. Two new disasters occurred since the completion of the 2013 plan. The county has also experienced additional emergencies and disasters that were not severe enough to require federal disaster relief through a presidential declaration.

Table 3.7: Presidential Disaster Declarations for Baraga County, 1965-2018

Event	Declaration Date	Declaration Number
Drought	March 2, 1977	3035
Blizzards and Snowstorms	January 27, 1978	3057
Severe Freeze	May 10, 1994	1028
Flooding	May 6, 2002	1413
Hurricane Katrina Evacuation*	September 7, 2005	3225
Flooding	June 18, 2013	4121
Severe Storms, Flooding, Landslides, and Mudslides	August 2, 2018	4381

*This declaration applied to all 83 counties in Michigan for Emergency Protective Measures only (to aid in direct relief efforts for Hurricane Katrina evacuees).

Source: Federal Emergency Management Agency

SECTION 4: Hazard Identification

The United States and its communities are vulnerable to a wide array of hazards that threaten life and property. Upon review of the natural hazards suggested under FEMA planning guidance and the State of Michigan’s Hazard Mitigation Plan, Baraga County has identified twenty-five (25) hazards that are addressed in this Plan. Following the State of Michigan’s listed hazards, the 2020 Update features two new hazards (Fog and Invasive Species). The plan has also been reorganized so that the most closely related hazards are located near each other in the same section of the plan. The hazard analysis component of this plan now includes three major divisions that correspond to three major hazard classifications: Natural, Technological, and Human-Related Hazards. Each of these three major sections have been further organized so that readers and responders can more easily find information about hazards that are closely related. The three major hazard divisions and subsections addressed in this plan include:

- **Natural Hazards**

- **Weather Hazards**

- Extreme Temperatures
- Fog
- Hail
- Ice and Sleet Storms
- Lightning
- Severe Winds
- Snowstorms and Blizzards
- Tornadoes

- **Hydrologic Hazards**

- Flood Hazards
 - Dam Failure
 - Riverine and Urban Flooding
 - Shoreline Flooding and Erosion
- Drought

- **Ecological Hazards**

- Invasive Species
- Wildfires

- **Geologic Hazards**

- Earthquakes
- Subsidence (Ground Collapse)

- **Technological Hazards**

- **Industrial Hazards**

- Scrap Tire Fires
- Structural Fires
- Hazardous Materials: Fixed Site Incidents
- Hazardous Materials: Transportation Incidents

44 CFR Requirement

201.6(c)(2)(i): The risk assessment shall include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

- Petroleum and Natural Gas Incidents
- **Infrastructure Hazards**
 - Infrastructure Failure and Secondary Technological Hazards
 - Transportation Accidents
- **Human-Related Hazards**
 - Civil Disturbances
 - Public Health Emergencies
 - Sabotage and Terrorism

Some of these hazards are interrelated (i.e., snowstorms can consist of ice and sleet storms) and some consist of hazardous elements that are not listed separately (i.e., extreme hot temperatures can lead to drought conditions). It should be noted that some hazards, such as snowstorms and blizzards, may impact a large area yet cause little damage, while other hazards, such as a tornado, may impact a small area yet cause extensive damage. **Table 4.1** provides a brief description of the hazards listed above.

Table 4.1: Descriptions of Identified Hazards

Hazard	Description
NATURAL HAZARDS	
WEATHER	
Extreme Temperatures	Prolonged periods of very low or very high temperatures, often exacerbated by conditions such as high humidity with lack of rain or heavy snowfalls with high winds. Extreme cold is classified as any period of low temperatures or wind chill of -35°F or colder. Extreme heat is characterized by a combination of very high temperatures and humid conditions. Temperatures and the heat index values meet or exceed 90°F.
Fog	Condensed water vapor in cloudlike masses lying close to the ground and limiting visibility. Fog itself is not a hazard, but it is the interaction between humans and fog that can be a dangerous situation. However, freezing fog can cause direct harm by causing slickness on roadways and serious transportation accidents.
Hail	Hail is a type of precipitation that is formed when updrafts in thunderstorms carry raindrops upwards to parts of the atmosphere where temperatures are below freezing. The water freezes and can form ice pellets that can range from pea sized to as large as grapefruits.
Ice and Sleet Storms	Ice storms (freezing rain) are the result of cold rain that freezes upon contact with a cold surface and results in accumulation of at least 0.25” of ice on exposed surfaces. Sleet is small ice pellets that fall from the sky and bounce when hitting the ground or other surfaces.

Lightning	The random and unpredictable discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm. It creates a “bolt” when charge buildup is strong enough.
Severe Winds	Sustained non-tornadic, forceful winds of 58-mph or greater for any duration of time. Includes thunderstorm winds which can cause similar damage as high winds. Also known as straight line winds.
Snowstorms and Blizzards	A snowstorm is a period of rapid accumulating snow accompanied by high winds, low visibility, and cold temperatures. This includes lake-effect and heavy snowfall. It can also consist of a “wintry mix” of snow, sleet, ice, and freezing rain. Blizzards are the most dangerous of all winter storms. It combines low temperatures and heavy snow with winds of at least 35-mph. This reduces visibility to only a few yards.
Tornadoes	A tornado is a violently rotating column of air that extends from the base of a thunderstorm and has contact with the ground. It is hard to see unless it forms a condensation funnel made up of water droplets, dust, and debris. The funnel may have winds that range from 40 to 300-mph and interior air pressure that is 10 to 20 percent below that of the surrounding atmosphere.
GEOLOGIC	
Earthquakes	Shaking or trembling of the Earth’s crust caused by the breaking and shifting of rock beneath the surface. Also caused by an abrupt release of slowly accumulating strain resulting in ground shaking, surface faulting or ground failures.
Subsidence (Ground Collapse)	Ground settling or sudden sinking due to subsurface movement of earth materials. Depressions, cracks, and sinkholes in the ground surface that can threaten people and property. The greatest risk of subsidence in Michigan is associated with underground mining or improper stabilization of mine openings.
HYDROLOGIC	
Dam Failure	The collapse, breach, or other failure of a dam structure resulting in downstream flooding. Dam failure can result in severe property damage and loss of life.
Riverine and Urban Flooding	Overflowing of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt, or ice. Floodplains, the lands that are adjacent to rivers, streams, and lakes, are becoming more highly developed, increasing the potential for serious flooding. Urban flooding is due to the combination of excessive rainfall and/or snowmelt, saturated ground, and inadequate drainage. It usually

	involves low-lying areas that collect runoff waters even though they are not adjacent to drains or bodies of water.
Shoreline Flooding and Erosion	While shoreline flooding and erosion are natural processes along Lake Superior, during periods of high water, flooding and erosion are more frequent. Strong, onshore winds can also cause shoreline flooding and erosion due to vertical rise of water above normal level and increased wave action.
Drought	A drought occurs when there has been a prolonged period of well-below average precipitation. Common effects of drought include crop failure, water supply shortages, and fish/wildlife mortality. Drought conditions can be worsened by high temperature, winds, and low humidity.
ECOLOGICAL	
Invasive Species	A species that has been introduced by human action to a location where it did not previously occur natural. It can establish a breeding population in its new location without further intervention by humans and becomes a pest by threatening local biodiversity. It can also cause human health impacts, significant economic costs, and/or harmful ecological effects. Species can include animals, plants, and other organisms (e.g., microbes).
Wildfires	An uncontrolled fire in grass, brush, or forested areas.
TECHNOLOGICAL HAZARDS	
INDUSTRIAL	
Scrap Tire Fires	A large, uncontrolled fire that burns scrap tires that are being stored for recycling or reuse.
Structural Fires	Any instance of uncontrolled burning resulting in structural damage to residential, commercial, industrial, institutional, or other properties in developed areas.
Hazardous Materials: Fixed Site Incidents	An uncontrolled release of hazardous materials from a stationary location that can pose a risk to health, safety, property, and the environment. This is a particular risk for locations that store or have higher quantities of hazardous materials. This includes industrial businesses, agriculture, universities, and hospitals.
Hazardous Materials: Transportation Incidents	An uncontrolled release of hazardous materials during transport that can pose a risk to health, safety, property, or the environment. Hazardous materials are transported over highway, railway, seaway, airway, and pipeline systems.
Petroleum and Natural Gas Incidents	The uncontrolled release of petroleum, natural gas, or hydrogen sulfide, a poisonous by-product.

INFRASTRUCTURE	
Infrastructure Failure and Secondary Technological Hazards	Infrastructure failure is a failure of critical public or private transportation or utility infrastructure resulting in temporary loss of essential functions and/or services. This includes electric power, water, storm drainage, communications and transportation. If infrastructure failure results from a natural hazards event, it is termed a secondary or cascading technological hazard .
Transportation Accidents	A crash or accident involving air, land, or water-based commercial passenger carrier resulting in death or serious injuries.
HUMAN-RELATED HAZARDS	
Civil Disturbances	A public demonstration or gathering, or an uprising in a prison or other institution that results in some disruption of essential community function. Includes rioting, looting, arson, or other unlawful behavior. May be the result of labor disputes, controversial judicial proceedings, resource shortages, or perceived unjust injury or death of a person held in high regard.
Public Health Emergencies	A situation that presents a danger or negatively impacts the general health and wellbeing of the public. Examples include disease epidemics, water contamination, harmful exposure to chemical, radiological, or biological agents, or infestation of disease carrying insects or rodents. May also be considered a secondary event caused by other emergencies (e.g., floods).
Sabotage and Terrorism	An intentional, unlawful use of force or violence against persons or property to intimidate or coerce the government, civilian population, or any segment for political, social, or religious objectives.

Data sources:

Michigan Hazard Mitigation Plan, Emergency Management and Homeland Security Division, Michigan Department of State Police: www.michigan.gov/documents/msp/MHMP_480451_7.pdf

National Climatic Data Center (NCDC), U.S. Department of Commerce, National Oceanic and Atmospheric Administration: www.ncdc.noaa.gov

National Centers for Environmental Information Storm Events Database, U.S. Department of Commerce, National Oceanic and Atmospheric Administration: www.ncdc.noaa.gov/stormevents

National Weather Service (NWS), U.S. Department of Commerce, National Oceanic and Atmospheric Administration: www.nws.noaa.gov

Storms Events Database, National Centers for Environmental Information (NCEI), U.S. Department of Commerce, National Oceanic and Atmospheric Administration: www.ncdc.noaa.gov/stormevents

SECTION 5: Hazard Analysis

This section of the Plan describes the hazards identified by Baraga County to pose a threat to people and the property located within the county and its participating jurisdictions. Further, an assessment of risk has been developed which includes hazard descriptions and background, climate change considerations, notable historical occurrences⁵, and the probability of occurrences for each hazard. Information has also been included regarding local jurisdictions or critical facilities where the hazard vulnerability is higher than that of the county. Readily available online information from reputable sources, such as Federal and State agencies, were also evaluated to supplement information from these key sources. Once the hazards have been analyzed, conclusions on hazard risk are presented. This includes the extent of each hazard as it pertains to Baraga County and the priority risk index formula which assigns a risk level to each hazard in the county. The hazards listed in Section 4 were identified and analyzed.

Study Area

To a large extent, historical records are used to identify the level of risk within the planning area – with the methodological assumption that the data sources cited are reliable and accurate. This section also provides a series of maps that illustrate the location and spatial extent for those hazards within Baraga County and its participating jurisdictions that have a recognizable geographic boundary (i.e., hazards that are known to occur in certain areas of Baraga County, such as the 100- and 500-year floodplains, shoreline erosion areas, etc.). For those hazards not confined to a specific geographic area, such as thunderstorms and tornadoes, general information on the applicable intensity of these events across the entire planning area is provided.

Natural Hazards: Weather Hazards

The following outline summarizes the significant weather hazards covered in this section:

1. Extreme Temperatures
2. Fog
3. Hail
4. Ice and Sleet Storms
5. Lightning
6. Severe Winds
7. Snowstorms and Blizzards
8. Tornadoes

Weather hazards are perhaps the single greatest natural hazard anywhere in the world due to climate change. Climate change is a significant variation in either the mean state of climate or in its variability, persisting for an extended period. Most authorities predict rising temperatures in

⁵ Historical occurrences for hazards were sourced from NOAA's Storm Events Database, unless indicated otherwise.

all areas, with warm temperatures coming from the equator and pushing various flora and fauna further north. Along with these temperatures come overall changing weather patterns, causing events such as more frequent and severe winters that fluctuate towards either extreme, warm with light snowfall or cold with heavy snowfall.

In Baraga County, weather hazards already vary greatly by season and from year to year. In winter, Baraga County has a reputation for heavy and frequent snowfalls, especially throughout interior parts of the county. Residents are acclimated to severe winter weather.

However, transportation is a hazard and is discouraged during severe winter weather events. Collapsing roofs are also a significant risk of primary winter hazards, being mostly dependent on the age of buildings and building codes. During the spring and summer months, thunderstorms, hail, high winds, and extreme temperatures are more variable and less location dependent. Due to the variability and inability to control these types of storm events response plans can be the best mitigation.



Baraga County fairground roof partially collapsed due to heavy snowfall in March 2019 (Source: Megan O'Connor, Upper Michigan Source)

For the weather hazards and, particularly, in Baraga County, it may make sense to think in terms of two parts of the year: winter and non-winter. A general distinction can be made between the “winter weather risk season” and the “non-winter weather risk season.” The winter weather risk season is defined in terms of historically documented events involving extreme cold and significant snowstorms.

Extreme Temperatures

Hazard Description

Temperature extremes are broken down into two categories: extreme heat or extreme cold. In both instances there are extended periods of either abnormally low or high temperatures worsened by conditions such as high humidity with lack of rain or heavy snowfalls with high winds. Both extremes can last for weeks without any advance warning and in the middle of a seemingly normal weather pattern. Extreme heat and extreme cold can cause loss of life to vulnerable population (e.g., elderly, young children, low to moderate income households, and those in poor health), damage to infrastructure, and disruptions to schools and businesses.

Extreme heat or a “heat wave” occurs mainly during late May to early September in the Upper Peninsula and is marked by temperatures above 90°F. Individuals working outdoors, the elderly, and children need to be accounted for during oppressively hot conditions. Extreme hot temperatures also put a strain on the energy demands for an area, as air conditioning becomes a

necessity for vulnerable populations. The National Weather Service (NWS) devised the Heat Index as a mechanism to better inform the public of heat dangers, The Heat Index Chart, shown in **Figure 5.1**, uses air temperature and humidity to determine the heat index or apparent temperature. The major threats of extreme heat are heat exhaustion and heatstroke (a major medical emergency). **Table 5.1** shows the dangers associated with different heat index temperatures.

Figure 5.1: NOAA’s National Weather Service Heat Index Chart

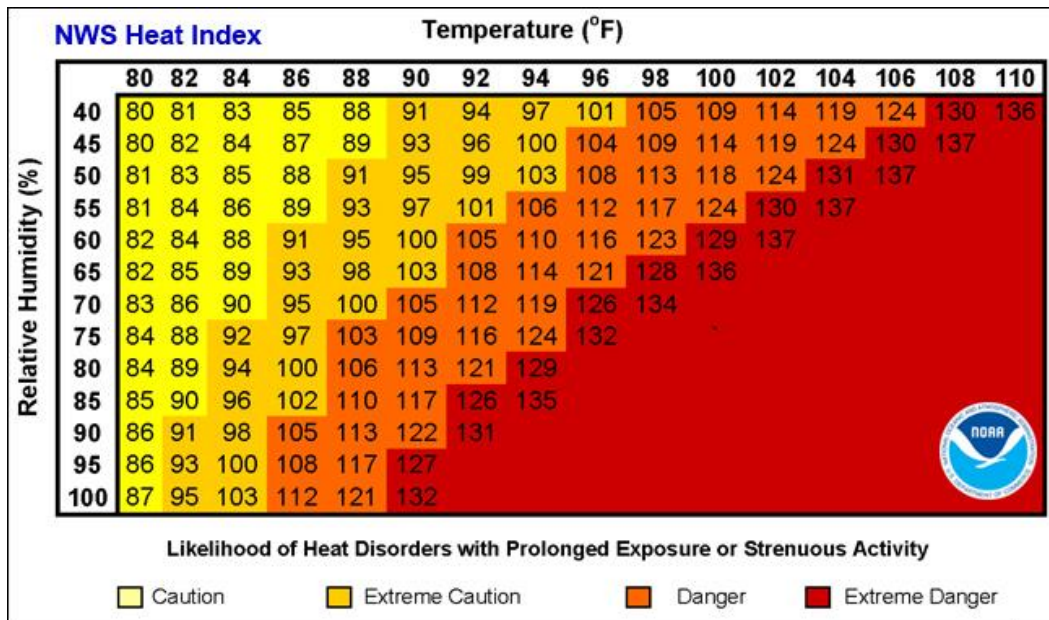


Table 5.1: Heat Index and Related Heat Disorders

Heat Index (°F)	Possible Heat Disorders
80°F - 90°F	Possible fatigue with prolonged exposure and/or physical activity
90°F - 105°F	Heat exhaustion, heat cramps, and heat stroke possible with prolonged exposure and/or physical activity
105°F -130°F	Heat exhaustion and heat cramps likely; heat strong possible with prolonged exposure and/or physical activity.
130°F or higher	Heat stroke exceedingly likely with continued exposure

Source: NOAA – National Weather Service

Extreme cold is primarily associated with the wintery months of October through May in the Upper Peninsula and categorized by temperatures plunging near or below 0°F. Period of extreme cold are risky for those in both rural and urban areas. An extreme cold event to the NWS can refer to a single day of extreme or record-breaking day of sub-zero temperatures. Extended or single day extreme cold temperatures can be hazardous to people and animals, and cause problems with buildings and transportation. **Table 5.2** lists the threats associated with extreme

cold, such as hypothermia, which is a medical emergency and is a concern for individuals living in inadequately heated apartments or rooms. Loss of life can occur with this situation. Damage to buildings and pipelines can also occur in the bitter cold conditions, resulting in expensive repairs and potential days of business and school shutdowns.

Table 5.2: Cold Disorders Associated with Extreme Cold Temperatures

Cold Hazard	Definition
Wind Chill	Temperature based upon how wind and cold feel on exposed skin. As wind increases, it draws heat from the body, which drives down skin temperature and internal body temperature. Animals are also affected by wind chill.
Frostbite	Damage to body tissue when exposed to cold temperatures for a long period of time. A wind chill of -20°F will cause frostbite in 30 minutes. Frostbite is most susceptible to fingers, toes, ear lobes, and the tip of the nose. Signs of frostbite include loss of feeling and a white or pale appearance.
Hypothermia	A condition that occurs when body temperature falls below 95°F and, if not properly treated, can result in death. Warning signs include uncontrollable shivering, memory loss, disorientation, slurred speech, drowsiness, and exhaustion. Most commonly occurs in very cold temperatures, but it can also occur at cool temperatures (above 40°F) if an individual is not properly clothed.

Climate Change Considerations

Certain indicators of climate change in Michigan and Baraga County have already been observed. In Michigan, new heat records outnumbered new cold records by 3 to 1 during the 1990s and 6 to 1 in the 2000s. Extreme heat problems are expected to increase in the future. Although Michigan’s winter season has been shortening, there have been lessened differences in temperature between polar and temperate regions (due to warming of the arctic and polar regions) can make it easier for a polar weather front to swing southward across the United States. Instances of persistently cold temperatures, ice storms, freezing rain, and heavy snowstorms are affecting the state with increasing rapidity. Historical facts show that Michigan has experienced colder temperatures in the past, but one of the new patterns connected with climate change involves lesser amount of time for persons to become acclimated to the cold weather. Increasingly mild fall months from October to early December will suddenly give way to bitter cold, winds, ice, and snow, with the shorter winter season providing less time for people to adjust to the frigid weather.

Historical Occurrences

Extreme temperatures typically cover a large area and cannot be confined to any geographic or political boundaries. All areas of Michigan are subject to extreme temperatures. Baraga County’s inland locations can experience high temperatures and severe cold temperatures. Monetary damages are generally minimal, though schools are often closed during these events.

From 1996 to 2019, four extreme cold events were reported in Baraga County. There were zero incidences of extreme heat. The highest temperature on record was 99°F during the month of July. For all events, Baraga County incurred no recorded damages.

Occurrence Probability and County Vulnerability

The probability of an extreme temperature event is moderate as it can occur anytime during the year. Based off reported events from 1996 to 2019, the likelihood of an extreme cold event is every 5.75 years. There have been no reported incidences of extreme heat, making the likelihood 0. While there is a likelihood that these events may occur any given time during the year, severity is low countywide as resident behaviors are effective in limiting damage to life and property.

All Baraga County communities are vulnerable to both extreme heat and cold events. Vulnerability to extreme heat primarily impacts the elderly and persons with pre-existing health problems who live in housing with inadequate ventilation or cooling systems. Extreme heat can also have impact on demand on electric utilities and may cause power outages to critical facilities. Critical facilities vulnerable to extreme cold include drinking water services such as the L'Anse Water Treatment Plant. If water mains were to break, such facilities would be unable to provide water to residents.

Fog

Hazard Description

Fog forms near the ground when water vapor condenses into tiny liquid droplets that remain suspended in the air. Many different processes can lead to the formation of fog, but the main factor is saturated air. Two ways that air can become saturated are by cooling it to its dew point temperature or by evaporating moisture into it to increase its water vapor content. Fog can form quickly, in a matter of minutes or hours. Fog itself is not a hazard because it does not actually apply destructive forces, but the interaction between humans and fog can be a dangerous situation, sometimes resulting in disastrous consequences. However, **freezing fog** (a hazard that the National Weather Service does issue special statements) can cause direct harm by causing slickness on roadways and thus leading to serious transportation accidents.

Fog has played a contributing role in several multi-vehicle accidents over the past several years. It can be very dangerous because it reduces visibility. Although some forms of transport can penetrate fog using radar, road vehicles must travel slowly and use more lights. Localized fog is especially dangerous because it catches drivers by surprise. Increase in lakeshore development can result in an increase in the number of miles driven through fog, thereby increasing travel-related risks related to fog.

Historical Occurrences

Five dense fog events occurred in Baraga County from 1955-2018. Of those, three were from 2008-2018. There were no reported incidences of freezing fog. While no property damages or

injuries were reported as a result from these events, the low visibility was attributed to longer commute times in the area.

Occurrence Probability and County Vulnerability

While only five dense fog events were reported, fog is a common occurrence in Baraga County. It does typically dissipate by mid-morning. There is an assumption that the county is uniformly exposed to fog hazards. Only when fog and humans interact on transportation corridors, people and facilities become vulnerable to fog. Within the last 15 years there have been five fog events, making the likelihood of occurrence to be 3 per year.

Hail

Hazard Description

Hail is produced by thunderstorms when strong updrafts among the clouds carry water droplets above the freezing level and cause the formation of ice pellets around some nucleus, such as a water crystal or a speck of dust. Frozen droplets gradually accumulate on the ice crystals until having developed enough weight and they fall in the form of a ball or irregularly shaped ice masses greater than 0.75 inches in diameter. They are typically accompanied by heavy rains. Falling hailstones batter crops, home roofs, dent autos, and injure wildlife and people. Approximately \$1 billion in damages occur annually across the United States. In Michigan, there is usually at least one intense hailstorm per year that causes significant damages. Unfortunately, for many hailstorms, the total property damages go unreported.

As a product of strong thunderstorms, the size of hail is usually proportional to the intensity of the storm cell that generates it. As a thunderstorm passes over, hail usually falls near the center of the storm, along with the heaviest rain. Sometimes, strong winds occurring at high altitudes in the thunderstorm can blow the hailstones away from the storm center, causing an unexpected hazard at places that otherwise might not appear threatened. Whether in predictable locations or not, instances of hail can be very localized – to an area as small as a few city blocks.

Hail reported in Michigan range in size from a pea ($\frac{1}{4}$ " diameter) to a golf ball ($1\frac{3}{4}$ " diameter), but hailstones larger than baseball ($2\frac{3}{4}$ " diameter) have occurred with the most severe thunderstorms. **Table 5.3** provides official classifications of hail magnitude as often used in weather reporting and event records.

Table 5.3: Hail Size Reference

Descriptive Size of Hail	Size in Diameter (inches)	Descriptive Size of Hail	Size in Diameter (inches)
Pea	¼”	Golf ball	1 ¾”
Marble or mothball	½”	Hen’s egg	2”
Penny or Dime	¾”	Tennis ball	2 ½”
Nickel	0.9”	Baseball	2 ¾”
Quarter	1”	Teacup	3”
Half-dollar	1 ¼”	Softball	4”
Walnut/Ping-pong ball	1 ½”		

Climate Change Consideration

Climate change increases the occurrence of the more extreme and severe thunderstorms that often accompany hailstorms.⁶ This means that, although North America may experience fewer rainstorms overall, the storms that do occur are those that are more likely to come with larger hailstones that can be dangerous and damaging to plants, animals, crops, and property.⁷

Historical Occurrences

A hail event may occur anywhere throughout the county and is not confined to any geographic boundaries. Often accompanying thunderstorms, these events are typically widespread. **Table 5.4** provides an overview of hail events in Baraga County from 1955-2018. From 2008-2018, 11 events were recorded. The most significant hailstorm in Baraga County occurred on August 2, 1982 where severe thunderstorms produced hail up to 2.50 inches and damaging winds.

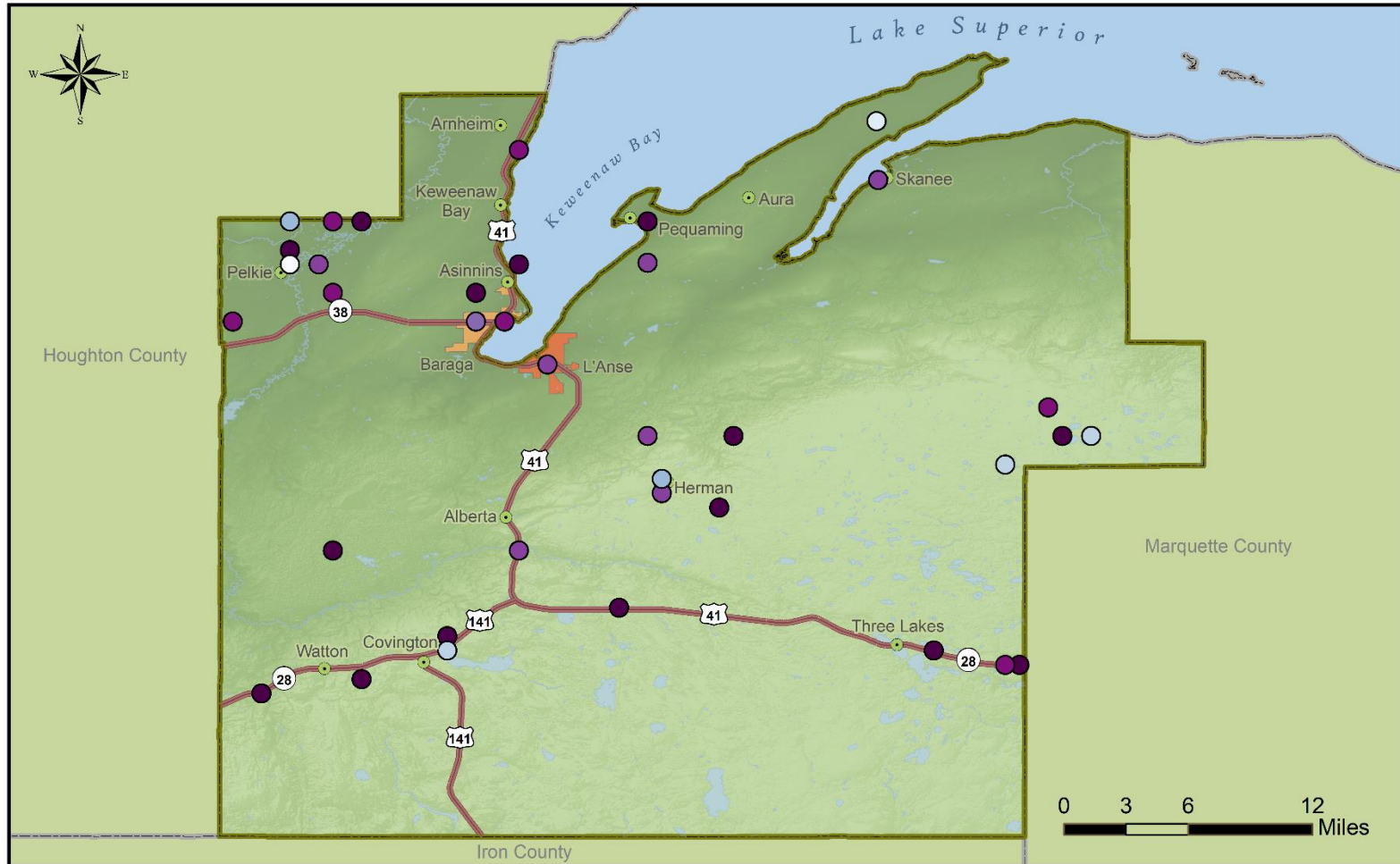
Table 5.4: Reported Hail Events by Size in Baraga County, 1955-2018

Hail Size Reported	Number of Events
¾”	20
0.9”	7
1”	11
1 ¼”	1
1 ½”	2
1 ¾”	3
2”	1
2 ½”	1
TOTAL	46

⁶ Brimelow, J. C., Burrows, W. R., & Hanesiak, J. M. (2017). The changing hail threat over North America in response to anthropogenic climate change. *Nature Climate Change*, 7(7), 516-522.

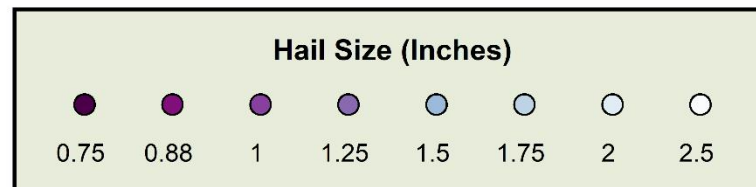
⁷ Botzen, W. J. W., Bouwer, L. M., & Van den Bergh, J. C. J. M. (2010). Climate change and hailstorm damage: Empirical evidence and implications for agriculture and insurance. *Resource and Energy Economics*, 32(3), 341-362.

Map 5.1: Hail Events in Baraga County, 1955-2018



**Recorded Hail Events 1955-2018
Baraga County, Michigan**

Boundary data was derived from Michigan's Open Data Portal;
DEM was derived from elevation data available through the USGS;
Weather event data was downloaded from the National Weather Service
GIS Portal <https://www.weather.gov/gis/>
Created by WUPPDR May 2019



Occurrence Probability and County Vulnerability

The frequency of a hail event is approximately 1.1 events per year looking at reports since 2008. Thus, probability of a hail event is likely, but the severity of damages due to a hailstorm is low to moderate. There are no known areas within the county that have an unusual risk from hail, but some communities may have structures that are more vulnerable to hair damage than others. Damage to homes and buildings, such as broken windows, dented roofs, and damaged siding, is frequently reported; critical facilities in all jurisdictions are vulnerable to receive similar damage from hail. However, hail should not negatively impact the services a facility provides.

Ice and Sleet Storms

Hazard Description

Severe winter weather hazards can include ice and sleet storms. Although these two types of winter storms have been combined, ice and sleet storms are two different phenomena. Ice storms, also known as freezing rain, coat roads, trees, power lines, and buildings with thick, heavy, and slick surfaces. Ice storms are sometimes incorrectly referred to as sleet storms. Sleet is small frozen raindrops or ice pellets that bounce when hitting the ground or other objects. Sleet is less dangerous than ice storms as it does not stick to trees and wires but can still cause hazardous driving conditions if there is sleet of sufficient depth.

Ice storms are the result of cold rain that freezes on contact with a surface, coating the ground, trees, overhead wires, and other exposed objects with ice, sometimes causing extensive damage. When electric lines are downed due to ice, power may be out for several days. Massive traffic accidents and power outages from downed tree limbs and utility lines are common when an ice storm occurs. Often, ice storms are accompanied by snowfall, in which the ice is camouflaged and covered up by snow, creating treacherous transportation conditions. Both storms occur when the temperature is close to 32°F but are far more severe when the temperature is in the 20s.

Climate Change Considerations

Climate change seems likely to cause an increase in the number of ice and sleet storm events. Average temperatures in and around the winter months are closer to the freezing point and at the temperature at which ice and sleet events typically occur. Instead of winter arriving and precipitation turning into snow, Michigan winters have involved many thawing episodes followed by refreezing which cause treacherous ice cover on frozen surfaces, weigh down cables and tree branches, and cause infrastructure failures. Even though Michigan winters have been shortening a bit over time, winters remain hazardous because the increasing level of precipitation more often takes the form of major snow event and provides more moisture for refreezing after the warmer thawing periods occur.

Historical Occurrence

Ice storms usually have a regional effect and groups of counties are usually affected instead of just one county when they occur. In Baraga County, three ice storms and one sleet storm were recorded from 1996-2018. They are listed in **Table 5.5**, including estimated property damages.

Table 5.5: Reported Ice and Sleet Storms in Baraga County, 1996-2018

Date	Type of Storm	Description and Location	Property Damages
12/18/2002	Ice Storm	Ice accumulations around a quarter to half inch thick on road surfaces as well as cars and trees. Many schools were closed, and minor traffic accidents were reported due to slick roads.	No reported damages
12/30/2004	Ice Storm	Quarter inch or more of ice on roadways with numerous minor accidents reported by law enforcement officials.	No reported damages
01/01/2005 to 01/02/2005	Ice & Sleet Storm	Significant ice accumulation reported overnight of a quarter inch or more; Sleet accumulation of a half inch to an inch created hazardous travel on area roadways with few minor accidents reported by law enforcement.	No reported damages

Occurrence Probability and County Vulnerability

Only three ice storms were reported in the past 20 years (2000-2019). With a frequency of 0.15 events per year, the probability of an ice storm in Baraga County is low. However, due to their infrequency, these events can be damaging as people are typically unprepared. Facilities with large concentrations of employees, such as local schools and the hospital, are more vulnerable during an ice or sleet storm due to temporary closures. Heavy volumes of employee traffic in and out of a facility may contribute to transportation mishaps on area roadways. Transportation and electric infrastructure are also vulnerable to ice storms, causing icy roadways or potential for power and communication outages.

Lightning

Hazard Description

The discharge of electricity from a thunderstorm is called lightning. It is a random and unpredictable product of a thunderstorm’s energy. Lightning strikes when a thunderstorm’s electric potential (the difference between its positive and negative charges) becomes great enough to overcome the resistance of the surrounding air. In the United States, approximately 100,000 thunderstorms occur each year and each of those storms generates lightning. It is not uncommon for a single thunderstorm to produced hundreds or even thousands of lightning strikes.

Lightning is often perceived as a minor hazard, but it damages many structures and kills and injures more people in the United States each year, on average, than tornadoes and hurricanes. From 2005-2014, Michigan ranked seventh in the nation in lightning fatalities⁸. Because it is virtually impossible to provide complete protection to individuals and structures from lightning, this hazard will continue to be a problem for Michigan's residents and communities. However, lightning deaths, injuries, and property damage can be reduced through a combination of public education, human vigilance, technology, proper building safety provisions, and simple common sense.

Historical Occurrence

There have been no damaging lightning events reported in Baraga County. Lightning of a lower level, or non-damaging strikes, may have occurred, but these events usually do not have any recordable damage and thus are not reported.

Occurrence Probability and County Vulnerability

Although the likelihood of the lightning event causing damage to human life or property is negligible, when a damaging event does occur its severity is extreme at the discharge site. Most injuries and deaths due to lightning strikes occur on open fields and under trees. Park and recreation areas in Baraga County contain most of these hazard-prone features and may contribute to or intensify the effects of lightning. Each municipality in the county has an equal vulnerability to lightning strikes as there is really no way to pinpoint exactly where, when, and to what extent lightning will cause damage. Critical facilities in the county are protected by lightning strikes through grounding and other protective measures. However, electrical substations, transformers, and power lines are still vulnerable to lightning strikes. A more specialized study will need to be done to determine what facilities in the county are a higher risk and might need greater protection.

Severe Winds

Hazard Description

Severe wind, or straight-line winds, sometimes occurs during severe thunderstorms and other weather systems and can be very damaging to communities. Severe winds with velocities over 58 mph may be confused with tornado occurrence. Locally, lesser events termed high winds and thunderstorm winds can cause similar damage as severe winds. Severe winds can cause damage to homes and businesses, power lines, trees, and agricultural crops. Power outages can result in a need to shelter persons left without power for extended times.

These wind events also have the potential to cause loss of life from breaking and falling trees, property damage, and flying debris, but tend not to cause as many deaths as tornadoes do. However, property damage from straight line winds can be more widespread than tornadoes,

⁸ "Lightning Deaths the Last 10 years, Mapped," The Weather Channel, July 22, 2015, <https://weather.com/storms/severe/news/lightning-deaths-by-state-2005-2014>.

usually affecting multiple counties at a time. Along the Great Lakes shoreline, high winds of lower magnitude occur regularly, as do hurricane-velocity gusts (over 74 miles per hour).

Microbursts are localized but powerful wind gusts that typically occur from a single storm. Microbursts result in what is often referred to as straight-line wind damage and usually result in damage like a brief, weak tornado. Derechos are usually large-scale storm systems that travel hundreds of miles and are many miles long. Damages from derechos can stretch statewide and often exceeds 250 miles in length. Derechos are most common in Michigan during the warmer half of the year. Wind speeds in derechos can exceed 100 mph at times. In the Upper Peninsula, a derecho can be expected once every 4 years.

Historical Occurrence

Historically in Baraga County, windstorms are rarely a singular event. They usually accompany other severe weather – particularly thunderstorms and occasional blizzards. The highest wind gust recorded in Baraga County from 1955 to 2018 was 70 knots or 80.5 miles per hour. This was recorded on July 28, 2006 near Covington where large tree limbs fell, and trees were uprooted along a 20-mile damage path. Downed trees and power lines were reported throughout the region as well as other property damage totaling an estimated \$50,000.

From 1955-2018, 69 severe wind events were reported in Baraga County (**Map 5.2**). **Table 5.6** summarizes the total property and crop damages that these events caused.

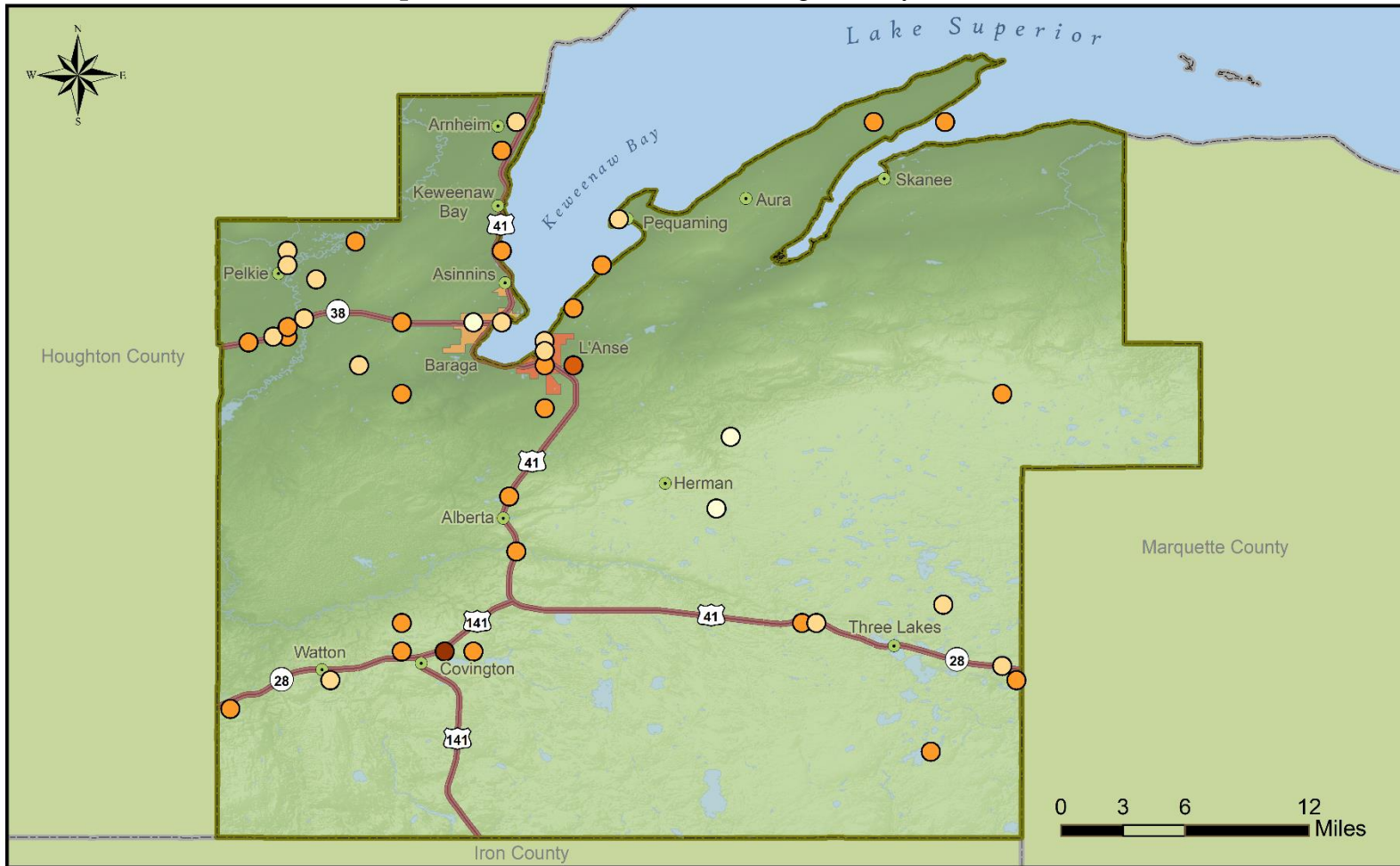
Table 5.6: Severe Wind Event Totals in Baraga County, 1955-2018.

Number of Events	Total Property Damage	Total Crop Damage	Injuries	Deaths
69	\$488,500	0	0	0

Other severe wind events that caused significant property damage in the past 10 years include:

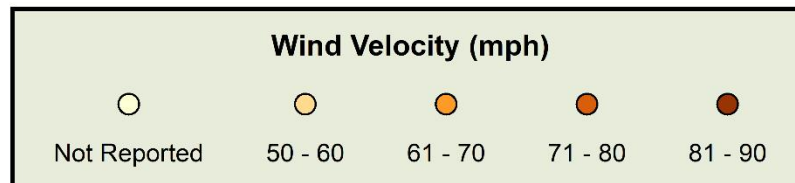
- June 21, 2011: A wake low formed by a **thunderstorm** complex caused damaging winds and downed trees. Power outages were reported in L’Anse and Baraga from the winds. Tree damage reported in Watton. Estimated property damage of \$5,000.
- July 18, 2013: A cold front moving slowly across the region caused severe **thunderstorms** to focus over Baraga County, allowing for sporadic straight-line wind damage over a path around 1-1.5 miles wide. Winds were estimated at 65 mph, uprooted trees and broke off large limbs. A tree fell on a mobile home when the owner was nearby, causing a fire to break out when it landed on the stove. Fallen tree damage caused other households to suffer damage and totaled one vehicle. A portion of the county road commission garage was torn off. Estimated property damage at \$200,000.
- December 24, 2015: A deepening low pressure system moved from the Central Plains through the upper Great Lakes downing trees and causing power outages affecting almost 6,000 UPPCO customers. **High winds** were reported to be 50- 55 mph. Total property damage reported at \$5,000.

Map 5.2: Severe Wind Events in Baraga County, 1955-2018



Recorded Wind Events 1955-2018
Baraga County, Michigan

Boundary data was derived from Michigan's Open Data Portal; DEM was derived from elevation data available through the USGS; Weather event data was downloaded from the National Weather Service GIS Portal <https://www.weather.gov/gis/> Created by WUPPDR May 2019



- July 21, 2016: A western upper disturbance interacted with a warm unstable air mass, producing severe **thunderstorms** and **high winds** of up to 65 mph. Numerous trees were downed reported across Baraga County. There were no injuries and total property damage is estimated at \$5,000.

Occurrence Probability and County Vulnerability

The probability of a future wind event occurrence based off reported events is every 0.98 years. Thus, the likelihood of severe winds is an annual event. Future damage severity potential is highly variable and site-specific, but difficult to predict. Probability and severity are both highest along the Lake Superior shoreline on the north side of the county and in areas surrounding Keweenaw Bay. Critical infrastructure, such as power and communication lines, are vulnerable to damage from severe wind events. Fallen trees can damage these lines, causing electrical and communication outages. Additionally, trees on roadways can delay emergency response capabilities.

Snowstorms and Blizzards

Hazard Description

Snowstorms are a period of rapid snow accumulation that is usually accompanied with high winds and cold temperatures. These events can be very dangerous for a community over a period of days or weeks. Heavy snows can shut down towns and villages for several days if snow is persistent and cannot be cleared in a timely fashion. Rural areas may have inaccessible roads for some time but often have residents that are more equipped to independently deal with power outages and temporary isolation.

Blizzards are the most dramatic of all snowstorms as it is characterized by low temperatures and strong winds of over 35 miles per hour. Most blizzard snow is in the form of fine, powdery particles that are wind-blown in such great quantities that, at times, visibility is reduced to only a few feet. Blizzards have the potential to result in property damage and loss of life. The cost of clearing snow can be enormous.

Some areas suffer greater flood risks because thick snow cover can rapidly melt off during rainstorms, causing rapid drainage of water towards cities and into drains and rivers. Partially melted snow and ice may cause blockages within these water channels, causing waters to back up or divert sideways and over banks where they damage property and roadways.

As a result of being surrounded by the Great Lakes, Michigan experiences large differences in snowfall over relatively short geographic distances. The western Upper Peninsula experiences the most snowstorms and snowfall in Michigan each year. One reason for this is the “lake effect,” a process by which cold winter air moving across Lake Superior picks up moisture from the warmer lake waters, resulting in larger snowfall amounts. Due to weather patterns, severity of different types of snowstorms varies somewhat throughout the county. *Lake effect snow* is almost exclusively focused on areas close to Lake Superior. *System snow*, which includes heavy

snow or snow associated with winter storm/weather, results from weather fronts moving across the country.

Climate Change Considerations

The effect of climate change upon Michigan is expected to cause an increase in the amount of precipitation. Even though the length of Michigan winters has been decreasing, the season remains intense. During the winter months, the increase in precipitation means that snowfall events will tend on average to be more intense. More snowfall is likely to happen at a time and take the form of significant snowstorm events (e.g., 8 or more inches, higher snowdrifts, larger transportation disruptions, canceled school sessions, etc.).

Historical Occurrence

Residents of Baraga County are accustomed to major snow events, which occur regularly every winter. From 1996-2018, the county has experienced 219 recordable winter weather events (blizzard, heavy snow, lake effect snow, winter storm, and winter weather). Note that some winter weather events list freezing rain in addition to snow.

Table 5.7 summarizes the total number of snowstorm events and associated deaths of injuries. Of these storms, four events had reported property damages. Snowstorm events with property damages are listed below:

- November 11, 2011: Winter storm conditions throughout Baraga County, with 13.1 inches of snow in only 18 hours. The heavy wet snow caused numerous minor accidents, sporadic power outages, and some tree damage. Estimated property damage was reported at \$2,000.
- December 3, 2011: Winter weather conditions throughout Baraga County, with whiteout conditions and blowing snow. Snowfall of five inches in just 12 hours were reported in Herman and Sidnaw. Several accidents were reported in the L’Anse area due to slippery roads. Estimated property damage was reported at \$4,000.
- March 8, 2017: Winter weather and strong winds throughout the county. Between 3 to 4 inches of snow was reported. Wind gusts of up to 50 mph caused considerable blowing and drifting snow and power outages throughout county. The harsh weather and whiteout conditions led to a three-vehicle accident with major injuries along US-41. Reported property damages at \$60,000.
- December 5, 2018: Heavy Lake effect snow and strong winds caused poor visibility and slick roads in Baraga County. This weather event also contributed to a fatal head-on car crash on 6th St. in L’Anse. Estimated property damage was reported at \$15,000.

Table 5.7: Snowstorms by Type in Baraga County, 1996-2018

Snowstorm Type	Number of Events	Total Property Damage	Injuries	Deaths
Blizzard	4	\$0	0	0
Heavy Snow	30	\$0	0	0
Lake Effect Snow	9	\$0	0	0
Winter Storm	68	\$2,000	0	0
Winter Weather	109	\$79,000	0	1 ^A
TOTAL	219	\$81,000	0	1

^A Death is listed as indirect

Occurrence Probability and County Vulnerability

The probability of a snowstorm event in Baraga County is very high, with the likelihood of an occurrence 3 times a year. However, the vulnerability of the community is low due to the preparedness of residents and their properties.

Depending on type of snow (wet, heavy versus fine, powdery snow), snowstorms and blizzards may result in a variety of infrastructure problems. Snow accumulations on above-ground electrical lines often create power outages, which can vary from several hours to days. Dangerous driving conditions frequently occur during and shortly after severe snowstorms and blizzards. Some state and county roads in experience drifting snow, which can result in greater vulnerability to accidents. When transportation is disrupted, schools close, emergency services are delayed, some businesses close, and some government services are delayed. More rural areas in the county may experience impassable roads, preventing emergency services from reaching residences in rural locations.

Tornadoes

Hazard Description

A tornado is an intense rotating column of wind extending from the base of a severe thunderstorm to the ground. Tornadoes are high-profile hazards that can cause catastrophic damage to either a limited or an extensive area. A strong tornado can level everything in its path. Tornadoes can have winds greater than 300 miles per hour and can have widths of over one mile.

The mean national annual death toll due to tornados is 87 persons. Death and injuries associated with tornadoes have declined since the 1950s, thanks to advances in severe weather forecasting, but tornadoes can still be deadly. Although tornado deaths have decreased, tornado damages have increased in recent years, since a larger part of the country’s land area contains developments with each passing year. Property damage resulting from tornadoes totals hundreds of millions of dollars every year.

Note that winds are invisible until they pick up enough material that can allow their patterns to be seen and it is this carried material that provides a tornado with a visible form that is easy to recognize. Funnel clouds can be invisible except for the liquid, dust, and debris that they carry. Therefore, a tornado can be present but not yet discernable to nearby persons.

Tornado intensity is measured on the Fujita and Enhanced Fujita Scale, which examines the damage caused by a tornado on homes, commercial buildings, and other infrastructure. Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita scale (**Table 5.8**). After 2005, the Enhanced Fujita Scale (**Table 5.9**) was utilized. The Enhanced Fujita Scale rates the intensity of a tornado based on damaged caused, not by its size. The size of the tornado is not necessarily an indication of its intensity.

Table 5.8: Fujita Scale with Associated Damages

F-Scale Number	Intensity	Wind Speed	Type of Damage
F0	Gale Tornado	40-72 MPH	Some damage to chimneys; branches break off trees; shallow-rooted trees blown over; damages to signs
F1	Moderate Tornado	73-112 MPH	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving cars pushed off roadways
F2	Significant Tornado	113-157 MPH	Considerable damage. Roofs torn off homes; mobile homes demolished; large trees snapped or uprooted; light objects can turn into missiles.
F3	Severe Tornado	158-206 MPH	Roof and some walls torn off well-constructed homes; most trees uprooted
F4	Devastating Tornado	207-260 MPH	Well-constructed homes leveled; structures with weak foundations blown away; cars thrown; large objects can turn into missiles.
F5	Incredible Tornado	261-318 MPH	Strong frame house lifted off foundations and carried considerable distances; automobile sized missiles can fly over 100 meters; trees debarked; steel reinforced concrete structures damaged

Source: Storm Prediction Center

Table 5.9: Enhanced Fujita Scale with Associated Damages

EF-Scale Number	Intensity Phrase	3 Second Wind Gust	Type of Damage
EF0	Gale	65-85 MPH	Some damage to chimneys; branches break off trees; shallow-rooted trees blown over; damages to signs
EF1	Moderate	86-110 MPH	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving cars pushed off roadways
EF2	Significant	111-135 MPH	Considerable damage. Roofs torn off homes; mobile homes demolished; large trees snapped or uprooted; light objects can turn into missiles.
EF3	Severe	136-165 MPH	Roof and some walls torn off well-constructed homes; most trees uprooted
EF4	Devastating	166-200 MPH	Well-constructed homes leveled; structures with weak foundations blown away; cars thrown; large objects can turn into missiles.
EF5	Incredible	Over 200 MPH	Strong frame house lifted off foundations and carried considerable distances; automobile sized missiles can fly over 100 meters; trees debarked; steel reinforced concrete structures damaged

Source: Storm Prediction Center

Tornados in Michigan are most frequent in the spring and early summer when warm, moist air from the Gulf of Mexico collides with air from the polar regions to generate thunderstorms. These thunderstorms often produce the violently rotating columns of wind known as funnel clouds. Winds that converge from different directions, heights, or at different speeds are the source of the spinning pattern that gets concentrated as distinct funnels of wind. Michigan lies at the northeastern edge of the nation's primary tornado belt, which extends from Texas and Oklahoma through Missouri, Illinois, Indiana, and Ohio.

In Michigan, tornadoes occur more frequently in the southern half of the Lower Peninsula than any other area of the state. This area could be referred to as Michigan's "tornado alley." Since 1996, Michigan has averaged about 16 tornadoes per year.

Climate Change Considerations

According to NOAA, there is no known way to predict whether or how climate change is affecting thunderstorm and tornado frequency or severity. These types of weather events involve a different scale of phenomenon than climate change and the models of the latter have not yet been able to predict local trends in the former.


Map 5.3: Reported Tornadoes in Baraga County, 1950-2018




Recorded Tornadoes 1950-2018 Baraga County, Michigan

Boundary data was derived from Michigan's Open Data Portal; DEM was derived from elevation data available through the USGS; Tornado location data was downloaded from the National Weather Service GIS Portal <https://www.weather.gov/gis/> Created by WUPPDR May 2019

Tornado Magnitude* and Path



F-0



F-2

*Tornadoes are measured on the F-scale pre 2007 and the EF-scale after January 2007



Historical Occurrences

From 1950-2018, there were two tornadoes recorded in Baraga County. The first tornado occurred on August 22, 1968 and was rated an F2. The tornado moved east through wooded area near Herman leaving “a clean-cut path of complete destruction.” The second tornado occurred on September 8, 1980 and was rated an F0. A narrow path of extreme damage through the forest was found several days after the event and recorded via radar data.

Occurrence Probability and County Vulnerability

In Baraga County, tornadoes occur with infrequency, with a likelihood of occurrence every 34 years based off reported events. However, if an event were to occur, the region’s vulnerability to tornadoes is very high due to their unpredictability and the lack of preparedness in the county. Because a tornado can hit anywhere in the county, all critical facilities are vulnerable to being hit. Schools throughout the county are a concern due to the large number of people present and their potential to being used as a storm shelter.

Hydrological Hazards

The following outline summarizes the significant hydrological hazards covered in this section:

1. Flood Hazards
 - a. Dam Failures
 - b. Riverine and Urban Flooding
 - c. Shoreline Flooding and Erosion
2. Drought

Michigan residents are largely impacted by flooding. The section, **Riverine and Urban Flooding**, focuses on inland areas, mapped floodplains, and urban areas. Not all flooding occurs within recognized floodplain areas or adjacent to rivers and lakes. In some cases, melting snow or other runoff waters pool in low-lying areas, damaging structures and obstructing roads and other infrastructure. In other cases, some type of breakdown in an area’s pumping or drainage infrastructure may result in a damaging flood. **Urban flooding** typically occurs in well-developed urban or suburban areas. It tends to occur due to either a breakdown in infrastructure or inadequate planning and design standards on the part of builders, engineers, architects, and planners.

Many flood mitigation activities have taken place in recent decades, including separation of combined sewer systems, installation of backflow preventers in houses, and dredging, expansion, and re-design of drainage systems. Throughout the state, communities have learned lessons from previous flood occurrences and taken steps to mitigate flood impacts in the future. More importance is now placed on the preventative role in coordinating land development plans with existing knowledge of local floodplains, wetlands, sewer capacity, and upstream development and hydrology.

Overlap with Other Sections of Hazard Analysis

Hydrological hazards stem from precipitation patterns, which are affected by the types of events described in **Weather Hazards** sections on thunderstorms, severe winter weather, and extreme temperatures. Thunderstorms, snowstorms, and ice/sleet storms produce precipitation that can cause or exacerbate flooding – either immediately or when frozen precipitation melts. Additionally, ice can build up and block critical parts of drainage-ways and cause flooding. During extreme temperatures, freeze events have caused flooding when pipes and water mains have broken, while heat waves may worsen the impact of drought.

Technological Hazards can inhibit smooth functioning or drainage on water supply infrastructure and may cause or worsen flooding or drought hazards. For example, sewer pumps and lift stations can go out of operation during a power failure and cause flooding to occur or a reduction in water supply.

Dam Failures

Hazard Descriptions

Dams are structures that stretch across a stream or other water body in order to control its flow or to convert the energy within the water into more convenient forms, such as electricity. The impounded waters may be used for agriculture, flood-control, artificial lakes, municipal water supplies, or for energy generation. Some dams have become obsolete and should be removed to restore the natural water flow through the area. Otherwise, neglected dams will eventually fail, and would then be likely to cause a flash flood downstream, through the sudden release of their impounded waters. Some dams are constructed by wildlife instead of humans but can pose similar risks.

Dam failure is the breach or collapse of an impoundment resulting in flooding downstream. Dam failure can result in loss of life and in extensive property or natural resource damage for miles downstream from the dam. Failure can occur not only during flood events which cause overflowing of the dam, but also due to poor operation, lack of maintenance, and vandalism. Most dam failures are considered catastrophic because they occur unexpectedly, with no time for evacuation. As of 2014, there has been approximately 287 dam failures in Michigan since 1888⁹.

Dams are officially classified into three categories of risk, based upon a wide array of potential impacts that can result from a dam's failure. The categories are as follow:

1. Low hazard potential dam: Failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.
2. Significant hazard potential dam: Failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.

⁹ Michigan Department of Environment, Great Lakes, and Energy (EGLE)

3. High hazard potential dam: Failure or mis- operation will probably cause loss of human life.

Baraga County has several dams within its boundaries that have been built for power generation, water reservoirs, and recreation. The National Inventory of Dams (NID) lists six dams (**Table 5.10**) located in Baraga County (**Map 5.4**) with an average age of 75 years. All are of low to moderate hazard potential except for the Prickett Dam, and Ford Dam which are listed as having a high hazard potential. There are also numerous beaver dams throughout the county which have not been inventoried. Beaver dam locations are typically reported by residents and done in an informal manner with the road commission due to the dams’ threat to roadways

Table 5.10: Dams in Baraga County

Dam Name	River
Prickett Dam & Prickett Intake and Powerhouse	Sturgeon River
Sixmile Creek Pond Dam	Six Mile Creek
Ford Dam	Plumbago Creek
Parent Creek Dam	Parent Creek
Net River Dam	West Branch Net River

Historical Occurrence

There are four large dams in Baraga County: Ford Dam, Net River Dam, Prickett Hydro Project, and Six Mile Creek Pond Dam. The Net River Dam and Six Mile Creek Pond Dam are MDNR-owned rockfill dams used for recreational purposes, while the Ford Dam was built for a water supply and the Prickett Dam for hydroelectric power generation.

According to an inspection conducted by a private engineering firm in 2006, the Ford Dam is an earthen embankment of approximately 500 feet across the Plumbago Creek valley and is approximately 20 feet high¹⁰. The dam was constructed in 1936 by the Ford Motor Company to serve as a water supply for a sawmill at Alberta. In 1946, the Michigan Department of Transportation (MDOT) rerouted Highway U.S. 41 across the Ford Dam crest. In 1954, the dam, buildings, and properties were donated to MTU. Presently the dam serves as the Highway U.S. 41 road surface and forms a water supply impoundment used for fire protection and public recreation.

The Prickett Dam Project along the Sturgeon River in Baraga and Houghton Counties is located about 31 miles above the river mouth. The reservoir for the project is about 3.5 miles long and has an area of 810 acres at normal pool elevation. There are 346 square miles of drainage area above the Prickett Dam. The Project includes a main diversion dam of earth embankments and a hollow concrete dam with gate-controlled spillways; a 500-foot intake canal and gate-controlled structure of concrete and earth embankments; two 87-foot-diameter wood stave penstocks, each 80 feet long; an indoor powerhouse with two generating units; and an outdoor substation with

¹⁰ Michigan Tech, 2019 Michigan Tech Multi-Hazard Mitigation Plan. <https://www.mtu.edu/facilities/pdfs/draft-hazard-mitigation-plan.pdf>

one transformer bank. The dam is monitored and licensed by the Federal Energy Regulatory Commission. It has regular yearly inspections and is monitored in person and remotely by the Upper Peninsula Power Company. The Baraga County Emergency Manager also visits the dam yearly and in 2021, a full-scale exercise is planned to test the Emergency Action Plan¹¹.

Beaver dams are of increasing concern in Baraga County. In 1968 a L'Anse beaver dam failure caused a death, and Covington has beaver dams that flood the area. Mapping inventory efforts are underway for beaver dams, but this is difficult as it is addressed in an informal manner with the road commission due to the dams' threat to roadways.

On July 18, 2017, a beaver dam collapse around Beaufort Lake and Stagecoach Drive caused a major road washout¹². Residents of the area knew of the beaver dam and reported the sound of rushing water to 911. Baraga County Road Commission and the Michigamme-Spurr Volunteer Fire Department responded, and alternative travel routes were established.



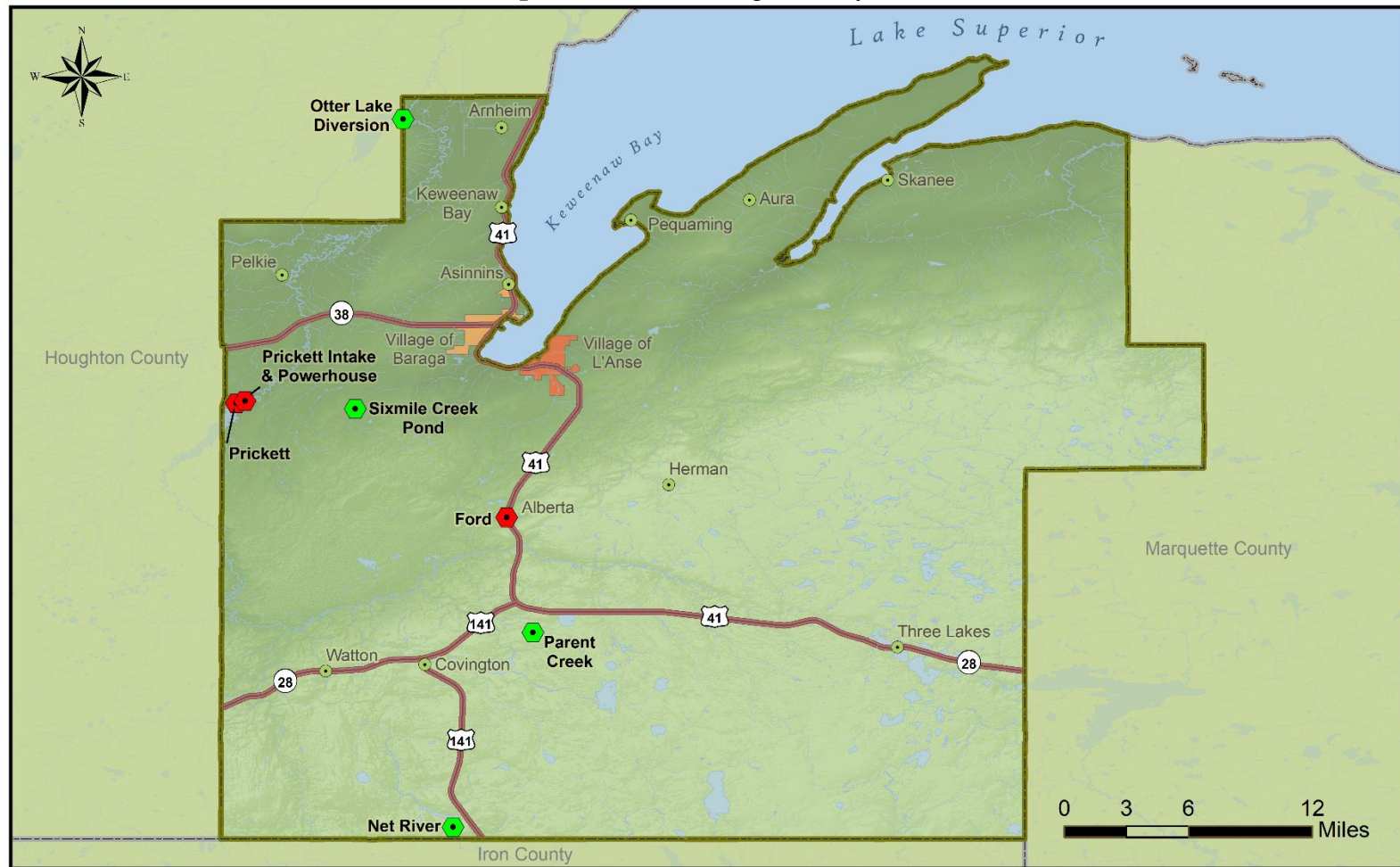
A Beaver dam collapse caused major road damage on July 18, 2017 (Source: ABC 10 News)

Smaller dams in Baraga County have a history of failure, including the Lough's Lake failure in 2003, and the Robillard dam failure in 2002. The Lough's Lake dam failure resulted in over \$200,000 in damaged roadways and drainage structures as well as an environmental degradation to Gomache Creek. Since those two failures, drainage structure improvements have been implemented and are expected to limit the damage of these areas

¹¹ <http://www.keweenawreport.com/news/local-news/update-on-prickett-dam/>

¹² ABC 10 UP, 2017. <https://abc10up.com/2017/07/18/flooding-affecting-local-county/>

Map 5.4: Dams in Baraga County (NID)



Dam Inventory Baraga County, Michigan

Boundary data was derived from Michigan's Open Data Portal
 DEM was derived from elevation data available through the USGS
 Dam locations and hazard level taken from the National Inventory of Dams
 Created by WUPPDR April 2019

Hazard Potential	
	High
	Low



Occurrence Probability and County Vulnerability

Failure of the Prickett Dam on the Sturgeon River – a major power generation structure – has low probability but could have moderate-severity impacts downstream resulting in high hazard potential. Downstream areas include Portage Charter and Chassell Townships in Houghton County. As required, evacuation plans are in place for those affected by failure of power generation dams. If there were a dam failure, it would be a high severity issue for these communities. Numerous downstream structures would be affected by the failure of the dam. A gauge monitors stream flow at the dam¹³ and is operated in cooperation with UPPCO.

Failure of the Ford Dam in Plumbago Creek Valley would cause the old US 41 bridge to be submerged and flood waters could reach the first floor of area buildings at the Ford Center. Erosion of the US 41 embankment is also possible with a breach of the dam, resulting in the loss of utilities. Emergency plans are in place for the areas potentially affected by the Ford Dam failing. Ford Dam is inspected every three years by Michigan Tech and the Michigan Department of Transportation (MDOT). The latest inspection was completed in 2018.

A vulnerability analysis for dam failure in this hazard mitigation plan has not been conducted for all dams in Baraga County and dams that affect the county due to insufficient data. Dam-breach analysis and mapping dam breach inundation areas are the most appropriate means for examining the impact to people, property, and critical facilities. As individual dam failure analysis and inundation mapping become more available, Baraga County intends to add this information and include a vulnerability analysis in future hazard mitigation plan updates.

Beaver dam failure is unpredictable due to unknown factors such as locations and unreliable reporting of events. With two confirmed reported beaver dam failures and no reported dam failures, the likelihood of a beaver dam failure is higher than that of a constructed dam failure.

Riverine and Urban Flooding

Hazard Description

Riverine flooding is defined as a periodic occurrence of overflow of streams and rivers resulting in an inundation of the adjacent floodplain. While flooding of land adjacent to streams and rivers is a natural occurrence, floodplains typically are not left in the natural state. Development in and near floodplains have increased the potential for serious flooding because rainfall that used to soak into the ground or take several days to reach a river or stream via natural drainage now quickly runs off streets, parking lots, and rooftops, through man-made channels and pipes.

Riverine and urban floods are caused by prolonged, intense rainfall, snowmelt, ice jams, dam failures, or any combination of these factors. Bank overflows are natural and may occur on a regular basis on river systems that drain large geographic areas and many river basins. Floods on

¹³ USGS 04041500 Sturgeon River near Alston, MI. https://waterdata.usgs.gov/mi/nwis/uv?site_no=04041500

large river systems may extend several days. Many areas of Michigan are subject to riverine flooding.

Most riverine flooding occurs in early spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Ice jams are also a cause of flooding in winter and early spring. Log jams can also cause streams and rivers to be clogged up and backed-up waters to overflow the stream's banks. Either ice jams or log jams can cause dangerous flash flooding to occur if the makeshift dam-effect caused by the ice or logs suddenly gives way. Severe thunderstorms may cause flooding during the summer or fall, although these are normally localized and have more impact on areas with smaller drainage areas.

Urban flooding may involve low-lying area that collect runoff waters even though they are not adjacent to drains or bodies of water. It is usually due to the combination of excessive rainfall and/or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are not in a floodplain. This risk does vary with topography, soil types, runoff rates, drainage basin size, drainage channel sizes, and impervious ground surfaces in each area. Other kinds of urban flooding stem from undersized or poorly designed sewer systems that cannot always process the amounts of precipitation and runoff that affects an area.

Flash floods are brief, heavy flows on small streams or normally dry creeks and differ from riverine floods in extent and duration. The cause of flash floods is normally locally intense thunderstorms with significant rainfall resulting in high velocity water often carrying large amounts of debris. These conditions can be exacerbated by secondary or cascading events such as beaver dam failure. Spring is highest-risk due to saturated or frozen ground with little infiltration capacity, along with quick rise in temperature, rapid snowmelt and intense precipitation.

All kinds of flooding can damage or destroy public and private property, disable utilities, make roads and bridges impassible, destroy crops and agricultural lands, cause disruptions 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 secondary dangers include potential disease outbreak, widespread animal death, broken sewer lines causing water supply pollution, downed power lines, broken gas lines, fires, and the release of hazardous materials.

Climate Change Considerations

One of the Michigan trends connected with climate change is to experience increasing amounts of precipitation. This precipitation is considered more likely to take the form of acute and severe weather events. This includes larger proportions of snow precipitation occurring in snowstorm events and cause more extensive snow accumulation, which may add to the drainage burdens of the normal melting and rainfall patterns of the spring season. Both spring and summer flood risks are likely to worsen, as are ice jam related flood risks.

Historical Occurrence

Several areas in Baraga County are susceptible to riverine and urban flooding. Riverbanks and many areas with inadequate culverts and ditches become overburdened, resulting in certain degrees of flooding and washouts. To deal with these risks, storm sewer upgrades, ditch management, and culvert replacements are ongoing. The Villages of L’Anse and Baraga are especially prone to flood events.

From 1996-2018, there have been 6 flooding events in Baraga County. Four of these events have reported property damages. One of these events were severe enough to result in a disaster declaration from the State of Michigan and FEMA. All minor flood events are listed in **Table 5.11**.

Table 5.11: Summary of Minor Floods in Baraga County, 1996-2018

Date	Type of Flood	Description and Location	Property Damages
04/27/1996	Riverine Flooding	Flooding on the Sturgeon River and Pequaming Bay due to significant snowpack melting. Several roads were closed.	\$41,500
04/14/2002-04/20/2002	Riverine Flooding	Record setting snowfall in February and March resulted in snowpack holding over 11 inches of water. Rapid snowmelt over a 6-day period released all the water into creeks, stream, rivers and lakes. Flooding of the Sturgeon River & other smaller creeks overflowed onto roads & local structures	No damages reported ^A
05/12/2003	Riverine Flooding	Heavy rainfall reaching 4.88 inches in Herman resulted in widespread flooding across Upper Michigan. Flood waters as deep as 3 ft inundated downtown L’Anse as Linden Creek overflowed its banks. The Sturgeon River also overflowed	\$2 million
04/18/2004	Riverine Flooding	A storm system produced heavy rainfall up to 2.07 inches. This caused some minor flooding of smaller streams and low-lying areas.	No damages reported ^A
09/24/2010	Riverine Flooding	A low-pressure system resulted in heavy rain from a moist airmass pushed by a warm front. The Sturgeon River overflowed, causing damage.	\$1,000

^A No damages reported in Baraga County

Significant flooding events in Baraga County, including those with disaster declarations are the following:

- Late April 2013: Rapid melting of late season snowpack caused moderate **flooding** of roads throughout Baraga County, especially along the Sturgeon River. Flooding of basements were also reported. Governor Rick Snyder issued a disaster declaration on

May 7, 2013. There were \$1.5 million in property damage due to flooding, mainly to roadway infrastructure.

Flood Insurance in Baraga County

In Baraga County, the Village of Baraga, Village of L’Anse, Arvon Township, and L’Anse Township participate in the FEMA National Flood Insurance Program (NFIP).¹⁴ The NFIP makes federally supported flood insurance available to homeowners, renters, and business owners in communities that adopt and enforce floodplain ordinances. These communities have enrolled in NFIP largely in response to a flooding event, hence the enrollment in the emergency programs. Participating communities encourage their residents to purchase insurance through NFIP if the resident feels as if they have the need for coverage.

Most other communities in Baraga County do not regularly experience severe flooding. Other communities in the county have not been affected by flooding to the extent that participation would be considered necessary, and participation is not a prerequisite for property owners to purchase flood insurance from private insurers. The NFIP puts a special focus on mediation of insured structures that have suffered more than one loss of at least \$1,000 within a rolling 10-year period since 1978. These are referred to as “repetitive loss properties.” There currently are no repetitive loss or severe repetitive loss structures in Baraga County.

During a flood hazard assessment, FEMA develops for NFIP a Flood Insurance Study and Flood Insurance Rate Map (FIRM). The FIRM is used by lenders to determine flood insurance requirements and by insurance agents to determine flood insurance premium rates for specific properties. The FIRM includes areas within the 100-year flood boundary, which are termed "Special Flood Hazard Areas" (SFHAs). A 100-year flood does not refer to a flood that occurs every 100 years but refers to a flood level with a one percent or greater chance of being equaled or exceeded in any given year.

Occurrence Probability and County Vulnerability

Riverine and urban flooding of variable severity is a moderate risk in Baraga County. Since 1996 there have been six reported events, making an event likely every four years. The severities of these events have been variable, with monetary damages ranging from no reported losses to \$1.5 million.

While flooding can impact a variety of critical facilities, identifying which specific critical facilities or populations are most vulnerable to riverine and urban flooding is limited due to the lack of available data. However, municipalities and critical facilities throughout the county are vulnerable to flood impacts. Steep slopes throughout the county contribute to flood vulnerability by accelerating surface water runoff into nearby rivers, streams, and lakes. Combined with impervious surfaces (e.g., roadways, parking lots, and other hard surfaces), populated areas become even more vulnerable to flooding.

¹⁴ FEMA. Community Status Report Book – Communities Participating in the National Flood Program. <https://www.fema.gov/cis/MI.html>

Other infrastructure, such as roads, bridges, and culverts, are also vulnerable to the impacts from floods. There are an estimated 2,000 cross culvert under roads, which are under the jurisdiction of the Baraga County Road Commission. The culverts vary greatly in size, ranging from 12-inch diameters to 20-foot spans. There are also 44 bridges on the county road system that are over 20-foot spans. These culverts and bridges are vulnerable to riverine and urban flooding impacts as runoff from populated areas can overburden culverts, causing them to fail. All culverts are at risk, but this is largely dependent on flood severity and location.

Additionally, sewer and water treatment plants and well and septic systems are vulnerable to riverine and urban flooding. Any homes and business or industry facilities that rely on well or septic service may experience operational problems that force closure of the facility. If flood waters cover well heads, the well water is considered contaminated and no longer safe for human consumption. If grinder pumps in septic systems are inundated with water, the septic may overflow causing additional human health issues.

Shoreline Flooding and Erosion

Hazard Description

Michigan has over 3,200 miles of coastline (the longest freshwater coastline in the world), and about 4.7 million persons live in the state's 41 shoreline counties, which includes Baraga County. Flooding and erosion along the Lake Superior shoreline are typically a result of high-water levels, storm surges, or high winds. These are natural processes that can occur at normal or even low water levels. However, during periods of high water, flooding and erosion are more frequent and serious, causing damage to homes, businesses, roads, water distribution and treatment facilities, and other structures in coastal communities. Seiches, which can drive like water inland over large areas and may be caused by storm surge, occur when windstorms and differences in atmospheric pressure temporarily tilt the surface of a lake up at one end. Water levels can rise to more than 10 feet. When the wind stops, lake water rebounds to the other side of the lake. This back-and-forth action, or oscillations, can occur for hours or even days.¹⁵

Shoreline erosion hazards typically involve the loss of property as sand or soil is removed by water action and carried away over time. Erosion effects that are experienced along rivers may be included in this category of hazard.

Lake Superior levels have fluctuated since prehistoric times and accurate measurements of this change are available for the last 160 years. According to the U.S. Army Corp of Engineers, the peaks of this fluctuation have been higher during this century than they were in the past. Current lake levels are over a foot or a half of meter above the average annual (1918-2018). The modern range of fluctuation between periods of high and low water is 1-meter.

¹⁵ Michigan Sea Grant. "Surges and Seiches." www.michiganseagrant.org/lessons/lessons/by-broad-concept/earthscience/surges-and-seiches-2/

The land in the Great Lakes region is slowly recovering from the last glacial period when ice loaded and depressed the land surface. The land is rebounding from the weight of the former glaciers at different rates. The outlet channel to Lake Superior at Sault Ste. Marie is rising more rapidly than most other points along the U.S. shore, resulting in a tilting of the lake. Because of this outlet channel, which controls the level of lake rise, the south shore of the lake is progressively inundated from east to west. This causes the amount of inundation to be the greatest at Duluth, Minnesota, where as much as 5.4 meters of inundation over the past 2,000 years. Maximum inundation over that same period for the Michigan shore occurred near Ontonagon where as much as 3 meters is noted.

Climate Change Considerations

Higher and lower water levels result from natural changes in climate in the region and will continue to occur. However, the impact from climate change on the magnitude and frequency of water-level change remains uncertain. Lake Superior water levels will continue to fluctuate, but the periods where it is either above or below average water levels may become prolonged.

Historical Occurrence

Baraga County has several areas identified as high-risk erosion areas by EGLE (Appendix B). High-risk areas are where erosion studies have indicated the erosion hazard line is receding at an average of one foot or more per year over a minimum 15-year period. For these areas, the state has regulations in place with mandatory and recommended setbacks for development. The high-risk erosion area regulations establish required setback distances to protect new structures from erosion for a period of 30 to 60 years, depending on the size, number of living units, and type of construction. High-risk erosion areas were identified in the early 1970s, but recession rates and erosion extent may have changed since the original documentation. Riprap protects the shoreline from erosion along the Village of L’Anse waterfront. Storm surges have occurred several times in the past in Baraga County. Shoreline erosion has also been identified as an ongoing concern in Arvon Township.



Riprap protects the shoreline from erosion along the Village of L’Anse Waterfront.

From 1996-2018, there have been 5 shoreline flooding and erosion events in Baraga County. Four of these events have reported property damages. All events are listed in **Table 5.12**.

Table 5.12: Summary of Shoreline Flooding Events in Baraga County, 1996-2018

Date	Type of Event	Description and Location	Property Damages
05/30/2011	Seiche	As a dying thunderstorm complex moved over Lake Superior, a seiche developed due to the	No damages reported ^A

		wake low formed. Water levels fluctuated by 2-5 feet in a matter of minutes.	
09/10/2014-09/11/2014	Lakeshore Flooding	Heavy rain developed along a cold front on the 10 th . Strong north winds behind caused coastal flooding and erosion along Lake Superior. North winds gusting to 40 mph at times cause high waves and pounding surf along L’Anse Waterfront Park, tossing debris along the shoreline.	\$1,000
10/27/2017-10/28/2017	Lakeshore Flooding	A strong fall storm caused flooding and a trained spotter near Keweenaw Bay reported the largest waves ever recorded in his 25 years at that location. The large waves eroded the beach down to bedrock and erosion took trees down on his neighbor’s property. The boat house was in jeopardy of being lost in the water.	\$10,000
10/27/2017-10/28/2017	Lakeshore Flooding	The L’Anse Fire Department reported damage to a park and sidewalks in downtown L’Anse due to high waves and lakeshore flooding. Highway US-2 between L’Anse and Baraga was sporadically closed on the 27 th to clear debris from the high waves.	\$20,000
06/30/2018	Seiche	Pressure differences caused by a large thunderstorm complex induced a seiche in Keweenaw Bay. A rise in water up to 5 feet in Keweenaw Bay impacted the Baraga Marine, the campground near Sand Point and many others along the bay. Debris was washed up on US Highway 41 prompting a brief closure.	\$2,000

Occurrence Probability and County Vulnerability

Erosion is an ongoing and unavoidable process – one that has very high probability but low severity. Based off frequency of previous events, an event is likely to occur every 12.6 years. Not all of Baraga County touches shoreline; this hazard has a higher likelihood to occur along parts of Baraga County that touch the shoreline. There are several high-risk erosion areas identified by EGLE in the county. These areas have mandatory and recommended setback regulations in place to mitigate losses due to erosion.

Approximately four miles, or roughly 6%, of the county’s Lake Superior shoreline are EGLE designated high-risk areas, and miles of adjacent shoreline are also continuously threatened by this hazard. Although areas along the shoreline of the Villages of Baraga and L’Anse are subject to flooding, drainage systems to manage storm water are continually improving and are expected to limit vulnerability to this hazard.

Although erosion has been identified as a concern in Arvon Township, hazard impact is limited by general compliance with a requirement of 95-foot setback of structures from the shore. It is important to note that erosion can impact a variety of structures and properties along the Lake Superior shoreline. However, identifying these specific at-risk properties is limited due to the lack of available data and maps in the area. FEMA is in the process of completing a coastal flood risk study and mapping program in Baraga County.¹⁶ The study aims to update coastal flood hazard information and flood risk maps along the Lake Superior shoreline in the county. The revised flood risk maps will identify new coastal high hazard areas in the county, or VE zones, that previously were not found prior to this analysis. Once these new coastal hazard maps are developed, analysis on at-risk structures and properties, including estimated future economic losses, will be included in future hazard mitigation plans.

Drought

Hazard Description

Drought is a water shortage caused by unusual hydrologic conditions such as lack of rainfall and it generally lasts for an extended period, usually a season or more in length. Drought can be a normal part of an area's climate, including areas that have very high or low average rainfall. The level of precipitation or runoff associated with a drought is substantially below an area's norms. The severity of a drought depends not only on its location, duration, and geographical extent, but also on an area's water supply needs for human activities and vegetation.

Drought differs from other natural hazards in several ways. First, there is no exact beginning and end point that is obvious for a drought; the effects may accumulate slowly and linger even after the event is believed to be over. Second, the lack of clearly visible and universal standards to define a drought can make it difficult to confirm in a timely manner if a drought exists and its degree of severity. Third, drought impacts are often less obvious than other natural hazards. Fourth, most communities do not have any contingency plans in place for addressing drought. This lack of pre-planning can hinder support for drought mitigation capabilities.

The severe impacts from droughts on communities and regions include water shortages for human consumption, power generation, industrial and agricultural use, and recreation; drop in quantity and quality of agricultural crops; lower water quality in lakes, rivers, and other water bodies; increase in wildfires; decline in land values; increase in insect infestation, plant disease, and wind erosion, and; possible human impacts such as food shortages, extreme heat, fire, and other health-related problems such as diminished sewage flows and increased pollutant concentrations in surface waters.

Despite thousands of miles of rivers and streams and its surround Great Lakes, Michigan can still experience occasional drought conditions. Most common are agricultural droughts, with severe soil-moisture deficits, which have serious consequences for crop production, particularly when coupled with extreme summer temperatures. Also, various water bodies, both inland lakes and

¹⁶ Great Lakes Coastal Flood Study. <https://www.greatlakescoast.org/>

the Great Lakes, cyclically go through periods of low-water levels. Michigan has emerged from its latest such period and is now experiencing high water levels.

Climate Change Consideration

While the effect of climate change on Michigan has involved an overall increase in precipitation, and drought severity in the state has generally been decreasing over the past 50 years, there will still be drought events and dryer seasonal phases, especially in areas that are locally more susceptible. Shorter duration seasonal droughts are expected to worsen during the warmer half of the year, even though overall annual averages of precipitation have increased. With enough planning and water infrastructure the climate change effects upon this hazard may be beneficial overall for a short period.

Historical Occurrence

Although Baraga County has not had a localized drought severe enough to be recorded, the United States Midwest has been significantly affected by drought in five years since 1981. These wide-ranging droughts have little long-term impact on wild flora and fauna, and since Baraga County has little cultivated land, drought does not significantly affect agriculture. Although stream and reservoir levels may drop, the county has not faced a critical power shortage resulting from interruption of hydroelectric generation (the power grid has a high degree of regional interconnectivity). Furthermore, the county has no drinking water sources dependent on surface water, and temporary droughts have not diminished groundwater reserves to a notable extent. However, even a minor drought is one of the primary factors of wildfire potential and is a major hazard for that reason alone.

Occurrence Probability and County Vulnerability

Countywide risk of other drought effects is minimal, with low probability of a recordable (moderately severe) drought but much higher incidence of less severe conditions. If a drought were to occur, all communities are vulnerable to drought effects, such as low water supplies in groundwater and drinking wells. Severe droughts can negatively affect drinking water supplies and impact critical facilities. Possible losses to infrastructure include the loss of potable water.

Ecological Hazards

The following outline summarizes the significant ecological hazards covered in this section:

1. Wildfires
2. Invasive Species

These types of hazards deal with biological ecosystems and their effects on human economy and the built environment. The most well-known ecological hazard is wildfire, which occur naturally, but become dangerous when they threaten humans that live in areas where the disaster event will periodically take place. Wildfires can cause damage and threats to human health and life. Ecological hazards must also be dealt with to maintain Michigan's environmental and

recreational quality of life, as well as the important economic sectors that are closely connected with them (such as tourism, recreation, agriculture, and natural resource extraction).

Wildfires

Hazard Description

Forests cover approximately 55% (20.4 million acres) of Michigan's total land area and provide Michigan with the largest state-owned forest system in the U.S. Additionally, Michigan has the fifth largest quantity of timberland acreage, which includes 19.3 million acres of softwood and hardwoods. While vast forest cover is a boom for industry and recreation, it also makes many areas of Michigan highly vulnerable to wildfires.

Michigan's landscape has significantly changed over the last several decades due to wildland development and thus potential danger from wildfires have become more severe. Increased development in and around rural areas has increased the possibility for loss of life and property from wildfires. Although most wildfires are small (a few acres), any one wildfire can burn out of control under the right conditions and multiply annual burned acreage. There are not enough fire suppression forces available in rural areas to protect every structure from a disastrous wildfire.

Most Michigan wildfires occur close to where people live and recreate. The most immediate dangers from wildfires are the potential injury or deaths of persons who live or recreate in the affected area and the destruction of homes, timber, and wildlife. Long-term effects included scorched and barren land, loss of wildlife habitat, soil erosion, landslides, water sedimentation, and loss of recreational opportunities.

According to the Michigan Department of Natural Resources, the main cause (47%) of wildfires in Michigan is burning yard debris, such as grass clippings, leaves, and trash. Most wildfires occur in the spring when days are dry and windy with abundant dead vegetation left after the snow melts. These conditions can spread a wildfire quickly because there is less moisture in the air and the wind carries burning debris to other areas. The dead vegetation makes for good wildfire fuel.¹⁷

Climate Change Considerations

The average wildfire seasons has extended 78 days longer across the United States, and large wildfires burn more than twice the area they did in 1970.¹⁸ Changes in climate have led to hot, dry conditions that may increase fire activity. While there has been an overall increase in precipitation in Michigan, there will still be drought events and drier seasonal phases. Shorter duration seasonal droughts are expected to worsen in the warmer half of the year, which may affect wildfire occurrence. Development trends in Michigan seem to involve increases in wildfire

¹⁷ Michigan Department of Natural Resources. https://www.michigan.gov/michiganprepares/0,4621,7-232-65025_65201---,00.html

¹⁸ Center for Climate and Energy Solutions. <https://www.c2es.org/content/wildfires-and-climate-change/>

risk over time, and annual cycles of summer drought have been projected by many climate analysts in the coming decades.

Historical Occurrence

Over 80% of Baraga County is forest cover. This is an asset for both industry and recreation but leaves the county highly vulnerable to wildfires. From 1981 to 2010, the Michigan DNR reported 116 wildfires in the County on areas under DNR jurisdiction.

From May 20 through 25, 2009, a large pinery fire burned 685 acres and brought over 100 firefighters from around the state and region. There were no injuries on the fire line, but one structure, a mobile home, and a privately-owned skidder were destroyed.

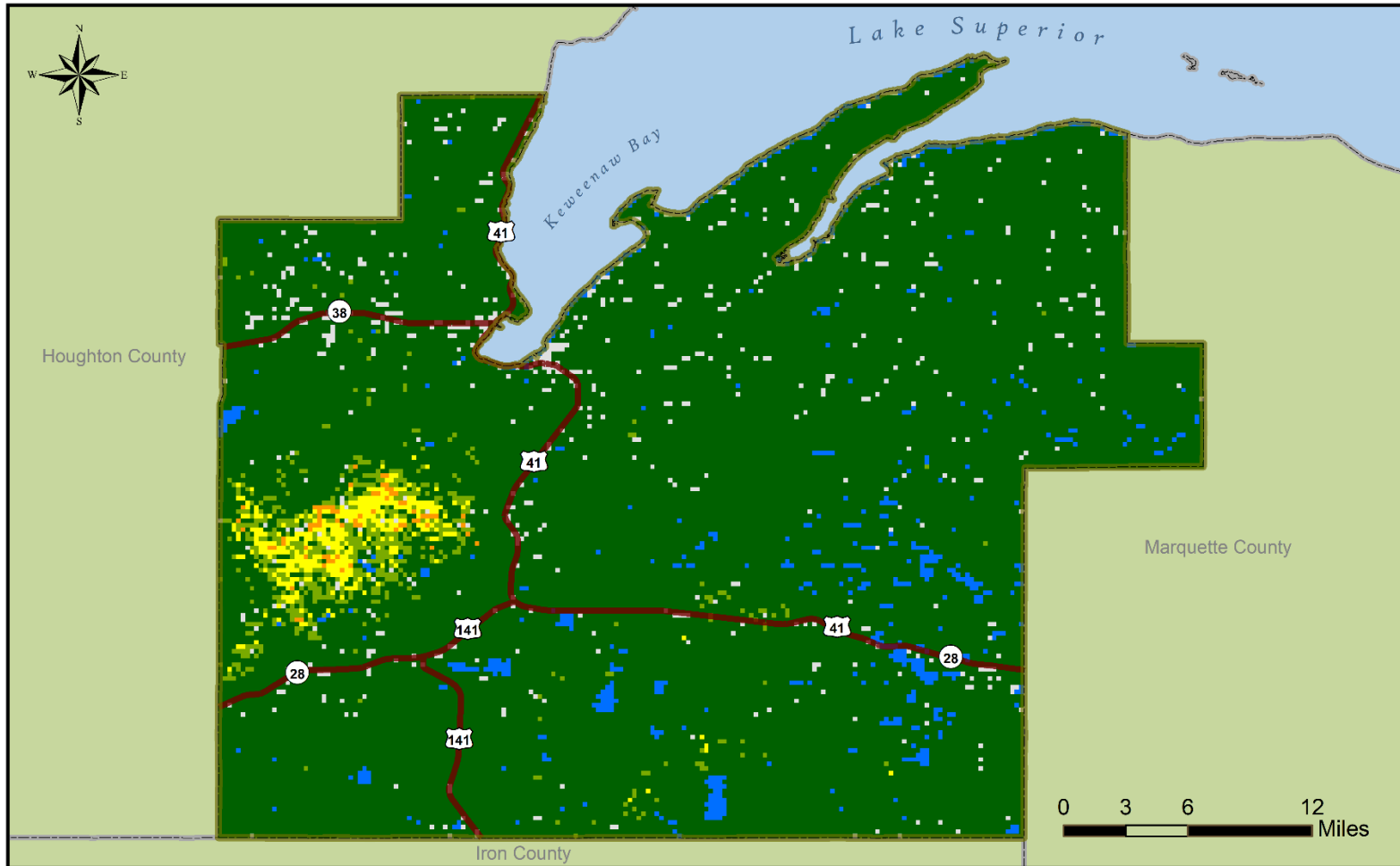


Snapshot of the Pinery Fire, which burned 685 acres over 5 days in May 2009 (Source: MSU Extension)

Occurrence Probability and County Vulnerability

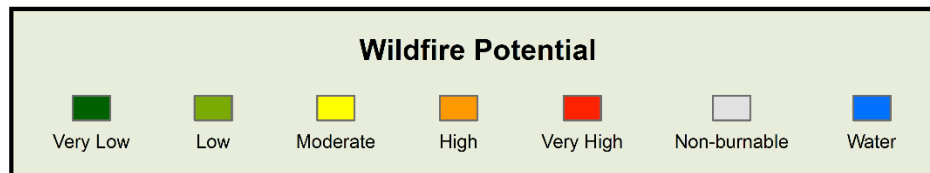
Baraga County has an ongoing risk of wildfires due to the tremendous amount of forest cover and increasing hazard due to urban infringement in rural areas. Development in rural areas can intensify overall damage from wildfires. All areas of the County have some vulnerability to wildfire, but extent varies greatly by location. Homes and other built infrastructure, such as roads and power lines, in rural townships are more vulnerable to wildfires due to their proximity to undeveloped areas.

Map 5.5: Wildfire Hazard Potential in Baraga County



Wildfire Hazard Potential
Baraga County, Michigan

Boundary data was derived from Michigan's Open Data Portal; Hazard data was developed by the USDA and USFS in 2014; Created by WUPPDR June 2019
<https://www.firelab.org/project/wildfire-hazard-potential>



Invasive Species

Hazard Description

An invasive species is defined as a species that is 1) non-native to the local ecosystem and 2) whose introduction causes or is likely to cause economic or environmental harm, or harm to human health. Invasive species can be plant, animals, and other organisms (e.g., microbes). Human actions are typically the cause of invasive species' invasion; it is not a natural shift in a species distribution. Nationally, the current environmental, economic, and health costs associated with invasive species were estimated as exceeding the costs of all other natural disasters combined.

Invasive species can be transported into an ecosystem in many ways, such as on animals, vehicles, ships, commercial goods, produce, and clothing. Although some non-native species are used to prevent erosion, provide fishing and hunting opportunities, and as ornamental plants and pets, occasionally a non-native organism flourishes too well and causes unwanted economic, ecological, or human health impacts. "Invasive" or "nuisance" are used to describe such species.

A plant or animal that causes little damage to agriculture or natural ecosystems in one area may cause significant problems in another. Certain non-native species are very successful in their new habitats because they out-compete native plants or animals and have no natural controls (predators, diseases, etc.) in their new area. Hundreds of new species from other countries are introduced intentionally or accidentally to the U.S. each year. Transportation efficiencies make it possible for invasive species to travel around the globe in hours and make it possible for organisms to survive transportation from one continent to another. At least 200 well-known, high-impact, non-native species presently occur in the U.S.

As more adaptable and generalized species are introduced to environments already impacted by human activities, native species are often at a disadvantage to survive in what was previously a balanced ecosystem. While invasive species primarily cause environmental damage and degradation, there are situations in which serious threats to public health and well-being can occur due to animal disease or plant/animal infestation. Invasive species can also create serious public safety threats; some invasive insects can cause significant damage to trees (disease or death) and may lead to partial/total tree collapse.

Terrestrial species are likely to have more public awareness than aquatic ones. Although there have been well-publicized aquatic species of concern (e.g., zebra mussels, Asian carp), people tend to be more aware of the impacts of terrestrial species, unless their recreational or business activities are impacted by aquatic species.

Climate Change Considerations

Due to the lengthening of Michigan's growing season, species that had been previously found only in warmer areas to the south have started to appear. As seasonal temperatures fluctuate, invasive species can establish themselves in previously inhospitable climates. While the definition of invasive species specifically refers to species introduced by humans, to distinguish

these patterns from naturally occurring ones, species transported by human action can be more likely to survive as climatic changes occur.

Historical Occurrence

Due to Baraga County's large amount of forest coverage, lakes, and rivers, both terrestrial and aquatic species have been found throughout the County. There have been over 3,800 reported locations of invasive species, most of which are terrestrial invasive plants,¹⁹ and 219 invasive species reported.²⁰ The Keweenaw Invasive Species Management Area (KISMA) is a partnership between many organizations throughout Houghton, Keweenaw, and Baraga Counties as well as Ottawa National Forest. The goal is to facilitate cooperation and education among federal, state, tribal, local groups and landowners in prevention and management of invasive species across land ownership boundaries.

The following are some examples of reported invasive species that have been found or threaten the local ecosystem in Baraga County:

Invasive Insects

Emerald Ash Borer (*Agrilus planipennis*): First discovered in southeastern Michigan near Detroit in 2002, this exotic beetle has killed hundreds of millions of ash trees throughout the U.S. Adult emerald ash borers (EAB) feed on ash foliage but cause little damage. The larvae feed on the inner bark of the ash trees, disrupting the tree's ability to transport water and nutrients. Many trees lose approximately 30 to 50 percent of their canopy in one year and the tree is often killed after 2-3 years of infestation. Most devastation has occurred in southeast Michigan, where about 20 million trees have been killed. EAB has not been reported within Baraga County,²¹ but due to its proliferation in nearby counties, it may have an unreported presence.



Emerald ash borer adult (a), larvae (b), and damage (c) to ash trees. (David Cappaert (a, b) and Troy Kimoto (c))

Gypsy moth (*Lymantria dispar*): Typically found on oak and aspen leaves, the Gypsy moth defoliates trees, leaving trees vulnerable to diseases and other pests. The damages can lead to tree mortality. When there are large populations of gypsy moths, tree debris (e.g., branches and twigs) and frass (tree sawdust) may occur, disrupting outdoor recreation.

¹⁹ Midwest Invasive Species Information Network. Data Map by State and County. www.misin.msu.edu

²⁰ Early Detection & Distribution Mapping System. www.eddmaps.org

²¹ Emerald Ash Borer Story Map. www.aphis.usda.gov/aphis/maps/plant-health/eab-storymap

Spotted Wing Drosophila (*Drosophila suzukii*):

The Spotted Wing Drosophila (SWD) is a small vinegar fly with the potential to damage many fruit crops. It was first detected in Michigan in late September 2010. Unlike most other vinegar flies that require damaged fruit to attack, SWD causes damage when the female flies cut a slit and lay eggs in healthy fruit. This insect is a pest of most berry crops, cherries, grapes and other tree fruits, with a preference for softer-fleshed fruit. Given the propensity for this insect to spread and its potential to infest fruit, it is important to learn about monitoring and management of SWD to minimize the risk of larvae developing in fruit and affecting fruit marketability.²²



Adult Female Spotted Wing Drosophila
(Hannah Burrack, North Carolina State University)

Invasive Plants

Wild parsnip (*Pastinaca sativa*): Wild parsnip has been found in Michigan since 1838 and was originally introduced to the U.S. as a food source. It is commonly found growing in open areas, fields, roadsides, and disturbed areas and can grow in a variety of soil types and moisture levels. Wild parsnip can spread through seeds carried by wind, water, and equipment. This kind of parsnip is also a human health hazard. The sap found in the stem, leaves, and flowers contain a chemical that increases skin sensitivity to sunlight and cause severe rashes or blisters. Wildlife and domesticated animals are also vulnerable.

Spotted knapweed (*Centaurea stoebe*): Spotted knapweed is commonly found on dry sandy soil in disturbed areas near roads and abandoned farms or in dry dunes or prairies. It was introduced into the U.S. in the 1890s from Eurasia and can outcompete native plants due to its ability to emit a chemical into the soil that is toxic to surrounding plants. While it is considered an invasive weed, it is also known for the honey that bees make from its nectar (Star Thistle Honey).



Eurasian watermilfoil (Chris Evans, University of Illinois)

Invasive Aquatic Plants

Eurasian watermilfoil (*Myriophyllum spicatum*): Eurasian watermilfoil (EWM) is an aquatic plant that was found in Michigan freshwater lakes during the 1960s. EWM has spread quickly throughout all U.P. counties. Stem fragments, which can be attached to fishing lines or boats, can take root and form a new colony after being transported from one water body to another. It

²² Rufus Isaacs, Noel Hahn, Bob Tritten, and Carlos Garcia. (2010) MSU Extension Bulletin E-3140. Spotted Wing Drosophila. Michigan State University <https://www.canr.msu.edu/ipm/uploads/files/E-3140.pdf>

forms thick underwater vegetation mats that shade out native plants and impedes recreational activities, such as swimming, fishing, and boating. Prime EWM habitat include lakes that have been disturbed by watershed runoff, shoreline construction, or stressed by pollution. If a lake has a healthy population of native aquatic plants, EWM has a hard time establishing itself in the lake.

Purple loosestrife (*Lythrum salicaria*): Purple loosestrife thrives in shorelines, roadsides, and wetlands. It is a perennial invasive plant and can spread quickly, replacing native vegetation which reduces food, shelter, and nesting sites for turtles, birds, frogs, and other wildlife. Seeds can germinate in water, but it prefers shorelines that are not always flooded. Purple loosestrife was first introduced to the U.S. in the 1800s from Europe as an ornamental plant and for bee keeping. It has since spread to every U.S. state.

Invasive Aquatic Species



Zebra mussel (Photo: A; Randy Westbrooks, Invasive Plant Control, Inc.) and *quagga mussel* (Photo: B; Amy Benson, USGS)

Dreissenid Mussels (including Zebra Mussels and Quagga Mussels); family *Dreissenidae*: Dreissenid mussels have been present in the Great Lakes since the late 1980s and were transported to the area via ballast waters from shipping barges. Both mussels can attach to hard surfaces, clogging water intake pipes and fouling other hard-shelled animals such as clams. Zebra mussels have significantly reduced plankton populations, as mussels are filter large volumes of water for food, which can deplete food resources of larval and planktivorous fishes like smelt and alewife. This also results in an increase in water clarity and an increase in aquatic plants. Clear water is aesthetically pleasing, but the clarity indicates that there have been drastic changes at the base of the food web. While more attention has been given to the zebra mussels, quagga mussels have a large spatial extent in the Great Lakes as it can tolerate colder and deeper waters than zebra mussels.



Sea lamprey attached to a fish (A; U.S. Fish and Wildlife Service) and mouth (B; Angela Yu)

Sea lamprey (*Petromyzon marinus*): Sea lampreys were first discovered in the Great Lakes in the 1800s and its introduction into Lake Superior has caused serious decline in fish populations and an alteration of the ecosystem. The lamprey uses its suction cup like mouth to latch onto the skin of a fish and scrapes away tissue with its sharp probing tongue and hooked teeth. Secretions in the lamprey's mouth prevent the victim's blood from clotting and the lamprey sucks the blood from the fish. Victims typically die due to excessive blood loss or infection. The sea lamprey has played a significant role in the decline of Lake Superior lake trout, a key predator fish, which has allowed other invasive fish species, such as the alewife, to explode in population. Control efforts to mitigate the impacts of lamprey have been used, but it is still present in the Great Lakes.

Occurrence Probability and County Vulnerability

The probability of future occurrence for invasive species for Baraga County is high and will rise due to the continual transport of goods and expanding global trade. This has created opportunities for many organisms to be transported to and establish themselves in new countries and regions. There are several invasive species that have yet to be found in Baraga County or surrounding area, but once established, they are hard to eradicate because most people will not notice their presence until the damage is already done.

The entire population is vulnerable to invasive species because the hazard primarily impacts the environment. The destruction that invasive species have on woodlands and water features ultimately impacts humans by diminishing the positive features that nature offers and diminishing our food supply. A widespread insect infestation, such as from the Emerald ash borer, can create serious public safety threats due to dead and dying trees being fire prone (due to their dry, brittle nature) or to partial/total collapse due to high winds or ice/snow accumulation. The falling trees or limbs can bring down power lines, cause damage to public and private structures, and cause injuries or death. Transportation infrastructure is also vulnerable to damage as tree debris can fall onto roadways and trails, blocking commuters, trail users, and emergency response vehicles.

Geological Hazards

The following outline summarizes the significant geological hazards covered in this section:

1. Earthquakes
2. Subsidence (Ground Collapse)

Although some states recognize “landslides” as an additional hazard, Michigan’s geology and history tends to make it more prone to land subsidence instead. Michigan’s two main vulnerabilities to ground movement are therefore identified in the sections on earthquakes and subsidence hazards.

Earthquakes

Hazard Description

Earthquakes range in intensity from slight tremors to great shocks. They may last from a few seconds to several minutes or come as a series of tremors over a period of several days. Earthquakes usually occur without warning; however, scientists cannot yet predict exactly when or where an event will occur. Earthquakes tend to strike repeatedly along faults, which are formed where tectonic forces in the Earth’s crust cause the movement of rock bodies against each other. Risk maps have been produced which show areas where an earthquake is more likely to occur.

Most areas of the country are subject to earthquakes, including parts of Michigan, and they occur thousands of times a year. Most earthquakes are minor tremors and results in little or no loss of life, property, or essential services. However, earthquakes are dangerous because they can cause severe and sudden loss and devastation without warning. Deaths and injuries are caused indirectly through the collapse of structures. Earthquakes are measured by their magnitude (amount of energy released at the epicenter) and intensity (measure of damage done at one location; essentially the same as "severity" as classified throughout this plan). The Richter Magnitude Scale is commonly used to determine earthquake magnitude, and the Modified Mercalli Intensity Scale is used for intensity. A 5.0 on the Richter Scale is a moderate event, while an 8.0 is a catastrophic event. The Mercalli Intensity Scale describes 12 increasing levels from imperceptible to catastrophic.

Michigan is not located in an area subject to major earthquake activities. Although there are faults in the bedrock of Michigan, they are now considered relatively stable. Earthquake risks in Michigan are generally low, which means structures or utilities are not necessarily built to withstand even small seismic events. Due to low risk, Michigan may be more vulnerable to an earthquake because of poor preparation.

Historical Occurrence

No severely destructive earthquake has ever been documented in Michigan. However, several mildly damaging earthquakes have been felt since the late 1700s. Earthquake tremors have been

felt in the Michigan Territory, with the earliest recorded in 1811. Up to nine tremors from the New Madrid Seismic Zone, which runs from Cairo, Illinois through New Madrid, Missouri to Marked Tree, Arkansas, were reportedly felt in Detroit. Since then, there has been only questionable activity in the Upper Peninsula, occurring in the Keweenaw Peninsula in 1905, 1906, and 1908. While there were explosions and ground shaking felt as far away as Marquette, it is believed to have been from pillars collapsing in local mines.

Occurrence Probability and County Vulnerability

As there are no documented occurrences of an earthquake in Baraga County, there is a very low – zero – likelihood of an earthquake occurring in future anywhere in Baraga County. There are no documented faults within or near Baraga County. Severity would also be low, as any physical effect of an incident on Baraga County would be weak and indirect.

Subsidence (Ground Collapse)

Hazard Description

Subsidence is depressions, cracks, and sinkholes in the ground surface that can threaten people and property. When there is a collapse or lowering of a land surface, it can be caused by a variety of natural or human-induced activities. Natural subsidence occurs when the ground collapses into underground cavities due to the solution of limestone or other soluble materials, such as salt and gypsum, by groundwater. Overtime, the dissolution of rock into groundwater can create a void that may be subject to sudden and catastrophic collapse, causing a sinkhole. Human-induced subsidence is caused mainly by groundwater withdrawal, drainage of organic soils, and underground mining. In the U.S., these activities have caused more than 17,000 square miles of surface subsidence, with groundwater withdrawal as the primary culprit.

In Michigan, the greatest risk of subsidence is associated with underground mining. Mine subsidence is a geologic hazard that can occur with little or no warning. It occurs when the ground surface collapses into underground mine areas. Strain from geological movements, additional surface loading, and vibrations from truck traffic and other industrial machinery can cause the ground above and around old mines to sink and collapse. Industrial or residential developments that are near or above active or abandoned mines are threatened by subsidence due to their proximity to underground cavities. Mine subsidence can cause damage to buildings, disrupt underground utilities, and be a potential threat to human life.

The legacy of underground mining can be felt throughout the state. Many of the underground mining areas, whether active or abandoned, are vulnerable to subsidence in some form. Unfortunately, records of abandoned mines are often sketchy and sometimes non-existent; it is often difficult to determine exactly where the mines were located. Many areas throughout the state may have been developed over abandoned mines and may not be aware of it. While underground mining has fueled economic growth in many parts of the state, it has left a legacy or threat of subsidence. Old, abandoned mines will eventually begin to collapse under their own weight or human neglect and oftentimes can swallow up whatever is built upon them.

Historical Occurrence

Michigan has a rich mining heritage and a wide variety of mineral resources, most notable of which are copper ore, iron ore, sand, gravel, coal, salt, oil, and gas. Underground mining has occurred on a significant scale throughout Michigan's history. Michigan's Lake Superior region has been home to significant copper mining operations since the mid-1800s. Mining activity ended in 1960s, when the last shipment of copper sent out.

There are over 800 underground mines in Michigan, with more than 2,300 or other openings. Many mines were opened in the 1840s and even though many mine sites have been inspected by a county mine inspector, some are still unknown and/or unmarked (**Map 5.6**).

There are very limited records of the locations of shafts, and the extent of underground minds and proximity to surface to the surface may be unknown. A Michigan Abandoned Underground Mine Inventory was completed in late 1998.²³ This inventory includes information about the location of shafts and mine extent however copies of the report are limited to the DNR and County Mine Inspectors. Distribution is limited to prevent the materials from becoming guides to potentially dangerous locations.

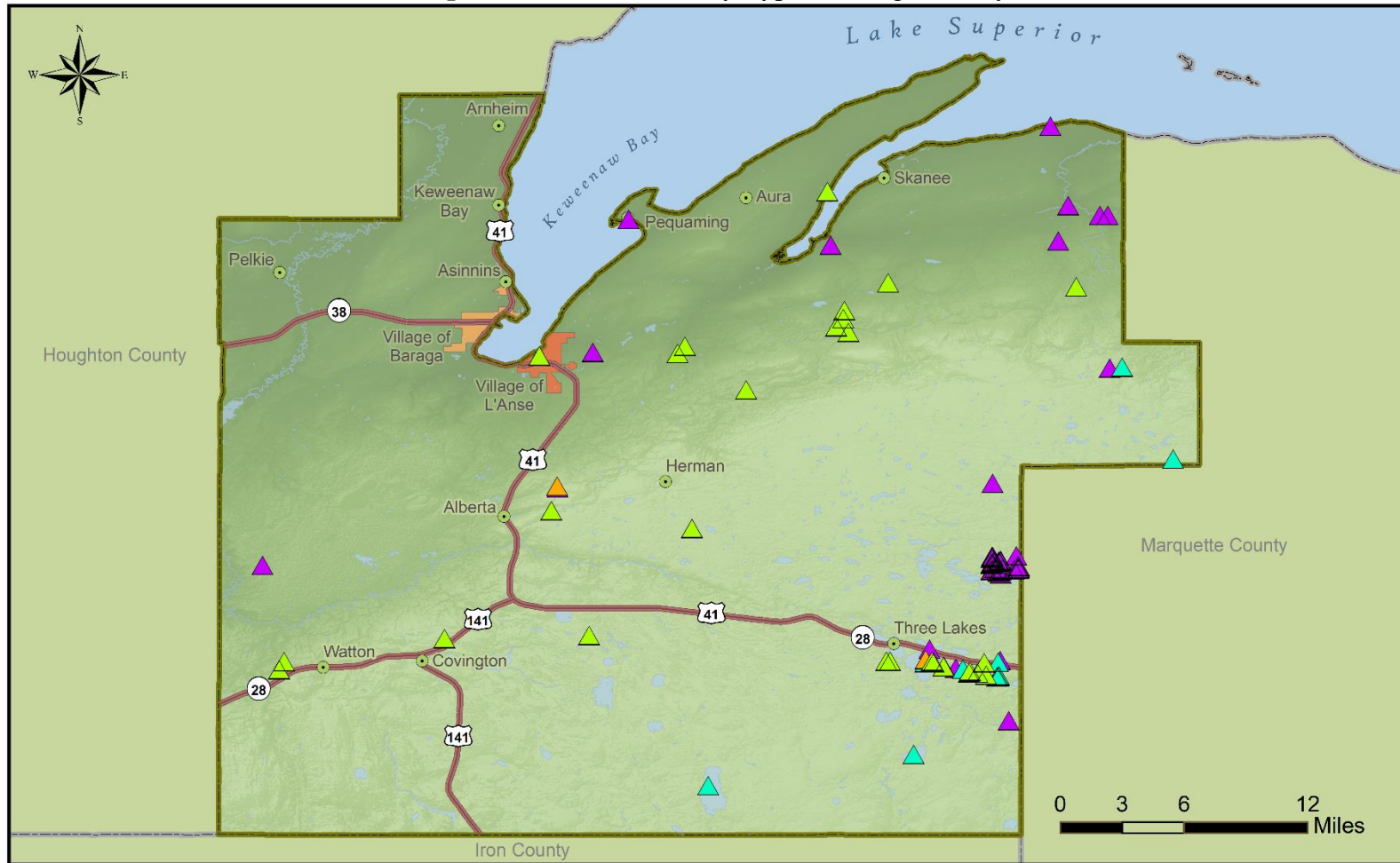
Baraga County is included in the "Iron Range" area of the U.P. Starting in the mid-1800s, iron ore mining occurred in the county as well as in nearby Dickinson, Gogebic, Iron, Marquette, and Menominee Counties. Nearly two billion tons of iron ore have been extracted from these areas. Economic forces led to the closure of many of the underground iron mining operations in the region. However, there are a couple of open-pit mines still generating in the area. Neither are in Baraga County. Despite this mining history, subsidence has not been a significant event in Baraga County. While there have been minor cave-ins near Alberta (L'Anse Township) and in Spurr Township, most known open shafts throughout the County have been fenced.

Occurrence Probability and County Vulnerability

Probability of a significant subsidence event is low based on known past incidents, but the possibility of unknown occurrences may mean probability is higher than expected. Baraga County does not have the extensive mining history of other areas in the Western U.P. Only a slight risk exists because of unknown hazards. In consideration of current remediated conditions of the county's small number of mine shafts, probability of subsidence is very low. Severity would likely be low to moderate depending on the site. Areas that are most vulnerable to subsidence is Spurr Township and some areas around M-28 due to the presence of known historic iron mines.

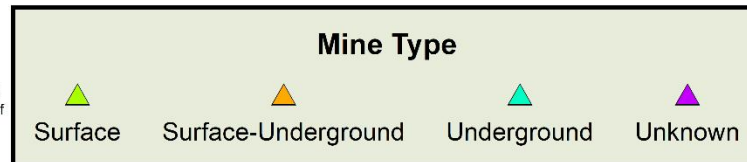
²³Michigan Underground Abandoned Mine Inventory. <https://researchworks.oclc.org/archivegrid/data/717282963>

Map 5.6: Mine Locations by Type in Baraga County



Mine Locations Baraga County, Michigan

Boundary data was derived from Michigan's Open Data Portal. DEM was derived from elevation data available through the USGS. Mine location data was downloaded from the National Mine Repository <https://mnr.osmre.gov/> and the U.S. Geological Survey <https://mrdata.usgs.gov/mrds/>. Created by WUPPDR April 2019 Office of Surface Mining Reclamation and Enforcement Disclaimer: Mine maps within the Office of Surface Mining Reclamation and Enforcement (OSMRE), National Mine Map Repository (NMMR) are not guaranteed to be accurate, correct, or complete. All maps in the NMMR have been donated to the OSMRE. The information contained therein cannot be verified and so cannot be guaranteed.



Technological Hazards: Industrial Hazards

The following outlines the significant industrial hazards that are covered in this section:

1. Scrap Tire Fires
2. Structural Fires
3. Hazardous Materials: Fixed Site Incidents
4. Hazardous Materials: Transportation Incidents
5. Petroleum and Gas Pipeline Accidents

This section covers many related types of events that stem from breakdowns or weaknesses in the industry and the built environment. Unlike ordinary fires and wildfire events, scrap tire fires are a special case of industrial hazard as these types of fires involve toxic smoke and chemical residues that have more in common with hazardous material incidents. This is also the case for structural fires, as it considers various types of large fires that occur among important buildings or structures. This hazard analysis focuses on larger-scale fires that have greater potential to affect an entire community, either through a fire's magnitude or through the vital nature of the facilities or resources that it affects.

The other hazards listed, specifically dealing with hazardous materials, cover a wide array of extremely hazardous substances across diverse situations that typically involve industrial or warehousing operations. Fixed site incidents include a consideration of fire-related industrial accidents and explosions, even if these did not involve a hazardous substance. The emphasis is on events of a relatively large magnitude, particularly those that resulted in a community states of emergency, evacuations, impairment or loss of economically significant or critical facilities, or multiple casualties.

Overlap with Other Sections of Hazard Analysis

Various types of structural, scrap tire, and industrial fires may be caused by other large-scale disaster events, such as lightning strikes which cause direct ignition of structure fires and the destruction caused by tornadoes could also lead to a fire. Additionally, wildfires have a clear potential to ignite structures and scrap tire piles. A structural fire involving a critical facility has the potential to cause infrastructure failures, energy emergencies, flooding, wildfires, dam failures, and transportation accidents.

Scrap Tire Fire

Hazard Description

A scrap tire fire is a large uncontrollable fire that burns scrap tires being stored for recycling or reuse. Scrap tire fires are dangerous because they can require significant resources to control and extinguish, often beyond the capability of local fire departments. Furthermore, the extreme heat from the fire can convert a standard automobile tire into about two gallons of oily residue. This residue can leach into soil or runoff into surrounding waterways, creating an environmental

hazard. Scrap tire fires may also require temporary evacuation of some residences and businesses and even close roadways.

Michigan generates approximately 10 million scrap tires each year. Whole tires are banned from disposal in Michigan landfills due to their associated problems. Stockpiled tires can be breeding grounds for mosquitoes and can be homes to snakes and other small mammals (rats, opossums, raccoons). Although responsible means of tire storage and disposal have become more common, tire dumps of the last 40 years still present environmental and safety hazards.

Historical Occurrences

There are no licensed or other known scrap tire facilities in Baraga County. Still, hazard risk is highlighted by projects such as a scrap tire removal effort in Arvon Township in recent years. L'Anse Warden Electric Plant presents some risk of fire due to its storage and burning of a large stockpile of scrap railroad ties, treated as biomass fuel, stored on the lot of the facility. These are handled very carefully with the understanding that they pose this risk.

Occurrence Probability and County Vulnerability

There have been no known scrap fire tire incidents in Baraga County. An additional but unknown risk exists due to the possibility of unknown and unlicensed storage areas. Probability of future occurrences based off previous incidences is low due to heavy regulation of scrap tire collection sites. However, the severity of the possible event is high as a small mistake on either a register or unregistered site can spark a severe fire – particularly where regulation is nonexistent.

Structural Fires

Hazard Description

In terms of average annual loss of life and property, structure fires are by far the most common and significant hazard facing communities in Michigan and across the country. Structural fires cause more property damage and loss of life than all types of natural disasters combined. These fires include any fire in or on a building or other structure, even if the structure itself was not damaged. Direct property losses due to fire exceed \$9 billion per year countrywide and much of that figure is the result of structural fires. In 2017, there were 13,523 structure fires statewide resulting in over \$415 million in losses and 104 deaths. Most deaths are due to structural fires in homes. In Michigan, residential fires account for 72.4% of all structural fires and cause nearly 82% of fire fatalities.

Structural fires can cause displacement and homelessness, in addition to serious injuries, death, and economic losses. Beyond the small-scale structural fires that only impact a single home or two, emergency management authorities are primarily focuses on disaster level events involving multiple or major structures such as hotels, college residence halls, and major employers and community facilities (e.g., schools and hospitals). Structural fires occur more frequently than other Michigan hazards and often cause more deaths, injuries, and property damage.

Historical Occurrence

Schools and several other multi-unit housing complexes in the urban areas of the County pose higher risk. Due to an older housing stock, compact development in downtown areas, and remote development, Baraga County is susceptible to fire. The County has several fire departments available to respond, along with mutual aid agreements with neighboring jurisdictions, to deal with structural fires. Education and functional fire detectors can often mitigate the loss from this hazard.

Structural fires are of special concern in Baraga County because many of the buildings were built in the early 1900s or before. Many of these older homes, as well as numerous camps and cabins in the woods, are also heated by wood-burning stoves, placing them at additional risk. Homes also fall vacant and become dilapidated over time, decreasing maintenance and monitoring and increasing fire risk, which becomes an even greater problem with absentee property ownership. In 2008 there were 31 fires reported in Baraga County resulting in \$180,600 in damage. Of the total fires, 16 percent were considered arson or were suspicious.

On May 27, 2019, a deadly barn fire at a major egg-producing local farm occurred in Pelkie, killing 3,000 hens and incurring estimated damage of \$250,000. The fire took over four hours to put out. Although volunteer firefighters from Pelkie, L'Anse, and Baraga all responded to the fire, two barns and a semi-trailer were also damaged.



Pelkie Barn destroyed following structure fire, May 27, 2019 (Source: Upper Michigan Source)

Occurrence Probability and County Vulnerability

Due to an older housing stock, compact development in downtown areas, and remote development, Baraga County is susceptible to fire. Probability is very high with potentially extreme severity throughout the County. Severity is highest in the cities and villages with large housing complexes. The County has multiple fire departments with mutual aid agreements in place to respond to structural fires. Education and operational fire detectors can often mitigate the loss from this type of hazard. L'Anse has a fire rating of 4, with a trained volunteer department and equipment. However, more rural communities away from the hydrant systems of the township can lead to slow response time and require supplying water.

Historically, the frequency of fires is 38 per year based on an average from 2002 to 2003 occurrences, so probability is very high in most areas. Average property losses per year for the same period were \$2,641,050. Severity is closely connected to damages incurred, which vary greatly by case and are impossible to predict.

Hazardous Materials: Fixed Site Incident

Hazard Description

As new technologies have developed, hazardous materials are present in quantities of concern in business and industry, agriculture, universities, hospitals, utilities, and other facilities. Hazardous materials, if released, pose a potential risk to life, health, property, or the environment due to their chemical, physical, or biological nature. Examples of hazardous materials include corrosives, explosives, flammable materials, radioactive materials, poisons, oxidizers, and dangerous gases.

Hazardous materials are highly regulated by federal and state agencies to reduce the risk to the public and environment. Despite precautions to ensure careful handling during the manufacture, transport, storage, use, and disposal of these materials, accidental releases do occur. Areas at highest risk are within a one to five-mile radius of identified hazardous material sites. Many communities have detailed response plans in place to mitigate the harm to people, property, and the environment from hazardous materials.

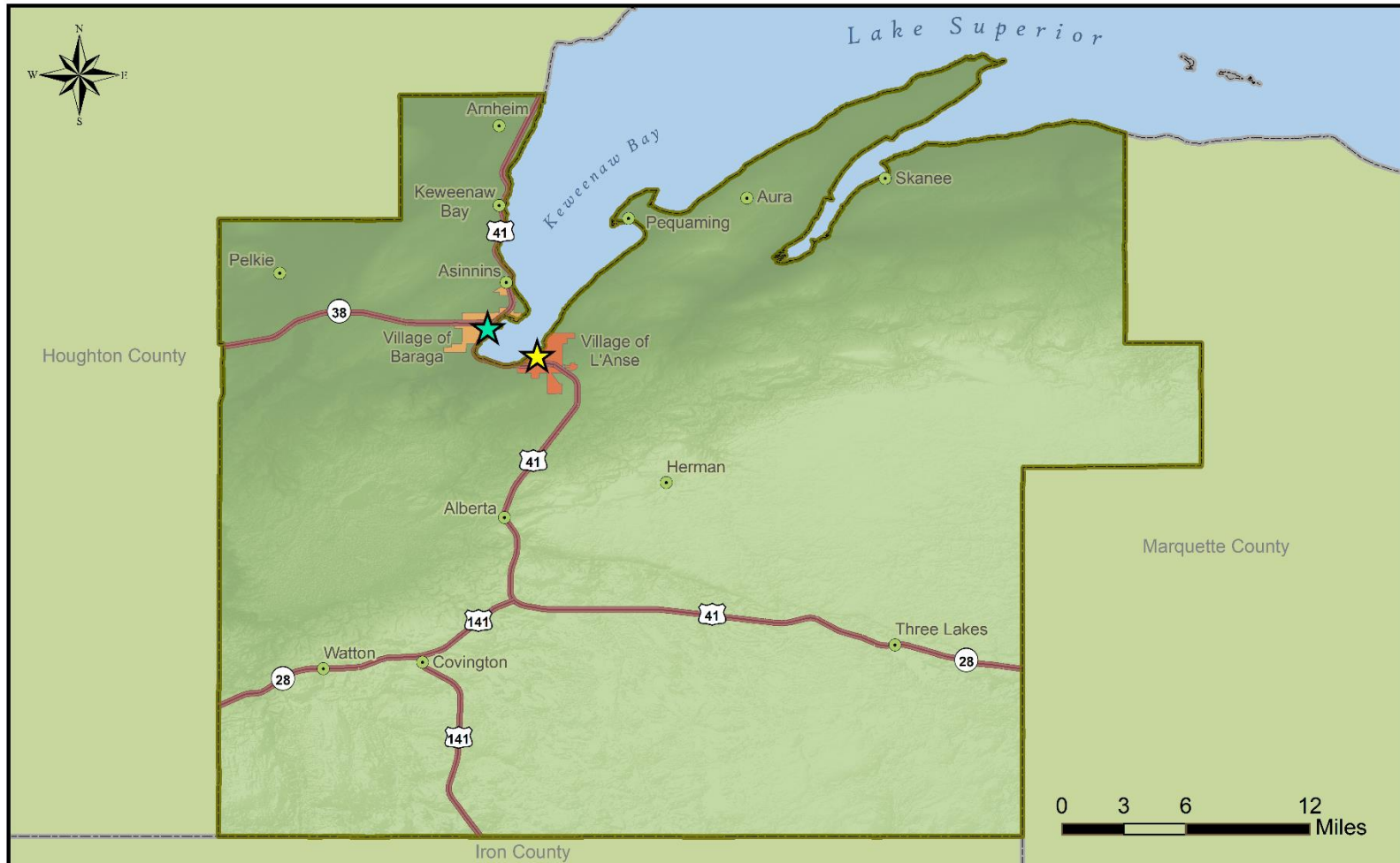
Historical Occurrences

There are only a few facilities within Baraga County with supplies of Extremely Hazardous Substances that require reporting under the Superfund Amendments and Reauthorization Act (SARA) Title III. Title III identifies what steps facilities, the State, and local communities must take to protect the public from hazardous materials accidents. Facilities within Baraga County that must report under Title III include water treatment facilities that store chlorine, and a telephone office with minor amounts of sulfuric acid. Besides these Title III sites, a risk is posed by industrial manufacturing and utility companies – namely CertainTeed and L'Anse Warden Electric Company, located in the Village of L'Anse (**Map 5.7**).

In 2019, Keweenaw Bay Indian Community received a grant from the United States Environmental Protection Agency to modernize their environmental data reporting system and provide better access to the nationwide inventory of toxic releases.²⁴

²⁴ <https://www.uppermichiganssource.com/content/news/Grant-to-help-Michigan-tribe-boost-environmental-reporting-507398881.html>



Map 5.7: Toxic Release Sites in Baraga County



Toxic Release Sites Baraga County, Michigan

Boundary data was derived from Michigan's Open Data Portal; DEM was derived from elevation data available through the USGS; Toxic release & Superfund data was downloaded from Specialized Information Services & the National Library of Medicine** <https://toxmap.nlm.nih.gov/toxmap/download.html> Created by WUPPDR May 2019 ***<https://www.nlm.nih.gov/toxnet/index.html> TOXMAP was retired 16 December 2019 Underlying data remains accessible through their original resources: Government of Canada National Pollutant Release Inventory (NPRI), U.S. Census Bureau, U.S. EPA Clean Air Markets Program, U.S. EPA Geospatial Applications, U.S. EPA Facilities Registry System (FRS), U.S. EPA Superfund Program, U.S. EPA Toxics Release Program (TRI), U.S. NIH NCI Surveillance, Epidemiology, and End Results Program (SEER), U.S. Nuclear Regulatory Commission (NRC)

Toxic Release Sites

-  Certaineed Ceilings Corps
-  Terex Telehandlers Baraga



Occurrence Probability and County Vulnerability

Chemicals that are being used in Baraga County are isolated and in relatively small quantities. Other materials that could cause an incident are carefully controlled to meet or exceed environmental laws. Probability of a fixed-site hazardous materials incident is thus low based off a lack of previous incidents, and severity is predicted to be low to moderate, but the hazard should be recognized as a concern.

Hazardous Materials: Transportation Accident

Hazard Description

Due to the extensive use of chemicals in society, all modes of transportation – highway, rail, air, marine, and pipeline – are carrying thousands of hazardous materials shipments daily through local communities. A transportation accident involving any one of those hazardous material shipments could cause a local emergency affecting many people. Areas at greatest risk are those within one to five miles from major transportation routes.

Michigan has had numerous hazardous material transportation accidents that affected the immediate vicinity of an accident site or a small portion of the surrounding community. They are effectively dealt with by local and state emergency responders and hazardous material response teams. Large-scale or serious hazardous material transportation incidents that involve a widespread release of harmful material can adversely impact the life safety and/or health and well-being of those in the area surrounding the accident site. Statistics show that most hazardous material transportation incidents are the result of an accident or other human error. Rarely are they caused simply by mechanical failure.

Michigan has not had a large-scale, serious hazardous material transportation incident, but has had numerous small-scale material transportation incidents that required a response by local fire department and hazardous material teams, and many events also required evacuations and other protective actions.

Historical Occurrences

Highway M-28 through Baraga County is a major transportation route for trucks traveling to and from Canada. The types and amounts of hazardous materials transported on trucks traveling this route are often unknown. While there are State and Federal restrictions on the transport of hazardous materials, this information is not required to be passed on to the local units of government potentially affected by a transportation accident. However, the county Emergency Manager receives notices for passage of aqueous ammonia trucks passing through the county. Baraga County has many miles of shoreline susceptible to shipping accidents on Lake Superior and its many rivers and streams.

On August 26th, 2019, a fatal collision involving a semi-truck and a passenger vehicle spilled fuel in a L'Anse portion of US-41. 140 gallons of fuel was spilled on the road. Road traffic was re-routed through Bruce Crossing due to the inability to create a local detour around the crash for six hours.



Fatal traffic accident on US 41 between the Villages of Baraga and L'Anse on August 26, 2019. (Source: WLUC TV6)

While there are State and Federal restrictions for the transport of hazardous materials, this information is not required to be passed on to the local units of government potentially affected by a transportation accident.

Occurrence Probability and County Vulnerability

In Baraga County, the probability of a hazardous materials transportation accident is low based on history, but there is a considerable risk. This is due to the high level of Canadian and American trucking traffic, proximity to shipping channels, and gasoline transmission lines within the county. Areas most susceptible and have a higher probability of experiencing an accident are corridors near major transportation routes, including HWY 41, M-26, and M-38, and the immediate shorelines of Lake Superior. Damage estimates for the previous events are unavailable, but potential severity of an events could range from low to extreme.

Petroleum and Natural Gas Incidents

Hazard Description

Often overlooked as a hazard because most petroleum and natural gas infrastructure in the state is underground, these pipelines can pose a real threat to many Michigan communities. Petroleum and natural gas pipelines can leak or fracture, causing property damage, environmental contamination, injuries, and even loss of life. Most pipeline accidents that occur in Michigan are caused by third party damage to pipelines, often due to construction or some other activity that involves trenching or digging operations. Many structures are located right next to pipelines and thus may be at risk. Pipelines can also cross through rivers, streams, and wetlands, thus posing the possibility of extensive environmental damage in the event of a major failure.

Michigan is both a major consumer and producer of natural gas and petroleum products. Michigan is the largest residential liquefied petroleum gas market in the nation due mostly to high residential and commercial propane consumption. The state has a single petroleum refinery but a large network of product pipelines. More than 78% of the overall home heating market uses natural gas as its primary fuel. Michigan also has the greatest underground natural gas storage capacity in the nation and supplies natural gas to neighboring states during high-demand winter months. The state has a highly developed and extensive gas and petroleum network, representing every sector of the two industries: from wells and production facilities to cross-county

transmission pipelines that bring the products to market, storage facilities, and finally to local distribution systems.

While petroleum and natural gas industries have historically had a fine safety record, and pipelines are the safest form of transportation for these products, the threat of fires, explosions, ruptures, and spills still exists. In addition to these hazards, there is a danger of hydrogen sulfide (H₂S) release. Hydrogen sulfide is not only an extremely poisonous gas but is also explosive when mixed with air at temperatures of 500 degrees Fahrenheit or above.

Historical Occurrence

Baraga County is bisected by two Northern Natural Gas pipelines (**Map 5.8**). One travels east to west along the southern third of the County, whereas the second branches off from the east-west line and runs north toward Houghton along the eastern edge of the county. Propane storage facilities in Baraga County include Northern Oil, Ferrellgas, and LaCourt.

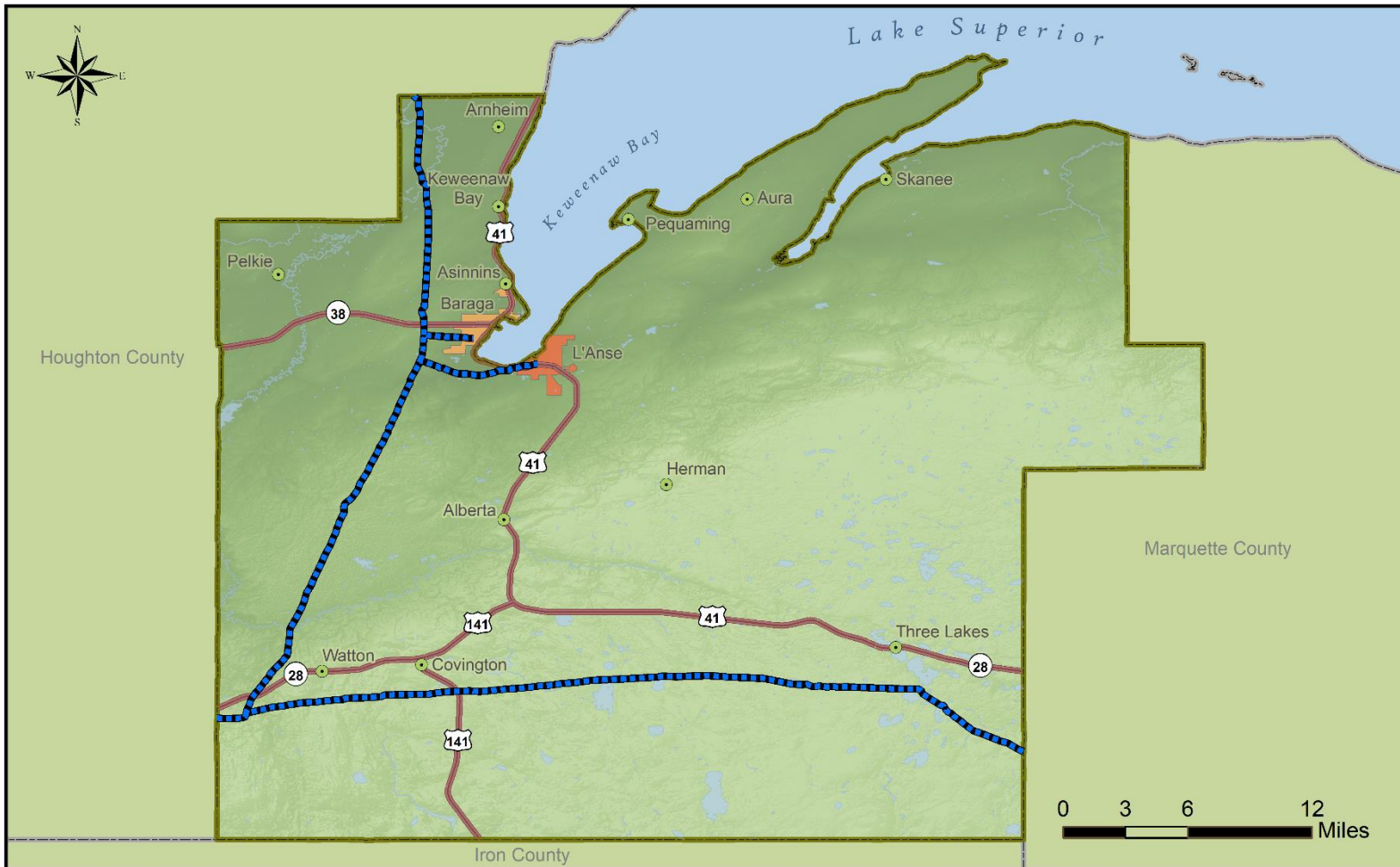
On December 23, 2016, 1,200 people in the village of L'Anse went without natural gas service after a driver collided with a Semco Energy gas line station in the early morning. The accident caused damage to the gas line and a subsequent fire. Service was restored the next day.

There is risk of a natural gas pipeline incident in Baraga County due to aging transmission lines or sabotage. Natural gas transmission lines present the greatest risk due to their remoteness, which may allow a leak to go undetected for an extended period. Though it is not uncommon for minor pipeline leaks to occur, the probability of a significant incident is low, and the same is true for petroleum events.

Occurrence Probability and County Vulnerability


Probability of a propane incident based off previous incidents is low, as no incidents have been reported. The probability exists all throughout Baraga County though more likely where storage facilities exist; severity would generally be expected to be low to moderate. A single-tank petroleum explosion could happen on any site where one is located, but probability of either type of fuel event is otherwise very low in rural areas away from natural gas lines. Consequences of a natural gas pipeline leak are mostly ecological or environmental, as pipelines are located underground and generally in sparsely developed areas, but evacuations are necessary for residents in the immediate surroundings due to the possibility of inhalation or an explosion.

Map 5.8: Pipelines in Baraga County



Pipelines Baraga County, Michigan

Boundary data was derived from Michigan's Open Data Portal; DEM was derived from elevation data available through the USGS; Pipeline and incident locations were estimated using the National Pipeline Mapping System (NPMS) Public Viewer; Created by WUPPDR April 2019

Pipelines	
	Gas Transmission Pipeline



Infrastructure Hazards

The following list summarizes the broad types of infrastructure problems covered in this section:

1. Infrastructure Failure and Secondary Technological Hazards
2. Transportation Accidents

Although various industrial hazards involve certain types of infrastructure (e.g., pipelines) and their breakdown, the section titled infrastructure failures and secondary technological hazards focuses on the interruptions in critical life-sustaining infrastructure, such as electricity and water supplies. For example, an electrical black out affects all sectors of society including communications, commerce, government, education, health care, public safety, emergency services, food and water supply, and sanitation.

While technical systems become more efficient, they sometimes become more vulnerable to failures. Many industrial systems operate close to their full capacity and maximum efficiency during times when everything is functioning smoothly and predictably. When something in the operating environment breaks down, as in the case of a disaster or system failure, the system has issues operating outside relatively narrow parameters. The system then become more vulnerable to failure. System management can help, but it still has issues of its own, including lack of ways to overcome coordination problems, interdependencies, and lack of knowledge of system management flexibility.

The section on transportation accidents involves any of the major modes of transportation systems within the county.

Infrastructure Failures and Secondary Technological Hazards

Hazard Description

Michigan's citizens are dependent on public and private utility infrastructure to provide essential life-supporting services, such as electric power, heating and air conditioning, water, sewage disposal and treatment, storm draining, communications, and transportation. When one or more of these utility systems fail due to disaster or other cause, it can have devastating consequences, even if it is over a short period of time. When infrastructure failures occur due to a natural hazard event, this is considered a secondary or cascading technological hazard. For example, during power outages, people can die in their homes during periods of extreme heat or cold if immediate mitigation actions are not taken. When water or wastewater treatment systems in a community are inoperable, serious public health issues can arise and actions must be taken immediately to prevent outbreaks of diseases. If storm drainage systems fail from damage or capacity overload, serious flooding can occur.

All these situations can lead to disastrous public health and safety consequences if immediate actions are not taken. It is the most vulnerable members of society (i.e., the elderly, children, impoverished individuals, and people in poor health) who are most heavily impacted by an

infrastructure failure. If the failure involves one or more system, whole communities and possibly entire regions can be severely impacted.

The risk of infrastructure failure grows each year, as physical and technological infrastructure becomes more complex and the interdependency between various facets of infrastructure (e.g., pipelines, telecommunications lines, and roads) become more intertwined. Additionally, more vulnerable and aging infrastructure (e.g., electrical components, bridges, roads, sewers, etc.) needs repair. Because of this, large-scale disruptions in various components of infrastructure are likely. Major disruptions could lead to widespread economic losses, limit security, and altered ways of life.

Many of the hazards considered in this plan could result in infrastructure failures, and any resulting infrastructure failures are dangerous in Baraga County due to its harsh climate and remoteness. Baraga County is served by a several systems, including power, water treatment, and phone, and loss of any or all of these systems can have a detrimental impact on the functioning of the county. Failure of infrastructure or utilities includes anything from water treatment failure to power outages, which is the most common type of failure and produces a minor interruption of everyday life but has the potential to cause severe problems over a long period of time. While power outages are usually of a short duration—up to a few hours—the implications of an extended outage could affect the health and safety of the community.

Historical Occurrences

Electric service in Baraga County is provided by Upper Peninsula Power Company, We Energies, and Ontonagon County REA, and loss of power to the grid for the area can affect the entire region. Due to the rural nature of the county, trees can fall on power lines in remote locations causing a delay in restoration of service. Trimming trees adjacent to power lines is one way to decrease this risk. Water and wastewater systems, and phone services can also be affected by failure due to aging facilities. Creating redundant systems and outfitting them with generators lessens the impact of such failure. Frequency of power outages is estimated at two per year based on previous incidents.

Failure of US-41 is a large infrastructure threat to the county. An incident preventing passage over the portion of highway in Keweenaw Bay would separate people on the western side from the eastern and would result in long detours and delays.

Water treatment and sewer facilities can also experience contamination and/or other problems that can impact the community's operations. According to County Road Commission engineer Douglas Mills, a fiber optics line was burned during a bridge fire, resulting in cellphone outages. Loss of communications can become a crisis in an emergency.

Occurrence Probability and County Vulnerability

Based on previous occurrences of power loss and communication failure – the best indicators of infrastructure failure – probability is high throughout the County, with an estimated frequency of 2 events per year. Numerous factors contribute to the impact of an infrastructure failure, including services affected, weather conditions, response capabilities, and time of day, but

overall severity is low throughout the County. Probability of future occurrences is similar countywide, but the severity from failures may be more pronounced in urban areas, where communities are more reliant on commuting and systems served by utilities. Necessary contingency planning is required and established through a group of emergency officials that continue to meet regularly.

All municipalities and critical facilities are vulnerable to infrastructure failures. Loss of electrical power, natural gas, or water treatment can cause an immediate significant threat to life, safety, and public health. Some facilities in Baraga County have partial or complete backup power sources (e.g., standby generators), such as hospitals, and some fire/police stations.

Transportation Accidents

Hazard Description

Transportation accidents can occur on land, air, or water. The one commonality all transportation accidents share is that they can result in mass casualties. Although automobile crashes tragically kill many hundreds of Michigan residents each year, this analysis focuses on the types of accidents that are large enough in scale to potentially cause an emergency of disaster-level situation. A major land transportation accident in Michigan has the potential to create a local emergency or to seriously strain or overwhelm local response and medical services. It can involve a commercial intercity passenger bus, a local public transit bus, or a school bus. Air transportation accidents can result in tremendous numbers of deaths and injuries, and major victim identification and crash scene management problems. Water transportation accidents that can involve marine passenger ferries, may require significant underwater rescue and recovery efforts that few local jurisdictions may be equipped or trained to handle. If any of these accidents were to occur in a rural community, an event can easily overwhelm the available resources in these areas.

Michigan has 19 airports with commercial passenger service,²⁵ 72 local bus transit systems serving 85 million passengers, 19 marine passenger ferry services and 3 intercity rail passenger corridors composed of 568 miles of track and serving 22 communities. Baraga County is serviced by an Indian Trails regional passenger bus service, which provides inter- and intrastate transportation. Other transportation services provided in Baraga County include the following: school buses, casino buses, and transit services provided by the senior center.

Historical Occurrence

While there have been minor transportation accidents within the county, there is no history of a large passenger transportation accident in Baraga County.

²⁵ Michigan Department of Transportation Aeronautics – Commercial Service Airports.
www.michigan.gov/aero/0,4533,7-352-79155_79156_79388---,00.html

Occurrence Probability and County Vulnerability

The risk of a large-scale passenger transportation accident is limited by the types of services operating in Baraga County. There is a risk of accidents involving those limited services, but mitigating potential accidents is difficult due to unpredictability. Some methods that are feasible are general emergency response planning and promotion of awareness of hazard intersections, roadways, and driving conditions. The low volume of commercial passenger traffic indicates any potential incident is likely to be isolated and of a small-scale; therefore, probability is low and severity low to moderate. Both factors are mostly uniform throughout the county, but, regarding over-the-road traffic, probability is higher along the same major roadways presenting an increased hazardous materials threat. The probability of an event is low based off previous incidents, but if an accident were to occur, the severity would be high, particularly in communities that are located along major transportation routes. Emergency response plans and awareness of hazardous intersections and roadways are ways to prepare for this type of hazard.

Human-Related Hazards

The following list summarizes the significant human-related hazards covered in this section:

1. Civil Disturbances
2. Public Health Emergencies
3. Sabotage and Terrorism

The civil disturbance hazard now shifts farther beyond the emphasis on prisons that had been a part of its original concept in earlier planning documents. Prison disturbances are still considered a hazard, but these “disruptions” encompasses ongoing social, economic, political, and environmental issues in any society. Emergency management typically deals with recognized disasters and emergency events rather than social problems more broadly. Most civil disturbance events are rooted in other human circumstances. The most probable circumstances may involve reaction to other emergency or disaster events, if overwhelming to or poorly handled by responders or governmental agencies. There are few, if any, historical records of such incidences escalating to the point of a civil disturbance emergency in Michigan.

Public health emergencies have taken on new importance recently, with the rise in concern about global pandemic illnesses. Travel is so rapid and widespread that quickly detecting and containing outbreaks of serious, even lethal, contagious diseases has been considered necessary and given higher priority by numerous levels of government and their partnering agencies. Various natural and technological hazards have the potential to cause significant public health concerns. For example, weather hazards, such as extreme temperatures, flooding, and drought, can affect the quality of drinking water in an area and increase the risk of contagious illness and food contamination.

Terrorism is one of the potential causes of widespread threats to public health, as well as certain types of civil disturbance. In many cases, it may not be immediately clear if an incident was motivated by political causes, some other form or protest, criminal enterprises, or personal

neurosis. It is recommended that human-related hazards be studied together since terrorism and civil disturbances can lead to public health emergencies and other hazards covered in this plan, such as infrastructure failures, transportation accidents, and hazardous materials incidents.

Civil Disturbances

Hazard Description

Civil disturbances, though rare, typically involve protests, hooliganism, riots, and insurrection. Places that may be subject to or impacted by these types of disturbances include government buildings, military bases, universities, businesses, nuclear power plants, and critical service facilities, such as police and fire stations.

Protest, including political protests and labor disputes, usually contain some level of formal organization or shared discontent. They are usually orderly, lawful, and peaceful. However, some may become threatening, disruptive, and even deliberately malicious. When protests become malicious and there is destruction of property, interruption of services, interference with lawful behaviors, use of intimidation or civil rights violations, and threats/actual acts of violence, then it is considered a civil disturbance.

Another kind of civil disturbance is hooliganism, which is relatively unorganized and involves individual or collective acts of deviance inspired by the presence of crowds. Individuals take advantage of situations where there is anonymity and confusion, allowing them to behave in an unlawful or unusually expressive way that is normally considered publicly unacceptable. These individuals may be under the influence of illegal drugs and alcohol and may include criminals and persons with mental illnesses who may either be reacting with extreme hostility to the crowding, noise, and disorder. Common problems include destruction of property, assault and disorderly conduct, and criminal victimization.

Hooliganism and protests that become disorderly may result in riots. Riots may stem from motivations of protest but lacks organization. These events tend to involve violent gatherings of persons whose level of shared values and goals are not alike to allow their collective concerns or efforts to unite in a relatively organized manner.

Lastly, insurrection involves the deliberative collective effort to disrupt or replace the established authority of a government or its representatives by persons within a society or under its authority. Prison uprisings may fall into this category, but it can also be classified as a riot or protest.

Historical Occurrence

There have been no recorded civil disturbance events in Baraga County in recent history. Historically, there have been large-scale strikes during the mining days, but in recent years the only disturbances have been small-scale peaceful protests to war.

Occurrence Probability and County Vulnerability

The risk for a civil disturbance exists in Baraga County because of governmental, educational, and other activities in the area. The probability of an incident is very low throughout the county but perhaps slightly higher in urban areas like in the Village of L'Anse.

Public Health Emergencies

Hazard Description

A public health emergency is the result of widespread and/or severe epidemic, contamination incident, or other situation that presents a danger to or otherwise negatively impacts the general health and well-being of the public. Public health emergencies include disease epidemics, food or water contamination, extended periods without adequate water and sewer services, and harmful exposure to chemical, radiological, or biological agents. The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, many people. An additional effect of public health emergencies is the number of “worried well,” individuals who think they are unwell, who can overwhelm the system by seeking treatment. The greatest emerging public health threat is the intentional release of a radiological, chemical, or biological agent with the potential to adversely impact many people.

Michigan has had several large-scale public health emergencies in recent history, but nothing that has caused widespread severe injury or death. There have been instances of infrastructure failure (widespread loss of water and sewer service in northern Michigan in 1994) and disease threats (foot-and-mouth disease and the West Nile encephalitis virus). No area in Michigan is immune to public health emergencies and areas with high population concentrations are more vulnerable to the threat. Additionally, more vulnerable members of society – elderly, children, impoverished individuals, and persons in poor health – are at higher risk than the general population.

The Western Upper Peninsula Health Department (WUPHD) works towards promoting community health through control of environmental health hazards and addressing the health needs of vulnerable population groups. The department is responsible for addressing and trying to prevent public health emergencies within Houghton, Baraga, Gogebic, Keweenaw, and Ontonagon counties. The Health Department does this by providing State-mandated public health services, such as restaurant inspections, foodborne illness investigation, sewage and well inspections, beach monitoring, and mercury clean-ups.

Exposure to Hazardous Materials

Exposure to hazardous materials can occur through accident, deliberate action, misuse of a product, or through natural means. Most common risks of exposure to materials are chemical in nature but can also be biological or radiological. Many materials are used in industry or in households. Household hazardous wastes come from everyday products that are used in the home, garden, or yard. Oil-based paints, antifreeze, household cleaners, and pesticides are a few

examples. Household hazardous wastes are corrosive, toxic, flammable, or reactive. When hazardous waste is improperly disposed of, such as in the trash, down the sink, or into a storm drain, it poses a threat to water quality, human health, and wildlife. Electronic waste that is improperly handled can pose human and environmental risk of exposure to lead and mercury. In addition to electronic waste, lead and mercury exposure may be due to legacy use of these heavy metals in household items such as paint, thermometers, dental fillings, and electric switches. Exposure to lead and mercury have long lasting negative health effects, such as memory loss, tremors, neuromuscular changes (e.g., weakness, atrophy), and lack of coordination of movements amongst other symptoms.

A natural exposure to a hazardous material is in the form of radon. Radon is a cancer-causing radioactive gas that moves up through soil and is trapped inside buildings. It cannot be smelled or seen and is the second leading cause of lung cancer in the U.S. Exposure to radon is possible in Baraga County. Testing kits are offered at no cost at the Western U.P. Health Department. If radon is detected above 4 picocuries per liter (pCi/L), follow-up testing and resistance techniques should be installed. Mitigation includes sealing cracks and venting gasses from the home.

Individual Wells

Many Baraga County residents live in rural areas that are not serviced by public sewer and/or water. The contamination of individual wells and the failure of individual septic systems presents the potential for public health emergencies. Coliform bacteria, high nitrates, and arsenic in water wells are common public health risks. Coliform bacteria are associated with animal wastes, sewages, and surface water. Nitrates are a naturally occurring form of nitrogen found in soil and groundwater. High concentrations of nitrates in drinking water can be toxic to infants and young animals. Elevated nitrate concentrations in groundwater and wells are typically associated with excessive fertilizers, sewage disposal systems, farm runoff, municipal wastewater and sludge, and industrial wastes. Arsenic is also naturally occurring; exposure to high levels of arsenic poses serious health effects because it is a known human carcinogen.

Public water and sewer facilities

Public water and sewer facilities are prone to public health emergencies such as broken or frozen lines that cause a loss in service, or system pressure loss that requires boil-water advisories due to potential water contamination. Any disruption in service is typically a secondary hazard as a result of a different hazard altogether. Extreme cold, subsidence, flooding, infrastructure failure, and sabotage are a few examples of what can cause a disruption in water or sewer service.

Drug and Substance Abuse Epidemic

As defined by the CDC, an epidemic is “the occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period of time.”²⁶ While it is not an infectious disease outbreak, deaths due to drug overdoses are now greater than deaths due

²⁶ Epidemic Disease Occurrence. Center for Disease Control and Prevention.
<https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section11.html>

to car crashes in Michigan.²⁷ The state has the 14th highest overdose death rate in the country. In 2017, there were 2,686 drug overdose deaths in Michigan and was 12.1% higher than drug overdose deaths in 2016.²⁸ Deaths due to synthetic opioids, such as fentanyl and tramadol, increased by 48.5% from 2016 to 2017. Most Michigan counties are underequipped to address the needs for people who have an opioid addiction and effects from this drug epidemic. This includes a lack of nearby drug treatment programs, medication-based treatment services, and transportation capability to get people who want help the necessary services they need.

The Western Upper Peninsula Health Department is responsible for addressing and trying to prevent public health emergencies within the county and Baraga, Gogebic, Keweenaw, and Ontonagon counties. It does so by distributing public information for both preparedness and notification, establishing a regional hotline in the event regular telephone system are overwhelmed. They also distribute and administer vaccines or countermeasures, if necessary. The Health Department also protects and treats emergency responders and has the sole power of quarantine should it become necessary.

Climate Change Considerations

Climate change has the potential to affect human health by increasing the occurrence of vector-borne diseases such as malaria, Lyme disease, and West Nile virus. Warmer temperatures, shorter/milder winters, and earlier spring seasons can result in an increasingly hospitable environment for carriers of these diseases. Ticks and the bacterium that causes Lyme disease have higher survival rates in warmer, milder winters.

Historical Occurrence

The most likely public health threat in Baraga County is influenza-type illnesses, which is the most common communicable disease, with an average mortality rate of 14.2 per 100,000 Western U.P. residents from 2015-2017.²⁹ Michigan's average mortality rate is 14.3. However, influenza, which can be widespread, rarely becomes a public health emergency.

There is potential in Baraga County, as in all areas, for a larger disease outbreak as an isolated event or secondary to flooding or another type of incident. Baraga County Memorial Hospital has a 24-hour emergency department. However, while awareness and planning have been carefully considered, an epidemic of sufficient magnitude could overwhelm the facilities that are equipped to deal with smaller magnitudes of this type of emergency.

Isolated incidents of hazardous materials contamination may also pose a localized public health threat as exemplified by the 2012 Chassell mercury spill detailed in the Hazardous Materials – Fixed Site section. This incident was determined to have had no significant public health impact. On the other hand, sites such as Osmose, a local manufacturer, could release hazardous

²⁷ “Opioid addiction: Michigan counties struggle to meet the need for treatment.” Michigan News – University of Michigan. <https://news.umich.edu/opioid-addiction-michigan-counties-struggle-to-meet-the-need-for-treatment/>

²⁸ Drug Overdose Deaths in Michigan, 2016-2017. Michigan Department of Health and Human Services. https://www.michigan.gov/documents/mdhhs/Drug_Overdose_Deaths_MI_2016-2017_649230_7.pdf

²⁹ Michigan Department of Health and Human Services, Community Health Information. www.mdch.state.mi.us/pha/osr/chi/IndexVer2.asp

substances that may present an airborne public health threat. EPA Superfund and other remediation sites, including those detailed in the Hazardous Materials – Fixed Site section, are being addressed as potential public health contamination threats.

Another less urgent issue is that of dilapidated buildings, which are abundant in many jurisdictions in Baraga County. These structures are often associated with asbestos, a component of past insulation materials which has been found to cause health problems, and with other hazards.

There is no recent history of widespread public health emergencies in Baraga County. Small incidences of flu outbreaks and similar sicknesses do occur, but the extent of the emergencies have been limited. There is potential in Baraga County for infectious disease outbreaks, such as chlamydia, hepatitis C, and Lyme disease (highest number of cases in nearby Dickinson County).³⁰ The County is also at risk for substance abuse, foodborne illnesses, and water contamination emergencies. The potential for disease outbreaks and contamination may be isolated events or as events secondary to flooding or other incidents. Alcohol abuse is of concern in Baraga County. In Michigan, the top five counties with the highest binge drinking rates are in the Upper Peninsula.³¹

Of increasing threat are opioid and meth-related issues. In Baraga County there is a high rate of children born with neonatal abstinence syndrome (NAS) because of addiction.³² In the Upper Peninsula, babies are treated for NAS at a higher rate than anywhere else in Michigan— 29 per 1,000 births in 2016. There are no NICU treatment centers in the county to deal with a rising concern of addicts and those seeking treatment. The Upper Peninsula Substance Enforcement Team (UPSET) is a multi-jurisdictional narcotics task force that serves all the Upper Peninsula's counties, and collaborates with local, state, and federal agencies to assist with local or state police in apprehension. They are the only federally trained and certified Clandestine Lab Team in the Upper Peninsula dealing with methamphetamine response. In 2016, UPSET West was formed to support an increased UPSET team, which targets the Western Upper Peninsula in increased narcotics enforcement. Since 2016, UPSET West detectives have made 48 felony arrests, but are fighting a growing meth supply as heroin supply decreases.³³ In Baraga County specifically, there have been multiple arrests related to the sale, production, and distribution of narcotics that involve UPSET.

³⁰ Upper Peninsula Community Health Needs Assessment 2018. <http://www.wupdhd.org/wp-content/uploads/2018/08/Upper-Peninsula-Community-Health-Needs-Assessment-2018-Second-Edition-1.pdf>

³¹ Detroit Free Press 2015. <https://www.freep.com/story/opinion/contributors/raw-data/2015/04/24/binge-drinking-us-county/26332545/>

³² Detroit Free Press 2018. <https://www.freep.com/story/news/local/michigan/2018/05/03/opioid-epidemic-drug-addicted-babies/335398002/>

³³ Keweenaw Report 2019. <http://www.keweenawreport.com/featured/upset-west-reducing-heroin-supply-meth-use-growing/>

Occurrence Probability and County Vulnerability

Public health emergencies can arise from a wide range of causes and exhibit varying levels of severity. In Baraga County, the probability of a public health emergency is highly likely as some health emergencies are currently occurring in the county (i.e., opioid and meth-related health emergencies). The severity of a public health emergency is unpredictable and could potentially be extreme, particularly as the population ages in the county. A large magnitude epidemic could overload medical facilities that are inadequately prepared to deal with this type or scale of emergency. The remoteness of the county could also be problematic during a largescale emergency.

Vulnerable locations include any public gathering area such as schools, long-term care facilities, medical facilities, public water, sewer, and electrical facilities, individual wells and septic systems, restaurants, etc. Almost all local communities in Baraga County have at least one of these vulnerable critical facilities. The entire population of Baraga County is vulnerable to public health emergencies, particularly the elderly and those with weakened immune systems. These population groups are more vulnerable to disease outbreaks than healthier individuals.

Public health emergencies have secondary impacts that may create further vulnerable situations that were otherwise not expected. For example, an influenza outbreak could result in large percentages of employees taking sick leave or mandated quarantine action, removing workers from their place of employment and thus impacting productivity in the economy or in emergency response capacity. Any hazardous event that would have secondary public health implications would significantly disrupt or halt the normal business activities of an impacted community. However, these measures should be taken if it lessens or slows the impact of a public health emergency.

Sabotage and Terrorism

Hazard Description

Terrorism is the use of violence by individuals or groups to achieve political goals by creating fear, while sabotage is any kind of deliberate action, such as obstruction, disruption, or destruction, for political or military gain. Both can take many forms, including the following: bombings; assassinations; organized extortion; use of nuclear, chemical, and biological weapons; information warfare, such as hacking or release of classified information; ethnic, religious, and gender intimidation (hate crimes); advocacy for overthrowing local, state, or federal government, and the disruption of legitimate scientific research or resource-related activities (eco-terrorism). The goal of terrorists is to frighten as many people as possible, not necessarily to cause the greatest damage possible. Media coverage allows terrorists to affect a much larger population than those who are directly attacked.

Sabotage and terrorism are long-established strategies that are practiced by many groups in many nations. The U.S. is not only threatened by international terrorists or saboteurs, but also by home-grown domestic terrorist groups including racist, ecological, and extreme anti-abortion

groups. Non-terrorist criminal activity may resemble terrorism or sabotage, but it lacks a political objective. These crimes are typically routine, individual crimes, but they may impact large portions of the population. Some of these attacks may require resources that are not available to local law enforcement agencies. Non-terrorist criminal activities may include mass shootings, random sniper attacks, infrastructure sabotage, and cyberattacks.

Terrorists fall into five major categories based upon the political cause that motivates their actions. They are the following:

1. **Nationalist terrorists** act in support of a culture or ethnic group. Typically, they are fighting on behalf of national populations that wish to have an independent government but are currently ruled by another country. They tend to direct their attacks against the “occupying power” but may also attack other nations that support their enemies. These terrorists claim to speak for their entire national group, but usually only represent a small minority of extremists.
2. **Religious extremist terrorists** are violent adherents of a specific religion. They tend to be especially committed because they believe their violent actions are supported by their deity. Religious terrorists see themselves fighting a battle of ultimate good against pure evil, in which any action is justified.
3. **Left wing terrorists** attempt to force society to change to match their goals and values. They tend to target the government, power institutions, and symbols of authority. Socialist and Communist terrorists of this type were a threat in the late 1960s and 1970s but have weakened in recent decades.
4. **Right wing terrorists** see themselves as fighting for traditional values against an invading group and/or against a tyrannical government. In the U.S., these terrorists are associated with anti-immigration, white supremacy, anti-government, and Christian Identity movements. Only the most extreme elements of these movements have become terrorist, but they have carried out a substantial portion of the recent attaches. Right wing groups tend to target members of hated ethnic or religious minorities, or government employees.
5. **Single-issue terrorists** are not committed to an all-encompassing belief system, but rather are intensely concerned with one cause. Common causes for these terrorists include animal-rights, environmentalism, and opposition to abortion. They tend to target property or individuals rather than attempting to cause massive casualties.

Because sabotage and terrorism objectives are so widely varied, the potential targets are also widely varied. Virtually any public facility, place of public assembly, or business engaged in controversial activities can be considered a potential target. Large computer systems operated by government agencies, financial institutions, large businesses, healthcare facilities, and universities are at risk.

Historical Occurrence

There have been a few reports of isolated sabotage to logging equipment in Baraga County. Sabotage and terrorism incidents are rare.

In the 1990's tensions resulting in a standoff led to allegations of police brutality, the hospitalization of a man, and a bomb being set off on U.S. 41. On August 22, 1995, a group of Ojibwa tribal members barricaded themselves in the Keweenaw Bay Indian Community Tribal Center in Assinins. This stand-off was the result of a December 1994 election in which some tribal members were stripped of voting rights. Fight for Justice, a grassroots organization, was formed; tribal members felt losing voting rights was akin to losing tribal membership. Originally peaceful, the conflict escalated into violence. The standoff lasted until February 4, 1997 when tribal officials retook the center³⁴. Concerns over the Ojibwa Casino and profits to tribal members polarized the tribal community. Three homemade bombs were exploded in a targeted attack on a tribal attorney's property³⁵.

Although few sabotage or terrorism events have occurred in Baraga County, the area is not immune to this problem. Ojibwa Casino in Baraga is perhaps the greatest facility of concern. Severity is impossible to predict. There is a low risk and low probability of sabotage and terrorism in Baraga County because there are no significant high-risk targets. Sabotage and terrorism, however, can occur at any level, so it should be recognized that political, social, and religious facilities could be a target.

Occurrence Probability and County Vulnerability

Although few sabotage and terrorism events have occurred in Baraga County, the area is not immune to this problem. Severity is impossible to predict. There is a low risk and low probability of sabotage and terrorism in Baraga County because there are no significant high-risk targets. Probability of sabotage/terrorism is low based on past events, but severity is case-specific and impossible to predict. Sabotage and terrorism, however, can occur at any level, so it should be recognized that political, social, and religious facilities could be a target.

³⁴ Michigan Technological University Archives 2014.

<https://www.mtu.edu/library/archives/collections/documents/ms-696-fight-for-justice-tribal-takeover-collection.pdf>

³⁵ Chicago Tribune 1996. <https://www.chicagotribune.com/news/ct-xpm-1996-07-07-9607070190-story.html>

SECTION 6: Risk Assessment

The hazard profiles presented in the *Hazard Analysis* section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its “How-to” guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, literature review, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies and technical reports.

This section will include the following components:

- Differential Vulnerability
- Hazard Extent
- Hazard Profiling Concept of Planning
- Hazard Risk Analysis Methodology
- Hazard Priority Risk Index and Ranking
- Hazard Summary

Differential Vulnerability

Currently, there is no reliable way to accurately estimate costs associated with many hazards that affect Baraga County. Numerous variables can affect the vulnerability of the county to hazards, including climate, location, scale, and time of day. Time of year also affects vulnerability. The population in many jurisdictions varies by season, and response capabilities are often compromised in winter. There is also an overall lack of publicly available data, including flood hazard maps, estimated critical facility costs, and dam inundation maps. FEMA is in the process of completing a coastal flood risk study and mapping program in the county.³⁶ The goal of the study is to update coastal flood hazard information and eventually flood risk maps along the Lake Superior shoreline in Baraga County. The updated flood risk maps will identify new coastal high hazard areas, or VE zones, that previously were not found in the county before this analysis. Once these data and maps become available, they will be utilized in future hazard risk assessments for Baraga County.

Although Baraga County is susceptible to many types of hazards, each jurisdiction varies in its level of vulnerability to certain hazards. Vulnerability to most fire hazards, weather hazards, flooding due to spring runoff, and all technological and societal hazards have been determined to be similar for all of Baraga County. Subsidence is of note because it can occur in most jurisdictions, but the most at-risk areas are in scattered locations. **Table 6.1** provides a summary of hazards within the County and notes especially high vulnerabilities for each jurisdiction. Countywide hazards and others that affect most but not all jurisdictions equally, such as subsidence and petroleum/natural gas incidents, are generally not noted for specific jurisdictions.

³⁶ Great Lakes Coastal Flood Study. <https://www.greatlakescoast.org/>

Table 6.1: Differential Vulnerabilities by Jurisdiction in Baraga County

Jurisdiction (Population)	Extreme Temperatures	Fog	Hail	Ice & Sleet Storms	Lightning	Severe Winds	Snowstorms and Blizzards	Tornadoes	Dam Failures	Riverine & Urban Flooding	Shoreline Flooding & Erosion	Drought	Wildfires	Invasive Species	Earthquakes	Subsidence	Scrap Tire Fires	Structural Fires	Hazardous Materials: Fixed Site Incidences	Hazardous Materials: Transportation Incidents	Petroleum & Natural Gas Incidents	Infrastructure Failures & Secondary Tech. Hazards	Transportation Accidents	Civil Disturbances	Public Health Emergencies	Sabotage & Terrorism
Baraga County (8,580)	X	X	X	X	X	X	X	X		X		X	X	X		X			X	X		X	X	X	X	X
Arvon Township (334)											X															
Baraga Township (3,719)											X										X					
Covington Township (526)																					X					
L'Anse Township (3,748)											X															
Spurr Township (253)																X					X					
Baraga Village (2,575)									X		X										X					
L'Anse Village (2,179)								X			X										X					
L'Anse Reservation (3,564)											X										X					

Hazard Extent

Table 6.2 describes the extent of each hazard identified in Baraga County. The extent of a hazard is its severity or magnitude, as it relates to the county.

Table 6.2: Hazard Extent in Baraga County

Weather Hazards	
Extreme Temperatures	Extreme temperature extent is measured by the number of reports above annual averages of that season, as well as population reporting effects due to the extremity of the temperature.
Fog	The extent of fog is measured by area and number of roads and vehicles affected by a fog event, as the fog itself is not hazardous.
Hail	Hail extent is defined by the size of the hail stone. The largest hail stone reported in Baraga County was 2.50 inches on August 2, 1982. It should be noted that future events may exceed this.
Ice and Sleet Storms	The extent of ice and sleet storms can be classified by meteorological measurements and by evaluating its societal impacts.
Lightning	Lightning extent for the purposes of this plan have been determined as the monetary damages accrued from strike events.
Severe Winds	Severe winds are measured in speed and duration of the event.
Snowstorms and Blizzards	The extent of winter storms can be measured by the amount of snowfall received (in inches).
Tornadoes	Tornadoes are measured using the Enhanced Fujita scale (EF), which assesses damage based on wind speed ranges categorized from F0-F5.
Hydrological Hazards	
Dam Failures	Dam Failure extent is defined using the Michigan Department of Environment, Great Lakes, and Energy under Dam Safety criteria. A significant hazard potential indicates that if the dam were to fail there would be no loss of life, but could cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Although no dam failures have been reported, a future event may occur.
Riverine and Urban Flooding	Flood extent in Baraga County is measured by the duration and magnitude of an event.
Shoreline Flooding and Erosion	The extent of erosion can be defined by the rate (in feet) of erosion that occurs according to the Michigan Department of Environment, Great

	Lakes, and Energy – Coastal Management. Approximately 4% of the County’s Lake Superior shoreline are officially designated as high-risk areas with other neighboring areas being continually threatened due to rising lake levels. It should be noted that areas may experience a higher rate, and thus great extent, of erosion in future years.
Ecological Hazards	
Wildfires	Wildfire extent is measured by the spatial extent and duration of the event.
Invasive Species	Invasive Species extent is measured by the spatial extent affected by this hazard.
Geological Hazards	
Earthquakes	Earthquake extent can be measured the Modified Mercalli Intensity (MMI) scale and the distance of the epicenter from Baraga County. It was determined that this hazard does not threaten Baraga County.
Subsidence (Ground Collapse)	Subsidence is measured by total displacement material volume from the event, as well as monetary damages.
Technological (Industrial) Hazards	
Scrap Tire Fires	The extent of scrap tire fires is measured in spatial extent of the event and duration of the burn.
Structural Fires	Structural fire hazard extent is measured in area affected by the hazard, fatalities as well as monetary damages incurred.
Hazardous Materials: Fixed Site Incidents	Extent is measured by the spatial extent of the event and volume of material lost
Hazardous Materials: Transportation Accident	Extent is measured by volume of material lost, as well as proximity to major transportation routes
Petroleum and Natural Gas Incidents	Extent is measured by the spatial extent of an incident, and volume of material lost
Infrastructure Hazards	
Infrastructure Failures and Secondary Technological Hazards	Hazard extent is measured by number of clients affected by infrastructure failures, and the duration.
Transportation Accidents	Extent is measured by fatalities, number of vehicles involved, damage incurred, and areal extent of detour
Human Related Hazards	
Civil Disturbances	Extent is measured by potential economic losses through damages to or disruptions of local businesses or other facilities
Public Health Emergencies	Public health emergency extent is measured by percentage of the population affected by the hazard. If the health emergency is a pandemic, the extent

	depends on how easily the illness is spread, mode of transmission, and amount of contact between infected and uninfected individuals.
Sabotage and Terrorism	Extent is measured by the area affected by the hazard, type of facility threatened, and the potential number of injuries or fatalities resulting from an event.

Hazard Profiling Concept of Planning

The method used to rank the hazards, vulnerabilities and risks includes the following:

- A public survey that was released for 30 days online with paper copies being made available at the county clerk’s office, public library, and the post office.
- A public comment period after the final draft was released and before plan adoption
- Government and institution survey released for added input into the plan
- Baraga County emergency manager reviewed the profile and ranked the overall risk for the county
- Members of the Local Planning Team reviewed and ranked the risks for their communities
- The risk profile was circulated among the staff at the Western U.P. Planning & Development Region for comment

A risk assessment identifies the characteristics and potential consequences of a disaster, how much the community could be affected by the disaster, and the impact on community assets.

Technical expertise is necessary to estimate the costs of each potential hazard. The value of property in Baraga County and its communities can, at a minimum, provide an overview of property that can be affected by hazards. **Table 6.3** shows the State-equalized Value (SEV) of properties in Baraga County by location and class. Vulnerability estimates that are provided in this plan were based on a most likely scenario.

Table 6.3: State-equalized Value for Baraga County, 2019

**** REAL ****						Total Real	Personal	Total Real & Personal
Township/ Villages	Agricultural	Commercial	Industrial	Residential	Timber Cutover			
Arvon	\$28,538	\$1,046,820	\$0	\$64,454,951	\$6,146,203	\$71,676,512	\$552,327	\$72,228,839
Baraga	\$5,585,620	\$4,931,524	\$12,091,321	\$61,626,713	\$3,175,969	\$87,411,147	\$28,627,045	\$116,038,192
Covington	\$4,891,983	\$903,706	\$155,277	\$15,408,380	\$6,442,501	\$27,801,847	\$2,300,196	\$30,102,043
L'Anse	\$248,706	\$13,210,222	\$10,493,767	\$77,510,160	\$4,716,469	\$106,179,324	\$7,328,699	\$113,508,023
Spurr	\$0	\$500,674	\$0	\$32,977,686	\$2,859,271	\$36,337,631	\$1,536,509	\$37,874,140
County Total Real and Personal								\$369,751,237

Source: Michigan Department of Treasury Assessed & Equalized Valuation

Hazard Priority Risk Index and Ranking

To draw some meaningful planning conclusions on hazard risk for Baraga County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a “Priority Risk Index” (PRI). The purpose of the PRI, described further below, is to categorize and prioritize all potential hazards for Baraga County as high, moderate or low risk. Combined with the asset inventory and quantitative vulnerability assessment provided in the next section, the summary hazard classifications generated through the use of the PRI allows for the prioritization of those high hazard risks for mitigation planning purposes, and more specifically, the identification of hazard mitigation opportunities for Baraga County jurisdictions to consider as part of their proposed mitigation strategy.

The prioritization and categorization of identified hazards for Baraga County is based principally on the PRI, a tool used to measure the degree of risk for identified hazards in a planning area. The PRI is used to assist the Baraga County Local Planning Team (LPT) in gaining consensus on the determination of those hazards that pose the most significant threat to Baraga County based on a variety of factors. The PRI is not scientifically based but is rather meant to be utilized as an objective planning tool for classifying and prioritizing hazard risks in Baraga County based on standardized criteria. The application of the PRI results in numerical values that allow identified hazards to be ranked against one another (the higher the PRI value, the greater the hazard risk). PRI values are obtained by assigning varying degrees of risk to five categories for each hazard (probability, impact, spatial extent, warning time and duration). Each degree of risk has been assigned a value (1 to 4) and an agreed upon weighting factor, as summarized in **Table 6.5**.

To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

$$\text{PRI VALUE} = [(\text{PROBABILITY} \times .30) + (\text{IMPACT} \times .30) + (\text{SPATIAL EXTENT} \times .20) + (\text{WARNING TIME} \times .10) + (\text{DURATION} \times .10)]$$

According to the weighting scheme, the highest possible PRI value is 4.0. Applying the weighting scheme to Baraga County, the highest score of 3.3 was given to Snowstorms and Blizzards as well as Shoreline Flooding and Erosion. Prior to being finalized, PRI values for each identified hazard were reviewed and accepted by the members of the LPT.

There are no NFIP-insured structures that have been repetitively damaged by floods in Baraga County.

It should be noted that due to data gaps in the region, FEMA’s HAZUS was unable to be utilized in estimating potential losses from hazards. To improve model accuracy and future hazard mitigation planning, Baraga County will seek to update hazard data with flood boundaries, flood depth grids, and asset inventories.

Key Definitions for Prioritized Risk Index Categories

Probability – a guide to predict how often a random event will occur. Annual probabilities are expressed between 0.001 or less (low) up to 1 (high). An annual probability of 1 predicts that a natural hazard will occur at least once per year.

Magnitude/Severity – indicates the impact to a community through potential fatalities, injuries, property losses, and/or losses of services. The vulnerability assessment gives information that is helpful in making this determination for each community.

Warning Time – plays a factor in the ability to prepare for a potential disaster and to warn the public. The assumption is that more warning time allows for more emergency preparations and public information.

Duration – relates to the span of time local, state, and/or federal assistance will be necessary to prepare, respond, and recover from a potential disaster event.

Table 6.4: Priority Risk Index Summary Table

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1 and 10% annual probability	2	
	Likely	Between 10 and 100% annual probability	3	
	Highly Likely	100% annual probability	4	
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities	1	30%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self-explanatory	1	10%
	12 to 24 hours	Self-explanatory	2	
	6 to 12 hours	Self-explanatory	3	
	Less than 6 hours	Self-explanatory	4	
Duration	Less than 6 hours	Self-explanatory	1	10%
	Less than 24 hours	Self-explanatory	2	
	Less than one week	Self-explanatory	3	
	More than one week	Self-explanatory	4	

PRI Results

Table 6.5 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Local Planning Team (LPT). The results were then used in calculating PRI values and making final determinations for the risk assessment.

Table 6.5: Summary of PRI Results for Baraga County

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Weather Hazards						
Extreme Temperatures	Highly Likely	Limited	Large	More than 24 hours	Less than one week	2.3
Fog	Highly Likely	Minor	Small	Less than 6 hours	Less than 6 hours	2.3
Hail	Highly Likely	Minor	Small	Less than 6 hours	Less than 6 hours	2.5
Ice and Sleet Storms	Likely	Minor	Large	12 to 24 hours	Less than 6 hours	2.7
Lightning	Highly Likely	Minor	Small	Less than 6 hours	Less than 6 hours	1.6
Severe Winds	Highly Likely	Limited	Small	Less than 6 hours	Less than 24 hours	2.9
Snowstorms and Blizzards	Highly Likely	Critical	Large	12 to 24 hours	Less than one week	3.3
Tornadoes	Unlikely	Critical	Negligible	Less than 6 hours	Less than 6 hours	2.3
Hydrological Hazards						
Dam Failures	Possible	Critical	Small	6 to 12 hours	Less than 24 hours	2.6
Riverine and Urban Flooding	Highly Likely	Critical	Moderate	6-12 hours	Less than one week	3.0
Shoreline Flooding and Erosion	Highly Likely	Limited	Small	Less than 6 hours	More than one week	3.3
Drought	Possible	Minor	Large	Less than 6 hours	More than one week	2.2

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Ecological Hazards						
Wildfires	Likely	Limited	Small	12-24 hours	Less than 24 hours	3.0
Invasive Species	Highly Likely	Limited	Large	More than 24 hours	More than one week	3.1
Geological Hazards						
Earthquakes	Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	1.5
Subsidence (Ground Collapse)	Highly Likely	Limited	Small	Less than 6 hours	Less than 6 hours	1.6
Technological (Industrial) Hazards						
Scrap Tire Fires	Unlikely	Minor	Small	Less than 6 hours	Less than 24 hours	1.9
Structural Fires	Highly Likely	Critical	Small	Less than 6 hours	Less than 24 hours	3.0
Hazardous Materials: Fixed Site Incidents	Likely	Minor	Small	12-24 hours	More than one week	2.7
Hazardous Materials: Transportation Accident	Possible	Limited	Small	Less than 6 hours	More than one week	2.8
Petroleum and Natural Gas Incidents	Possible	Limited	Moderate	Less than 6 hours	Less than one week	2.8
Infrastructure Hazards						
Infrastructure Failures & Secondary Technological Hazards	Likely	Critical	Moderate	Less than 6 hours	More than one week	2.8
Transportation Accidents	Highly Likely	Critical	Negligible	Less than 6 hours	Less than 6 hours	1.9
Human Related Hazards						
Civil Disturbances	Unlikely	Minor	Negligible	Less than 6 hours	Less than 24 hours	1.4
Public Health Emergencies	Highly Likely	Catastrophic	Moderate	12 to 24 hours	More than one week	3.2
Sabotage and Terrorism	Unlikely	Catastrophic	Negligible	Less than 6 hours	Less than one week	2.0

The conclusions drawn from the hazard profiling process for Baraga County, including the PRI results and input from the LPT, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk and Low Risk (**Table 6.6**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Baraga County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately and is described in the Vulnerability Assessment section. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future updates.

Table 6.6: Conclusions on Hazard Risk for Baraga County

High Risk	Snowstorms and Blizzards Shoreline Flooding and Erosion Public Health Emergencies Invasive Species Structural Fires Wildfires Riverine and Urban Flooding Severe Winds
Moderate Risk	Infrastructure Failures & Secondary Technological Hazards Petroleum and Natural Gas Incidents Hazardous Materials: Transportation Accident Hazardous Materials: Fixed Site Incidents Ice and Sleet Storms Dam Failures Hail
Low Risk	Tornadoes Fog Extreme Temperatures Drought Sabotage and Terrorism Transportation Accidents Scrap Tire fires Subsidence (Ground Collapse) Lightning Earthquakes Civil Disturbances

Hazard Summary

Although many of the hazards identified can and do occur throughout Baraga County, the highest priority hazards include:

- Snowstorms and Blizzards
- Shoreline Flooding and Erosion
- Public Health Emergencies
- Invasive Species
- Structural Fires
- Wildfires
- Riverine and Urban Flooding
- Severe Winds

Hazard mitigation activities will focus on mitigating loss due to these priority hazards in Baraga County while also considering activities that may mitigate loss due to lower ranking hazards.

SECTION 7: Hazard Mitigation

This section of the Plan provides the blueprint for Baraga County and its municipal jurisdictions to follow reduce potential exposure and losses identified as concerns in the Risk Assessment portion of this plan. The Local Planning Team and the Emergency Manager reviewed the risk assessment to identify and develop these actions. This section includes:

- Overview of Mitigation Strategy Development
- Review and Update of Mitigation Goals and Objectives
- Capability Assessment
- Mitigating Hazard in Baraga County
- Mitigation Resources
- Updating the 2020 Baraga County Hazard Mitigation Plan

Overview of Mitigation Strategy Development

In formulating Baraga County’s mitigation strategy, a wide range of activities were considered in order to help achieve the general countywide goals in addition to the specific hazard concerns of each participating jurisdiction (again, for more details on the specific activities discussed and considered by the Local Planning Team, please see the summary of the second Mitigation Advisory Committee meeting in Section 3: Planning Process). In general, hazard mitigation actions are commonly broken into four different categories and were thoroughly explained and discussed at the Mitigation Strategy LPT Meeting:

Local Plans and Regulations (LPR) – These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.

Structure and Infrastructure Project (SIP) - These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.

Natural Systems Protection (NRP) – These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.

Education and Awareness Programs (EAP) – These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.

The intent of the Mitigation Strategy is to provide Baraga County and its municipal jurisdictions with the goals that will serve as the guiding principles for future mitigation policy and project administration, along with a listing of proposed actions deemed necessary to meet those goals and reduce the impact of natural hazards. It is designed to be comprehensive and strategic in nature.

In being comprehensive, the development of the strategy included a thorough review of all natural hazards and identifies far-reaching policies and projects intended to not only reduce the future impacts of hazards, but also to assist the county and municipalities achieve compatible economic, environmental and social goals. In being strategic, the development of the strategy ensures that all policies and projects are linked to established priorities and assigned to specific departments or individuals responsible for their implementation with target completion deadlines. When necessary, funding sources are identified that can be used to assist in project implementation.

The first step in designing the mitigation strategy includes the identification of countywide Mitigation Goals. Mitigation Goals represent broad statements that are achieved through the implementation of more specific, action-oriented objectives listed in each jurisdiction's Mitigation Action Plan. These actions include both hazard mitigation policies (such as the regulation of land in known hazard areas through a local ordinance), and hazard mitigation projects that seek to address specifically targeted hazard risks (such as the acquisition and relocation of a repetitive loss structure).

The second step involves the identification, consideration and analysis of available mitigation measures to help achieve the identified mitigation goals. This is a long-term, continuous process sustained through the development and maintenance of this Plan, beginning with the Local Planning Team during the first meeting. Alternative mitigation measures will continue to be considered as future mitigation opportunities become identified, as data and technology improve, as mitigation funding becomes available, and as this Plan is maintained over time.

The third and last step in designing the Mitigation Strategy is the creation of the local Mitigation Action Plans (MAPs), which are provided separately in Section 8: Actions Plans. The MAPs represent unambiguous plans for action and are the most essential outcome of the mitigation planning process. They include a prioritized listing of proposed hazard mitigation actions (policies and projects) for each of Baraga County's local jurisdictions along with accompanying information such as those agencies or individuals assigned responsibility for their implementation, potential funding sources and an estimated target date for completion. The MAPs provide those individuals or agencies responsible for implementing mitigation actions with a clear roadmap that also serves as an important tool for monitoring progress over time. The cohesive collection of actions listed in each jurisdiction's MAP also can serve as an easily understood menu of mitigation policies and projects for those local decision makers who want to quickly review their jurisdiction's respective element of the countywide Plan.

In preparing their own individual Mitigation Actions Plans, each jurisdiction considered their overall hazard risk and capability to mitigate natural hazards as recorded through the risk and capability assessment process, in addition to meeting the adopted countywide mitigation goals and the unique needs of their community. Prioritizing mitigation actions for each jurisdiction was based on the following five (5) factors: (1) effect on overall risk to life and property; (2) ease of implementation; (3) political and community support; (4) a general economic cost/benefit review, and (5) funding availability.

Review and Update of Mitigation Goals

The goals of the Baraga County Hazard Mitigation Plan were crafted early in the planning process through a facilitated discussion and brainstorming session with the Local Planning Team (for more details, please see the summary of the second Local Planning Team meeting in Section 3: Planning Process). Each of the following goal statements represent a broad target for Baraga County and its jurisdictions to achieve through the implementation of their own specific Mitigation Actions Plans. These goals were reviewed at the Local Planning Team Meeting (August 2019) and confirmed to still be valid for the 2020 Baraga County Hazard Mitigation Plan.

- Goal 1** Work to improve existing local government policies and codes to reduce the impacts of natural hazards.
- Goal 2** Design and implement specific mitigation measures to protect vulnerable public and private properties.
- Goal 3** Increase the protection of critical facilities and infrastructure from hazard threats through retrofit projects for existing facilities and innovative design standards for new facilities.
- Goal 4** Enhance public education programs to promote community awareness of natural hazards and the hazard mitigation techniques available to reduce their impact.
- Goal 5** Improve stormwater management through enhanced local government programs, policies and practices.
- Goal 6** Enhance the county's storm evacuation procedures through increased intergovernmental coordination between Baraga County, its municipalities and the State of Michigan.
- Goal 7** Increase the County's emergency management capabilities through sustained system and technology improvements.
- Goal 8** Promote volunteer involvement in emergency preparedness and response through increased citizen awareness and training activities.

Note: A stated objective of the Disaster Mitigation Act of 2000 is to improve the coordination of risk reduction measures between state and local government authorities. Linking local and state mitigation planning goals is an important first step. It has been determined by the Baraga County Local Planning Team that the above goal statements are consistent with the State of Michigan's current mitigation planning goals as identified in the State Hazard Mitigation Plan promulgated by the Michigan Emergency Management and Homeland Security Division of the Michigan State Police.

Capability Assessment

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs or projects. As

in any planning process, it is important to try to establish which goals, objectives and/or actions are feasible, based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical and likely to be implemented over time given a local government's planning and regulatory framework, level of administrative and technical support, number of fiscal resources, and current political climate.

A capability assessment has two primary components: an inventory of a local jurisdiction's relevant plans, ordinances or programs already in place; and an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. A capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced, if possible, through future mitigation efforts.

The capability assessment completed for Baraga County and its participating municipalities serves as a critical planning step and an integral part of the foundation for designing an effective multi-jurisdictional hazard mitigation strategy. Coupled with the Risk Assessment, the Capability Assessment helps identify and target meaningful mitigation actions for incorporation in the Mitigation Strategy portion of the Hazard Mitigation Plan. It not only helps establish the goals for Baraga County to pursue under this Plan, but also ensures that those goals are realistically achievable under given local conditions.

Planning and Regulatory Capability

Planning and regulatory capability is based on the implementation of plans, ordinances and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development, and redevelopment in a responsible way while maintaining the general character of the community. It includes emergency response and mitigation planning, land use and transportation planning, zoning and building code enforcement, as well as protecting environmental, historical, and cultural resources. Some conflicts may arise, but these planning initiatives generally present significant opportunities to integrate mitigation principles into the local decision-making process.

Table 7.1 below provides a summary of relevant local plans, ordinances and programs already in place or under development for Baraga County's participating local governments. A checkmark (✓) indicates that the given item is currently in place, or it is currently being developed for future implementation.

Table 7.1: Relevant Plans, Ordinances, and Programs in Baraga County

Jurisdiction	Land Use Plan	Stormwater Management Plan	Master Plan	Asset Management Plan	Watershed Management Plan	Recreation Plan	Recreation and Natural Resource Conservation Plan	Emergency Operations Plan	Disaster Recovery Plan	Capital Improvements Plan	Historic Preservation Plan	Zoning Ordinances	Building Code	National Flood Insurance Program
Village of Baraga	✓ MP		✓			✓ Co								✓
Village of L'Anse	✓ MP	✓ MP	✓	✓ MP	✓ MP	✓	✓ (Rec. Plan?)			✓		✓ MP	✓	✓
Arvon Township	✓					✓ Co						✓	✓	✓
Baraga Township	✓ MP	✓ MP	✓			✓ Co				✓				
Covington Township						✓ Co								
L'Anse Township						✓				✓				✓
Spurr Township						✓ Co								

MP = Embedded in Master Plan Co = Embedded in County Plan

Mitigating Hazards in Baraga County

The following is an overview of potential activities by category for Baraga County. A more detailed list of activities, responsible parties, and estimated costs are mapped out in Section 8: Action Plan.

Local Plans and Regulations

The purpose of these actions is to include government authorities, policies or codes that influence the way land and buildings are being developed and built. Several activities can be implemented at the local level, including:

- Building Codes
- Planning and Zoning
- Open Space Preservation
- National Flood Insurance Program

Building Codes: Building codes are an effective way to address many hazards identified in this plan. Through building code enforcement all new and improved buildings can be built or rehabilitated to withstand the impacts of certain hazards such as snow load, high winds, extreme temperatures and flooding.

In 1999 the State of Michigan amended the process of code adoption under the State Construction Code Act (Act 230). This Act now requires municipalities to administer and enforce the statewide codes, including the Michigan Building Code 2003, Michigan Plumbing Code 2003, Michigan Mechanical Code 2003, and Michigan Residential Building Code 2003, all developed by the International Code Council (ICC); and the National Electrical Code 2002, published by the National Fire Protection Association. The language does not permit local communities to modify the State codes. In Baraga County, the County is responsible for all electrical, mechanical, and plumbing code enforcement and for building code enforcement in all jurisdictions except the Village of L'Anse and Arvon Township, which maintain local control of building codes. Thorough inspection of property during and after construction ensures that builders are incorporating all the current standards and requirements in effect.

Planning and Zoning: Planning and zoning guides indicate where development should occur based on suitability and compatibility, keeping development away from sensitive areas such as floodplains and wetlands and thereby protecting property from certain types of natural hazards. Master plans are a primary way for a local unit of government to guide future development within their community. Through a planning process that reviews a community's background, current land use, and projected needs, guidance can be given to future development. Master plans serve only as a guide and do not regulate land use.

Zoning regulations are the primary tool to implement comprehensive plans and control land use. By identifying different zones or districts, a community can guide development within its boundaries. Zoning puts restrictions on use, lot size, setbacks, etc. but can be combined with more creative regulations such as a planned unit development option that allows more flexibility

in the development process. Zoning is enforced by the local unit of government and should be based on a comprehensive plan for the community. Baraga County completed a new Master Plan in 2018 which includes an updated land use plan for the county. The Village of L’Anse has a land use plan in their 2017-2021 Master Plan. L’Anse Township also has a new Master Plan with a land use plan.

Open Space Preservation: Open space preservation is a way to keep hazardous areas free from



Land conservation is another good tool for communities to use for reducing the risks of stormwater runoff and sewer overflows.

development and is especially effective in floodplain areas. Prohibiting new development in hazard-prone areas is the best way to mitigate future problems. An additional benefit to open space preservation is the maintenance of agricultural areas, green space/parks, and the installation of green infrastructure to mitigate stormwater runoff. While single-purpose gray stormwater infrastructure—conventional piped drainage and water treatment systems—is designed to move urban stormwater away from the built environment, green infrastructure reduces and treats stormwater at its source while delivering environmental, social, and economic benefits. Comprehensive plans can help identify suitable areas to preserve through any number

of means including acquisition, donation by developers, easement or regulated setbacks/buffers where development is restricted.

National Flood Insurance Program: The National Flood Insurance Program aims to reduce the impact of flooding on private and public structures. It does so by providing affordable insurance to property owners, renters and businesses and by encouraging communities to adopt and enforce floodplain management regulations. These efforts help mitigate the effects of flooding on new and improved structures.

Natural Systems Resource Protection

Natural Systems Resource Protection mitigation activities are a way to enable land to function in a natural way. There are many benefits to naturally functioning watersheds, floodplains and wetlands, which can include:

- Reduction in runoff from rainwater and snowmelt
- Infiltration and velocity control during overland flow
- Filtering of excess nutrients, pollutants and sediments
- Floodwater storage
- Water quality improvement
- Groundwater recharge
- Habitat availability and regeneration

- Recreation and aesthetic qualities

Many natural areas have historically been affected by development and will be affected by development in the future, there are several ways to protect and restore the environment through hazard mitigation. Resource protection activities can include:

- Wetland protection
- Erosion and sedimentation control
- River restoration
- Best management practices
- Dumping regulations
- Urban forestry
- Farmland protection

Wetland Protection: Wetlands are a valuable resource that provides mitigation functions including storage of floodwaters and pollutant filtration, regulate overland flow, as well as habitat for fish, wildlife, and plants. As a result, wetlands are regulated in Michigan by Part 303, Wetland Protection, of the Natural Resources and Environmental Protection Act (Act 451 of 1995). EGLE administers the permit program. In Michigan, a permit is required to: deposit fill material in a wetland; dredge or remove soil or minerals from a wetland; construct, operate, or maintain any use or development in a wetland; or drain surface water from a wetland. Wetlands are specifically defined under the Act, and certain activities are exempted under the Act.

Local units of government can play a role in wetland protection and should serve as stewards over their water resources. Wetland protection measures can be implemented on a local level, and public education is a key to protecting this valuable resource.

Erosion and Sedimentation Control: Surface water can easily erode soil in large, exposed areas including farmlands, construction sites, and forested areas. In addition to exposed areas, erosion often occurs along stream banks and shorelines with high velocity currents and wave action. The erosion carries sediments and deposits them downstream where they can cause problems to storm sewers, culverts and ditches by reducing the capacity of the systems. Erosion also results in sediment in the water which reduces light and oxygen in the water. Heavy metals and other contaminants are the reason that sediment is identified as the number one nonpoint source pollutant for aquatic life.



Bioswales are vegetated, or mulched channels that provide treatment and retention as they move stormwater from one place to another. Vegetated swales slow, infiltrate, and filter stormwater flows. As linear features, they are particularly well suited to being placed along streets and parking lots.

Erosion and sedimentation can be controlled through phased construction, minimization of clearing, and stabilization of bare ground with vegetation, and other means. Sediment can be captured onsite with traps and filters, and water velocity can be slowed by terraces, temporary cover, constructed wetlands, and impoundment.

Part 91, Soil Erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act (NREPA), PA 451 of 1994, as amended, regulates only earth change activity (primarily construction projects disturbing one or more acres of land or that which is within 500 feet of the water's edge of a lake or stream). Part 31, Water Resources Protection Act, of NREPA addresses most other sources of sediment. In Baraga County, the County Drain Commissioner is the enforcing official. Locally, municipalities may adopt additional protection measures dependent on state laws via the NREPA or Planning and Zoning Enabling Acts.

River Restoration: History has proven that returning streams and adjacent land to a natural condition reduces erosion. The restoration of vegetation along stream banks protects the water by:

- Reducing the amount of sediment (and pollutants) entering the water
- Provides habitat for wildlife
- Slows the velocity of water, thus reducing flood damage and erosion
- Provides recreational opportunities and aesthetic value
- Reduces long-term maintenance costs

Best Management Practices: Non-point source pollutants including fertilizers, pesticides, animal wastes, chemicals, and sediment are washed away by storm water and distributed in storm sewers, ditches, and streams. The term “best management practices” (BMPs) refers to the design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff.

Dumping Regulations: Dumping regulations attempt to regulate the disposal of solid matter that can end up in streams and wetlands. Solid waste can pollute water, obstruct water flow, and reduce the ability of the stream or wetland to clean storm water. The dumping of waste materials such as garbage is illegal, but the dumping of yard waste, such as leaves and branches, can also affect a watercourse. Waste can block culverts, creating earthen dams that can fail during heavy rain events. Public information should be a central focus of a dumping enforcement program.

Urban Forestry: Damage caused by wind, ice, and snowstorms is often due to their impact on trees. Downed trees and branches can upset power lines, damage buildings, and harm property under them. An urban forestry program can reduce the damage potential of trees through maintenance and monitoring. Through better tree selection, proper pruning and evaluation, communities can also mitigate damage caused by downed trees.

Farmland Protection: Farmland protection's purpose is to provide ways to keep prime, unique or important agricultural land intact. Farmland is being converted to nonagricultural uses at an alarming rate which results in residential development that needs more infrastructure, increased storm water runoff, and emergency services capacity. Farmland protection parallels open space

protection in that it keeps the land open for future generations but also helps with storm water runoff, ecosystem maintenance, and scenic enhancement.

The Michigan Farmland and Open Space Preservation Act (PA 116) is a law that works to preserve farmland by offering incentives to farmers who are willing to participate. According to the Michigan Department of Agriculture and Rural Development (MDARD), the law, which was passed in 1974, enables a farm landowner to enter into a development rights agreement with the state. The agreement is designed to ensure that the land remain in agricultural use for a minimum of 10 years. In return, the farm owner may be entitled to income tax benefits and exemption from special assessments on the land. Today, 3.3 million acres of land, or 9% of Michigan’s total land area, is protected under this program.³⁷ In June 2019, MDARD issued a ruling opening farmland in the state preservation program to large-scale solar development, with several important caveats, including landowners not being able to claim tax credits under PA 116 until the panels are uninstalled.³⁸

Emergency Services

Local emergency services authorities, resources, and facilities throughout Baraga County are documented in Section 3 of this plan. Although all authorities are effective in conducting their internal and incident response activities, there is an opportunity to further educate the public about their operations – for example, through dissemination of hazard-related materials. Furthermore, several agencies lack necessary equipment to meet their responsibilities in areas of local government operations such as public works and planning. Inadequate funding sources will make this a continuing problem.

Emergency services provide protection for people both during and after a disaster. A thorough emergency services program addresses all hazards and involves all response departments and facilities. In Michigan, emergency services are supervised by the Michigan State Police Emergency Management and Homeland Security Division and coordinated through county emergency management offices. Several components pertain to emergency services, including:

- Threat Recognition
- Warning
- Response
- Critical Facilities Protection
- Post-Disaster Recovery and Mitigation

Threat Recognition: The first step in responding to a hazard is being aware that there is potential for an event to occur. With a threat recognition system, adequate warnings can be disseminated, and other response actions can be undertaken. Flood threats can be evaluated by measuring

³⁷ Farmland and Open Space Preservation Frequently Asked Questions. MDARD.

https://www.michigan.gov/mdard/0,4610,7-125-1599_2558-10312--,00.html

³⁸ Policy for Allowing Commercial Solar Panel Development on PA 116 Lands. MDARD.

https://www.michigan.gov/documents/mdard/MDARD_Policy_on_Solar_Panel_and_PA116_Land_656927_7.pdf

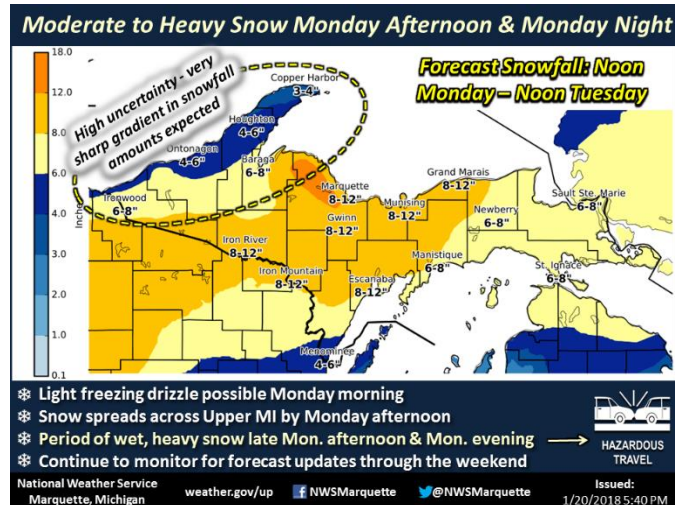
rainfall, soil moisture, and stream flows upstream and then calculating flood levels for downstream locations. Discerning the time and height of a potential flood crest will allow more efficient evacuations. Some rivers have gauges that establish threat levels. Under threat conditions, the National Weather Service (NWS) may issue flash flood watches for affected areas. The NWS is the agency that predicts meteorological threats and can issue public warnings.

Warning: After a threat is identified, the Office of Emergency Measures (OEM) notifies municipalities and other agencies that an event is possible or occurring. Early notification is key in order to distribute information to all affected parties. The NWS notifies the public using two levels: *Watch* and *Warning*. *Watch* refers to conditions that are right for flooding, thunderstorms, tornadoes or winter storms. *Warning* refers to a flood, tornado, etc. has started or has been observed. A more specific warning may be disseminated in a few ways, including:

- Warning sirens (outdoor and on public safety vehicles)
- Via commercial radio or TV (news and weather channels)
- NOAA Weather Radio (where available)
- Mass telephone notification
- Tone activated receivers in key facilities
- Door to door contact
- Mobile public address systems via text
- Internet/e-mail notification

All the systems have their limitations because they reach only certain audiences. TV and radio can provide information, but this method of notification is only effective if people have them on. NOAA radio will only reach those with access to a weather radio. Outdoor warnings can indicate to tune into another information source such as TV or radio, but this type of warning has limited reach and may not be heard by people indoors or in noisy environments. Door-to-door contact is time consuming but preferred when there is enough lead time for an incident. The best warning system is a redundant system that provides notification via numerous methods in order to reach as much of the population as necessary.

The warning system should also include information as to the response action to take, such as staying indoors during a tornado warning or staying off roads in the event of a severe winter storm.



National Weather Service in Marquette issuing a heavy snowfall warning on January 20, 2018

Response: Effective response, in combination with threat recognition and warnings, is another way for a community to mitigate hazard impact. A community typically coordinates an incident response through an emergency operations center (EOC) that assists the Incident Commander in the field with resources, expertise, etc. as part of the Emergency Action Plan (EAP). An EAP ensures that the community responds efficiently and appropriately to an incident. EAPs need to be regularly updated in order to keep names and contact information current.

Response activities may include a variety of agencies, offices, and measures such as closing streets and bridges, shutting off power to threatened areas, ordering an evacuation and opening evacuation centers, monitoring water levels, and implementing security measures.

Critical Facilities Protection: Critical facilities are the vital facilities that keep a community functioning as identified in Section 3. Critical facilities must be prepared to respond during an emergency. Most critical facilities will have their own response plan in place, and the facilities are also included in municipal emergency action plans. The best protections are early warning, response planning, and coordination in the event of an emergency.

Post-Disaster Recovery and Mitigation: Communities must be prepared for recovery and mitigation of future problems after an incident. While the primary focus is on recovery, it is also important to recognize mitigation methods to prevent the incident from reoccurring at the same magnitude. During recovery, several actions take place including patrolling, cleanup, providing services, monitoring impact, and regulating reconstruction. During this recovery time, mitigation activities can include undertaking public information efforts aimed at educating residents on how to protect themselves in the future, evaluating reconstruction methods including the addition of mitigation measures, and seeking funding for recovery efforts.

Structure and Infrastructure Projects

Structure and infrastructure projects are intended to protect people and infrastructure from damage due to natural hazards. Such projects are typically used to manage and control flood waters. The complexity and cost of structural projects can vary greatly and are dependent on individual circumstances. Structural projects are undertaken where non-structural measures would not be effective. Structural projects may include:

- Reservoirs and Detention Areas
- Roadway and Crossing Improvements
- Levees/Floodwalls/Seawalls
- Drainage and Storm Water Improvements/Maintenance
- Channel improvements

Because of the construction costs, maintenance and impacts of structural projects, they are often undertaken and funded by larger agencies with coordination at the local level. Agencies including the Michigan Department of Natural Resources, U.S. Army Corps of Engineers, and the USDA Natural Resources Conservation Service are often involved in structural projects.

Reservoirs and Detention: Reservoirs are intended to protect development downstream by temporarily storing flood waters. The reservoirs hold water behind dams or in storage/detention basins until flood waters subside. The detained water is then released downstream at a rate the river or stream can accommodate. Reservoirs are built to address existing problems or may be built to handle increased runoff from new development.

Roadway and Road Crossings Improvements:

Flooding can often affect accessibility by inundating roadways, culverts, bridges, driveways, and other transportation infrastructure. There are several things that can be done to maintain access when alternative access is not available, including elevating the roadbed, enlarging culverts to increase channel capacity, or replacing culverts with bridges. A concern when undertaking these types of improvements is the impact to downstream locations from increased capacity of the water system when it is no longer constricted up stream.



Upgraded culverts can mitigate flooding problems by increasing the flow capacity of streams as they pass under roadways.

Levees, Floodwalls and Seawalls: One of the most popular flood control measures is the construction of an earth levee or concrete floodwall to protect property. The purpose of these structures is to keep a stream within its channel by providing higher "banks." Levees require extensive design in order to address large floods, erosion, river access and views, and cost of construction and maintenance. Seawalls are often used to protect from erosion due to storm surges along Lake Superior's edge. Seawalls are built along a property edge and are designed to protect a property from the storm surges. Along the Great Lakes they can be significantly impacted by ice movement during the winter months and often have difficulty resisting lake forces.

Drainage and Storm Water Improvements/Maintenance: Human-made ditches and storm sewers assist in guiding runoff where surface drainage is inadequate. These systems allow water to be conveyed quickly to other locations; thus, they are most appropriate where the receiving location has adequate capacity. Storm sewer improvements may include installing new sewers, enlarging pipes, and preventing back flows. Other improvements in combination with drainage enhancements may include wetland detention, vegetated trenches, and practices that reduce the quantity and velocity of runoff. It is also important to maintain storm water and drainage systems. This involves keeping channels, ditches, and culverts cleared of debris; maintaining overgrowth; and remediating stream bank erosion sites. Debris can be any number of things, from tree limbs and branches to illegally dumped trash. Maintenance of public drainage systems is the responsibility of government agencies. The city of township must perform routine maintenance on these drainage systems or they (or residents in the watershed) may petition the

County Drain Commission to establish a county drain which after approval by the County Board of Commissioners, then becomes the county's responsibility to maintain.

Channel Improvements: Channel improvements are another method of increasing the capacity of streams, thereby allowing more water to travel at a faster rate. Improvements can be made through dredging, "channelization," or diversion. Dredging increases the capacity of a stream by removing material at the bottom. Channelization refers to the straightening, widening, and/or deepening of a stream. Diversion is the practice of creating a new channel to send floodwaters to an alternative location.

The Baraga County Road Commission maintains a future project list and continues to identify and upgrade inadequate culverts and problem roadways as needed. The communities of Baraga, L'Anse, and Assinins regularly experience high runoff related to steep topography and should continue upgrades that assist in management of these conditions.

Education and Awareness Programs

Education and awareness programs are a mitigation strategy that has broad reaching impact across both the public and private sectors. Activities that provide local officials, property owners, renters, businesses, and other parties with information about how to protect themselves and others from potential hazards may have the greatest impact of all mitigation strategies. Information empowers people to protect their own property and lives.

There are many ways to get information out to the public affected by hazards through community outreach. Community outreach is informing the public through news media, community newsletters, direct mailings, presentations, displays, signs, the internet, brochures, technical assistance, and other outlets. Because methods are diverse, it is best to analyze each community to find out how people obtain information and use that knowledge to build an outreach plan. While in some communities a local newsletter is distributed, other communities may rely on a newspaper to get information.

While public information on hazards is important, it is also vital to provide people with methods to address the hazard. Outreach projects should include information on hazards, safety, health, and property protection measures at the local level. Community offices and libraries are good places to distribute printed information (books and pamphlets) and increasing internet use indicates web distribution is also an effective way to disseminate information. Information on a website can easily be linked to an infinite number of available resources.

Technical assistance can further assist people in protecting their property. Assistance can be in the form of hazard identification assistance or property protection assistance. Resources for technical assistance may include direction from building department staff or FEMA Flood Map clarification with assistance from community staff.

In Baraga County and its local jurisdictions, education is the key to hazard mitigation. By providing individual citizens with the information and tools necessary, much can be done to further mitigation efforts in Baraga County. An ongoing education program and availability of limited technical assistance could provide the public with the ability to protect themselves and their property.

Mitigation Resources

There are two types of resources: existing institutional establishments, such as government agencies and continuing programs, and funding sources to undertake specific projects. The following list is intended to provide examples of funding sources for both current and future mitigation projects and should not be considered comprehensive. Potential new sources for mitigation funding should be added as identified. Project specific funding options are included in the respective Action Items identified in Section 9.

Federal		
Economic Development Administration	U.S. Department of Agriculture	U.S. Department of the Labor
Federal Emergency Management Agency	U.S. Department of Energy	U.S. Department of Transportation
U.S. Army Corps of Engineers	U.S. Department of Health & Human Services	U.S. Small Business Administration
U.S. Department of Housing and Urban Development		
State		
Michigan Department of Environment, Great Lakes, and Energy (EGLE)	Michigan Department of Natural Resources (MDNR)	Michigan Economic Development Corporation (MEDC)
Michigan Department of Transportation (MDOT)		
Other - Local		
Baraga County Community Foundation	Keweenaw Land Trust	Superior Watershed Partnership and Land Conservancy
Copper County Habitat for Humanity - Homeownership Program	Keweenaw Economic Development Alliance	Portage Health Foundation
Baraga-Houghton-Keweenaw Community Action Agency	Lake Superior Community Development Corp.	Western Upper Peninsula Planning and Development Region (WUPPDR)
Superior Health Foundation	Salvation Army - Ishpeming	
Other - National		
Community Restoration & Resiliency	National Low-Income Housing Coalition	Rebuilding Together
Grants for Indigenous Peoples	Planning for Post Disaster Recovery	Volunteer Organizations Active in Disasters (VOAD)

Updating the 2020 Baraga County Hazard Mitigation Plan

This section is intended to provide discussion on how communities will continue public participation in the plan maintenance process. It will also contain a description of plan monitoring, evaluating, and updating for keeping the plan current and updated within five years.

Throughout of the development of the 2020 Baraga County Hazard Mitigation Plan, the County has made a concerted effort to collect feedback from the public, local government, and agencies. Moving forward residents will continue to be notified of any plan updates and be invited to provide feedback through the incorporation of hazard mitigation into other planning documents.

The Hazard Mitigation Plan will be updated every five years to address changing priorities and remain eligible for FEMA mitigation funding programs. The Emergency Manager will convene a Local Planning Team representing local agencies and concerned parties to evaluate progress and update the plan in accordance with FEMA regulations. The Committee will review the plan to determine the sections that need to be updated or modified based on changing conditions or alterations in State or Federal requirements. It is recommended that public participation will include surveys, charettes, and other community presentations at regularly scheduled meetings. Goals, objectives, and strategies will also be reviewed to determine whether they thoroughly address new or changing conditions.

The Emergency Manager will monitor and evaluate the plan implementation overtime to assess the effectiveness of the plan at achieving its stated goals. They will work with Baraga County to update the plan within five years based on public feedback, the Local Planning Team and State Hazard Mitigation Officer recommendations. The public will also be notified of any plan updates (interim or within five years), and copies will be made available at all local government offices and online.

SECTION 8: Action Plan

This section highlights the 5-year action plan set out by the Local Planning Team for Baraga County to reduce the community's vulnerability and risk to local hazards based on their capability. The final step in the mitigation process is to build upon the general recommendations for mitigation activities suggested in Section 7 and identify specific action items for Baraga County and its communities. All the activities identified in this section are consistent with the following mitigation goals identified in Section 8:

- Goal 1** Protect lives and property within Baraga County from all known hazards while focusing on priority hazards.
- Goal 2** Identify feasible projects throughout the County that will help mitigate future problems.
- Goal 3** Be proactive in protecting public facilities and critical facilities through proper maintenance and upgrades.
- Goal 4** Educate citizens to encourage self-help and mitigation of hazards on private property.

Projects vary from structural measures to education and are prioritized based on impact to persistent, known hazards and potential resources available to complete the project. Although projects are prioritized on a countywide basis, this does not limit the county's or a local community's ability to pursue identified projects as funding becomes available. Several projects are ongoing action activities that will be accomplished as time and resources permit. Identified action items include a short description of the activity, the responsible agency or agencies, timeline, projected costs if available, and ways that Baraga County and its citizens will benefit.

Cost-benefit consideration, both financial and otherwise, is a major factor in the prioritization of action items. As a result, action priorities are not entirely consistent with the rankings in the Hazard Analysis section. In addition, a potential event that is anomalous within its hazard category may warrant action regardless of the rank of that general hazard type.

Past Mitigation Accomplishments

Tables 8.1 and 8.2 summarize the status of the mitigation action items from the 2005 and 2013 Baraga County Hazard Mitigation Plan.

Table 8.1: 2005 Hazard Mitigation Action Items

2005 Item	Status in 2013
Drainage Improvements and Maintenance	Partially Completed and In Progress
Update Stormwater Management Plans and Flood Maps	Partially Completed and In Progress
Bank Stabilization	Not Completed
Improved Emergency Response	Ongoing
KBIC Comprehensive Emergency Response Plan	Not Completed
Update Shoreline Erosion Map	Not Completed
Review Plans and Development Regulations	Ongoing
Retrofit Underground Pipes	Ongoing
Insurance	Ongoing
Public Information / Education Program	Not Completed but now Ongoing

Table 8.2: 2013 Mitigation Action Items

2013 Item	Status in 2019
Implement Baraga County Community Wildfire Protection Plan (CWWP) Action Items	Not Completed
Install Emergency Power Source at L'Anse Area School	Completed
Drainage Improvements and Maintenance	Ongoing
Update Stormwater Management Plans	Ongoing
Bank Stabilization	Ongoing
Improved / Continuing Emergency Response	Going
Update Shoreline Erosion Map	Completed
Review Plans and Development Regulations	Ongoing
Retrofit Underground Pipes	Ongoing
Identify and Remediate Hazardous Material Sites	Identify – Completed Remediate – Not Completed
Insurance	Not Completed
Public Information / Education Program	Ongoing
Distribute Weather Radios	Completed
Coordinate with Keweenaw Bay Indian Community	Ongoing
Plan for Emergency Detour Routes	Ongoing
Adopt Hazard Mitigation Plan and Update Regularly	Ongoing

Some action items are carried over from the 2013 Hazard Mitigation Plan. Several of these are ongoing activities that will continue indefinitely. Four projects have been completed – the installation of emergency power at L’Anse Area School, inventorying hazardous material sites throughout the county, updating shoreline erosion maps, and distribution of weather radios. The other items were and are dependent on funding that has not been available. Finally, emphasis to shoreline erosion and to establish an emergency detour was added to anticipate record levels on Lake Superior. No large-scale changes in land development have occurred in Baraga County since 2005. Most construction has been incremental within or adjacent to already-developed areas. The Villages of L’Anse and Baraga have recently completed, are in progress of completing, or have explored, respectively, new master plans. None of these are expected to have a major effect on land use in the County.

Action Item 1: Implement Baraga County Community Wildfire Protection Plan (CWPP)

Completed in 2011, Baraga County’s CWPP is the first countywide plan in Michigan. The plan aims to protect human life and reduce property loss. Identified action items include a comprehensive education program (Firewise), a countywide fuels reduction program, establishment of evacuation routes for communities, complete home ignition assessments, and regular review and evaluation of the CWPP. Wildfire preparedness has been identified by Arvon, Covington, and L'Anse Townships and the Village of L'Anse as a priority.

<i>Responsible Agency:</i>	Baraga County, Keweenaw Bay Indian Community, and local municipalities
<i>Deadline:</i>	2022
<i>Cost:</i>	Unknown; varies by component
<i>Potential Funding Sources:</i>	FEMA, USDA Forest Service, and local operating budgets
<i>Benefits:</i>	The County will benefit by reducing risk of wildfire.

Action Item 2: Drainage Improvements and Maintenance

As an ongoing project in the County, the Baraga County Road Commission has had an active role in upgrading roads and replacing inadequate culverts in response to previous problems and to mitigate future problems, such as preventing flooding and road washouts.

<i>Responsible Agency:</i>	Baraga County Road Commission and municipal Departments of Public Works (where applicable)
<i>Deadline:</i>	Ongoing
<i>Cost:</i>	Varies by project
<i>Potential Funding Sources:</i>	FEMA, MDOT, and agency/Road Commission operating budgets
<i>Benefits:</i>	Inspection and maintenance of the existing drainage system will prevent flooding caused by plugged culverts, while

upgrading of identified culverts and roads will ensure mitigation of future problems.

Action Item 3: Update Stormwater Management Plans

Stormwater management plans should be updated to address changing environmental conditions. This ongoing item is carried over from the 2005 / 2013 plan; however, flood map updates, which were part of the same item, have since been completed by FEMA. It should be noted that the updated Flood Insurance Rate Maps (FIRMs) only show riverine and coastal flooding risk to the 1% chance event level.

<i>Responsible Agency:</i>	Baraga County and local jurisdictions
<i>Deadline:</i>	Ongoing
<i>Cost:</i>	Varies, but includes staff time
<i>Potential Funding Sources:</i>	FEMA and agency operating budgets
<i>Benefits:</i>	The County and its jurisdictions will benefit by being able to make informed decisions based on accurate storm water information that incorporates upgrades that are completed, underway, or planned.

Action Item 4: Bank Stabilization

Areas of the Sturgeon River and Lake Superior experience ongoing bank erosion problems. Numerous mitigation efforts have corrected problems, but some areas have an ongoing need for stabilization.

<i>Responsible Agency:</i>	Baraga County, Baraga County Road Commission, and Keweenaw Bay Indian Community
<i>Deadline:</i>	Ongoing
<i>Cost:</i>	Unknown
<i>Potential Funding Sources:</i>	FEMA Pre-Disaster Mitigation Program
<i>Benefits:</i>	The County will benefit by protecting property owners from erosion and sedimentation that result in damage to property and degradation of stream quality. The project will also eliminate the potential loss of access to homes and other property.

Action Item 5: Improved / Continuing Emergency Response

Conduct ongoing reviews of response plans and programs to keep emergency contacts up to date, ensure critical facility information is current, and identify and incorporate new and improved

methods of warning and response. Adequacy of shelter facilities, response equipment, and training can be evaluated during these ongoing reviews.

<i>Responsible Agency:</i>	Baraga County Emergency Manager
<i>Deadline:</i>	Ongoing
<i>Cost:</i>	Staff time
<i>Potential Funding Sources:</i>	FEMA
<i>Benefits:</i>	Emergency plans that are up to date and incorporate all available methods of warning and response will be most effective in emergency situations, thus mitigating loss from hazards.

Action Item 6: Review Plans and Development Regulation

As master plans, zoning, and other plans and regulations are up for revision, include appropriate hazard mitigation provisions. Consider plans and regulations that divert new development away from identified hazards, include development standards that ensure adequate fire and emergency access, require buried utility lines, and promote open space requirements that protect properties from flooding.

<i>Responsible Agency:</i>	Baraga County and all municipalities, particularly those without master plans
<i>Deadline:</i>	Ongoing as plans and ordinances are reviewed
<i>Cost:</i>	Staff time
<i>Potential Funding Sources:</i>	Agency operating budgets
<i>Benefits:</i>	Citizens of Baraga County will benefit from plans that protect new development from known hazards and inform municipalities of methods of protecting their lands from hazards—specifically known priority hazards.

Action Item 7: Retrofit Underground Pipes

As work is done on underground utilities, municipalities should identify problem areas and insulate pipes as needed to protect them from extreme temperatures.

<i>Responsible Agency:</i>	Municipal Departments of Public Works
<i>Deadline:</i>	Ongoing
<i>Cost:</i>	Variable
<i>Potential Funding Sources:</i>	FEMA
<i>Benefits:</i>	Residents and municipalities will benefit from reduced flooding due to burst pipes.

Action Item 8: Remediate Hazardous Materials Sites

Many legacy sites containing hazardous materials are scattered throughout Baraga County. For example, closed gasoline station properties may have leaking underground storage tanks. Such sites need to be remediated. Known brownfields also require remediation.

<i>Responsible Agency:</i>	Local jurisdictions and EGLE
<i>Deadline:</i>	Ongoing
<i>Cost:</i>	Variable
<i>Potential Funding Sources:</i>	EPA Brownfields Program and MEDC Community Development Block Grants
<i>Benefits:</i>	Identifying these sites before they make themselves known and affect surrounding areas will reduce the risk of catastrophic events.

Action Item 9: Insurance

Not all hazards can be mitigated prior to occurrence, but by maintaining insurance, property owners can protect themselves from losses due to hazards.

<i>Responsible Agency:</i>	Local governments, residents, business owners, and others
<i>Deadline:</i>	Ongoing
<i>Cost:</i>	Variable
<i>Potential Funding Sources:</i>	FEMA National Flood Insurance Program (NFIP), organization/agency operating budgets, and individual property owners
<i>Benefits:</i>	All residents benefit by protecting themselves and their community facilities from loss. Conventional insurance policies will protect people from most hazards, while in municipalities participating in the NFIP, residents also have access to flood insurance. The County and municipalities can also educate its citizens on the importance of maintaining adequate property insurance.

Action Item 10: Public Information / Education Program

Public information is the key to mitigating many of the potential hazards in Baraga County. Several projects can help to educate the public on potential hazards and how to protect themselves from hazards. Recommended projects include preparing and gathering education materials regarding hazards affecting Baraga County and ways people can help with mitigation. These materials should be organized and made available at government offices, schools, and other easily accessible public facilities, as well as on the internet.

<i>Responsible Agency:</i>	Baraga County Emergency Manager, Keweenaw Bay Indian Community, and Michigan State University – Extension
<i>Deadline:</i>	Ongoing
<i>Cost:</i>	Staff time
<i>Potential Funding Sources:</i>	Organization / agency operating budgets
<i>Benefits:</i>	Organizing locally applicable materials and making them available to the public ensures that the message is getting out. Through use of newspapers and internet, the public is informed, and message is consistent. This action item helps inform people who want to learn more about property protection and how to reduce their risk.

Action Item 11: Coordinate with Keweenaw Bay Indian Community

Work with KBIC in mitigating local hazards and disaster response throughout the County.

<i>Responsible Agency:</i>	KBIC Government and Emergency Services
<i>Deadline:</i>	Ongoing
<i>Cost:</i>	Staff time
<i>Potential Funding Sources:</i>	FEMA, KBIC Government and agency operating budgets, local operating budgets
<i>Benefits:</i>	Improved coordination of hazard mitigation and emergency response between KBIC and local response agencies. More efficient use of resources and clearly defined responsibilities for responders will lead to faster, more effective, and less costly response and recovery.

Action Item 12: Plan and Implement Emergency Detour Routes

Develop a plan for connecting and developing alternative traffic routes in the event of an emergency or road outage. Apply for funding and implementation. This item is carried over from the 2005/2013 plans and remains a need.

<i>Responsible Agency:</i>	Baraga County Road Commission, KBIC, Baraga County, and MDOT
<i>Deadline:</i>	2022
<i>Cost:</i>	Staff time
<i>Potential Funding Sources:</i>	Agency Budget
<i>Benefits:</i>	A plan for the linking and development of alternative transportation routes will aid in safety and savings for the entire community.

Action Item 13: Proposed All-Season Route: US41 to M-38 Connector

Between Baraga and L’Anse, US41 is vulnerable to transportation accidents, spills, and erosion and flooding due to Lake Superior. If an accident occurs or the road is closed for any reason, rerouting turns a 5-mile drive between the two villages to 100 miles. It also cuts off timely access to the Baraga County Memorial Hospital.

<i>Responsible Agency:</i>	Baraga County, Baraga County Road Commission, Keweenaw Bay Indian Community, and MDOT
<i>Deadline:</i>	2024
<i>Cost:</i>	Unknown
<i>Potential Funding Sources:</i>	FEMA Pre-Disaster Hazard Mitigation Grant and MDOT
<i>Benefits:</i>	Development of alternative transportation routes (Class C) will aid in safety and savings for the entire community.

Action Item 14: Snow Removal Equipment Storage

Snowstorms and blizzards are a major hazard in Baraga County. Since the development of the last plan, there have been multiple occurrences that have shut down the County Road Commission for days due to their lack of access to snow removal equipment. The LPT proposes that snow removal equipment be purchased and housed throughout the County. The Road Commission will also need a generator for long-term power outages.

<i>Responsible Agency:</i>	Baraga County Road Commission
<i>Deadline:</i>	2024
<i>Cost:</i>	Unknown
<i>Potential Funding Sources:</i>	FEMA Pre-Disaster Hazard Mitigation Grant
<i>Benefits:</i>	Faster response time after disasters leads to less risk to residents and their property.

Action Item 15: Adopt Hazard Mitigation Plan and Update Regularly

By adopting the Baraga County Hazard Mitigation Plan, the County and its municipalities recognize the need to incorporate hazard mitigation activities into everyday decisions at the County and local level. The plan will be reviewed annually by the Emergency Manager in coordination with the Emergency Operations Plan update to determine whether revisions are needed.

The Hazard Mitigation Plan will be updated every five years in order to address changing priorities and remain eligible for FEMA mitigation funding programs. The Emergency Manager will convene a Hazard Mitigation Committee representing local agencies and concerned parties to evaluate progress and update the plan in accordance with FEMA regulations. The Committee will review the plan to determine the sections that need to be updated or modified based on

changing conditions or alterations in State or Federal requirements. Goals, objectives, and strategies will also be reviewed to determine whether they thoroughly address new or changing conditions.

The Emergency Manager will work with Baraga County to update the plan based on Hazard Mitigation Committee and State Hazard Mitigation Officer recommendations. The public will be notified of any plan updates, and copies will be made available at all local government offices and online if feasible. The public will be provided with and notified of comment opportunities during all interim and five-year plan updates.

<i>Responsible Agency:</i>	Baraga County Emergency Manager
<i>Deadline:</i>	Ongoing
<i>Cost:</i>	Unknown
<i>Potential Funding Sources:</i>	FEMA and organization/agency operating budgets
<i>Benefits:</i>	The adoption of the Hazard Mitigation Plan commits Baraga County and its communities to working on mitigation efforts within its boundaries. Through implementation of mitigation strategies in the Plan, the County and municipalities will be actively working to prevent future problems within Baraga County.

Appendix

Appendix A: County Capability Snapshot

Appendix B: Shoreline Erosion Maps for Baraga County

Appendix C: Mitigation Funding and Resources

Appendix D: County Letter to Commit Match

Appendix E: Public Participation

Appendix F: Meeting Materials

Appendix G: State Document Review

Appendix H: Plan Adoption

Appendix A: County Capability Snapshot

Baraga County

2020-2025

Hazard Mitigation Plan



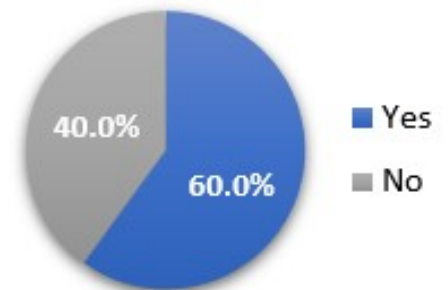
FAST FACTS

Area: 901 sq. miles	Climate: Humid Continental	Growing Season: 110 days?	Population: 8,580
Housing: 5,278 units	Average Household Income: \$42,757	Poverty Rate: 14.4%	Disability: 12.3%

PUBLIC SURVEY SUMMARY

Respondents are very concerned about shoreline flooding and erosion, snowstorms and blizzards, flooding due to precipitation events or snowmelt and invasive species. In the last five years, most households have experienced flooding (36.4%). Respondents were asked whether they have taken actions to make their home or community more resistant to hazards. Over half (60.0%) said yes. Information on property located in the floodplain, flood frequency, and flood insurance was also collected. According to the respondents, the most effective ways to receive hazard emergency management information are by radio, television and internet - social media.

Percentage of Households That Experienced a Hazard in the Past 5 years



DISASTER DECLARATIONS

Baraga County has experienced seven presidential declarations since 1965. Two have occurred since the 2013 plan. Other emergencies and disasters not declared by the president have impacted the county. Listed below are declarations from 1965-2019.

Presidential Disaster Declarations

Event	Declaration Date
Drought	March 2, 1977
Blizzards and Snowstorms	January 27, 1978
Severe Freeze	May 10, 1994
Flooding	May 6, 2002
Hurricane Katrina Evacuation	September 7, 2005
Flooding	June 18, 2013
Severe Storms, Flooding, Landslides, and Mudslides	August 2, 2018

Source: FEMA

HAZARD RANKING

Hazards are ranked using a “Priority Risk Index” (PRI) to categorize and prioritize county wide hazards. Risk is the estimated impact a hazard will have on human life and property. PRI helps to prioritize high risk hazards for mitigation planning purposes and to recognize mitigation opportunities in the planning area.

High Risk	
<ul style="list-style-type: none"> Snowstorms & Blizzards Shoreline Flooding & Erosion Public Health Emergencies Invasive Species 	<ul style="list-style-type: none"> Structural Fires Wildfires Riverine & Urban Flooding Severe Winds
Moderate Risk	
<ul style="list-style-type: none"> Infrastructure Failures & Secondary Technological Hazards Petroleum & Natural Gas Incidents Hazards Materials: Transportation Accident 	<ul style="list-style-type: none"> Hazardous Materials: Fixed Site Incidents Ice & Sleet Storms Dam Failures Hail
Low Risk	
<ul style="list-style-type: none"> Tornadoes Fog Extreme Temperatures Drought Sabotage & Terrorism Transportation Accidents 	<ul style="list-style-type: none"> Scrap Tires Fires Subsidence (Ground Collapse) Lightning Earthquakes Civil Disturbances

ACTION PLAN

A 5-year action plan set out by the Local Planning Team to reduce the community's vulnerability and risk to local hazards based on their capability. Identified specific action items for Baraga County and its communities. All activities are consistent with the following mitigation goals:

Goal 1: Protect lives and property within Baraga County from all known hazards while focusing on priority hazards;

Goal 2: Identify feasible projects throughout the County that will help mitigate future problems;

Goal 3: Be proactive in protecting public facilities and critical facilities through proper maintenance and upgrades;

Goal 4: Educate citizens in order to encourage self-help and mitigation of hazards on private property.

Action Item	Deadline	Cost
Implement Baraga County Community Wildfire Protection Plan (CWWP)	2022	Varies by Component
Drainage Improvements and Maintenance	Ongoing	Varies by Project
Update Stormwater Management Plans	Ongoing	Varies; Staff Time
Bank Stabilization	Ongoing	Unknown
Improved / Continuing Emergency Response	Ongoing	Staff Time
Review Plans and Development Regulation	Ongoing	Staff Time
Retrofit Underground Pipes	Ongoing	Variable
Remediate Hazardous Materials Sites	Ongoing	Variable
Insurance	Ongoing	Variable
Public Information / Education Program	Ongoing	Staff Time
Coordinate with Keweenaw Bay Indian Community	Ongoing	Staff Time
Plan and Implement Emergency Detour Routes	2022	Staff Time
Proposed All-Season Route: US41 to M-38 Connector	2024	Unknown
Snow Removal Equipment Storage	2024	Unknown
Adopt Hazard Mitigation plan and Update Regularly	Ongoing	Unknown

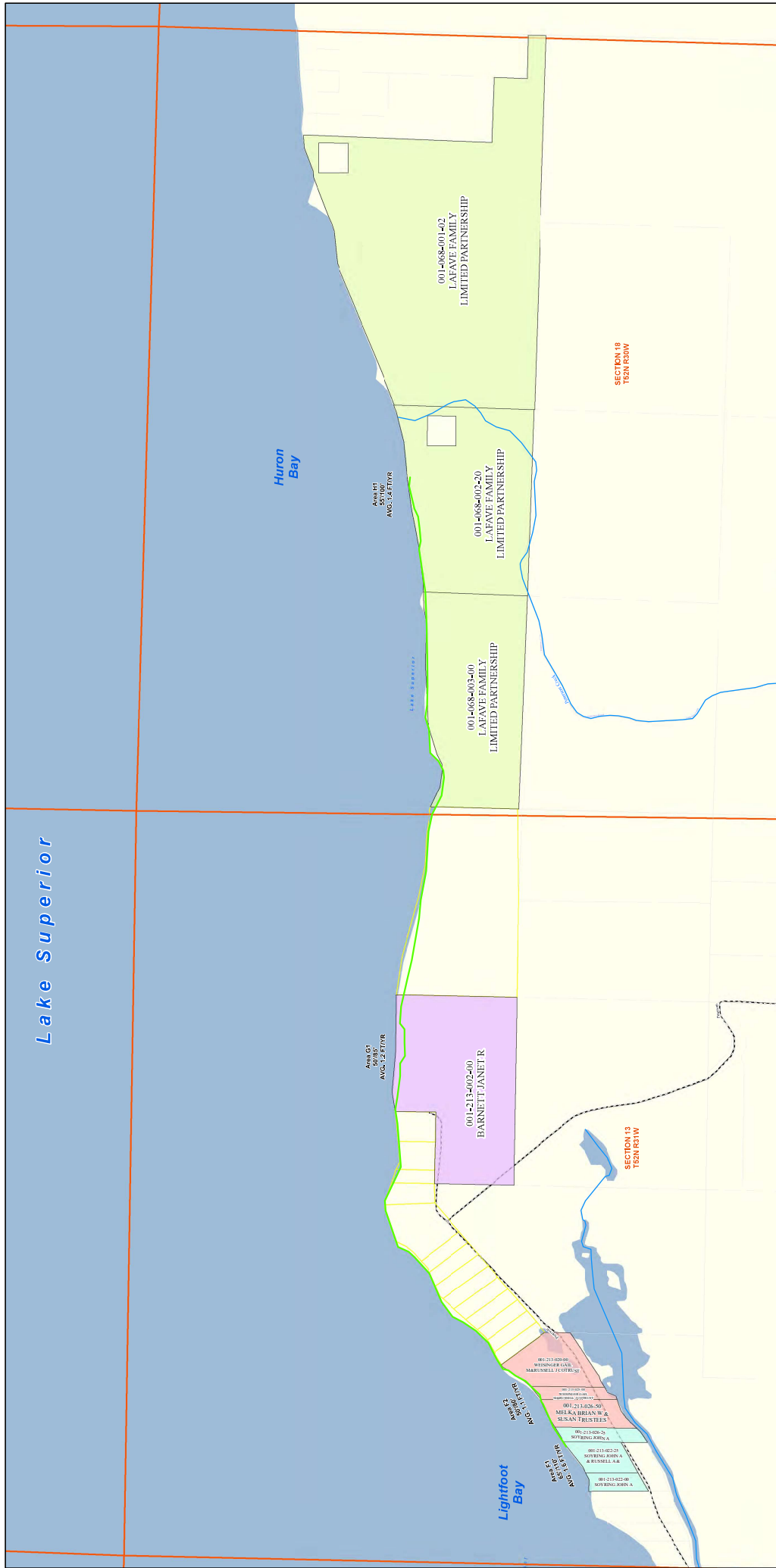
DATA SOURCES

Michigan Hazard Mitigation Plan, Emergency Management and Homeland Security Division,
Michigan Department of State Police: www.michigan.gov/documents/msp/MHMP_480451_7.pdf

National Climatic Data Center (NCDC), U.S. Department of Commerce, National Oceanic and
Atmospheric Administration: www.ncdc.noaa.gov

National Centers for Environmental Information Storm Events Database, U.S. Department of
Commerce, National Oceanic and Atmospheric Administration: www.ncdc.noaa.gov/stormevents

Appendix B: Shoreline Erosion Maps for Baraga County



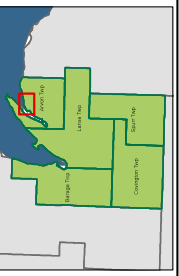
Lake Superior

Huron Bay

Lightfoot Bay

Map Created by: Jeremy Johnson
 Environmental Quality Judge
 Michigan Department of Environmental Quality
 10/15/2021

Representations made on this map are not a warranty, condition, or guarantee of accuracy. The Michigan Department of Environmental Quality is not responsible for any errors or omissions on this map. The user assumes all liability for any use of this map. © Michigan Department of Environmental Quality 2021.



MAP INFORMATION:
 This map identifies potential High-Risk Erosion Areas under Part 323, Shoreline Protection and Erosion Control, Act 184 of 1974, as amended. The shaded areas indicate recession of at least one foot per year. Background imagery, as well as roads and survey data were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.
 Questions regarding this map should be directed to the Michigan Department of Environmental Quality at 517-284-6567.
 Disclaimer:
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1 inch = 268 feet

0 400 800 1,200 Feet

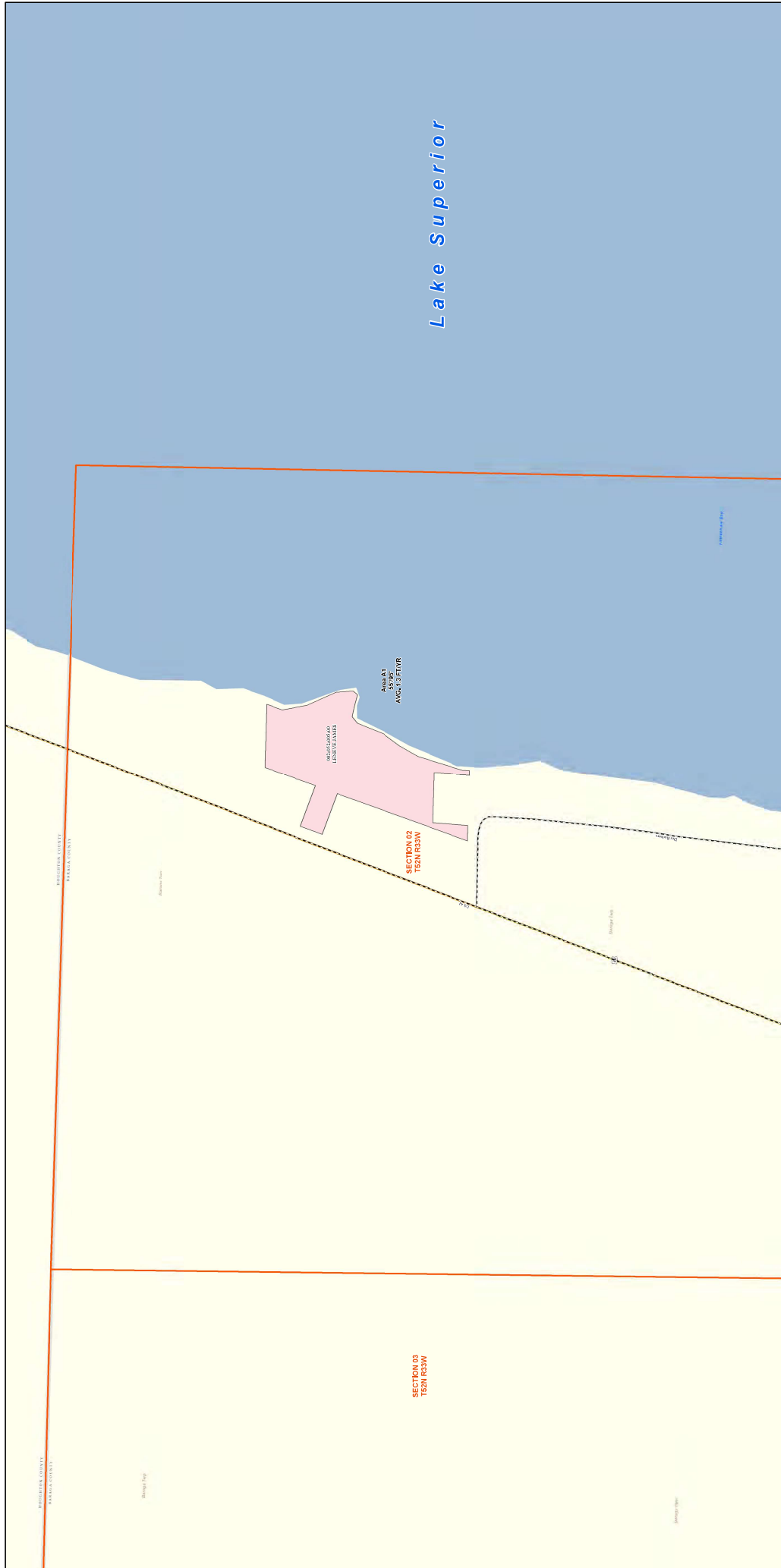
North Arrow

Roads: Dashed line
 Sections: Orange outline
 HREA Parcels: Yellow outline
 1983 HREAs (Approximate): Green outline
 De-Designated Parcels: Yellow fill

High Risk Erosion Areas
 30 YR60 7K Projected Recession Distance (Feet)
 Average Annual Rate of Recession (F/7Yr)

Light Blue	AREA F1: 657107 (Avg. 1.9 F/7Yr)
Red	AREA P2: 50987 (Avg. 1.1 F/7Yr)
Purple	AREA G1: 50985 (Avg. 1.2 F/7Yr)
Green	AREA H1: 551102 (Avg. 1.4 F/7Yr)

High-Risk Erosion Area Update - 2017
 Arvon Township, Baraga County
 T52N, R31W, Section 13
 T52N, R30W, Section 18
 Lightfoot Bay & Huron Bay



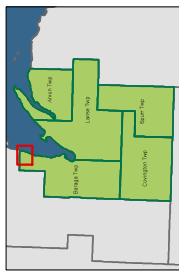
Lake Superior

Area A1
AVG. 1.3 FT/YR

SECTION 02
T52N R33W

SECTION 00
T52N R33W

Map Created by: Jeremy Johnson
Environmental Quality Center
Michigan Department of Environmental Quality
1000 West Grand Ave., Lansing, MI 48906-1200
Phone: 517-373-3000
Fax: 517-373-3001



MAP INFORMATION:
This map identifies potential High-Risk Erosion Areas under Part 323, Shoreline Protection Act, Act 323 of 1994, as amended. The shaded areas indicate recession of at least one foot per year. Background imagery, as well as roads and survey data, were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.
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High Risk Erosion Areas
30 YR/60 YR Projected Recession Distance (Feet)
Average Annual Rate of Recession (FT/YR)

AREA A1: 05/06 (Avg. 1.3 FT/YR)

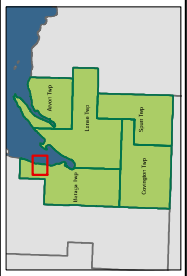
0 250 500 840 Feet
1 inch = 250 feet

Legend:
Rods (dashed line)
Sections (orange outline)
HREA Parcels (pink fill)

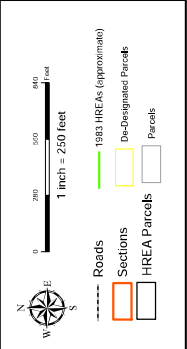
High-Risk Erosion Area Update - 2017
Baraga Township, Baraga County
T52N, R33W Section 02
South of Houghton County Line



High-Risk Erosion Areas
 Baraga Township, Baraga County
 T51N, R33W Section 03
 South of Beartown Road



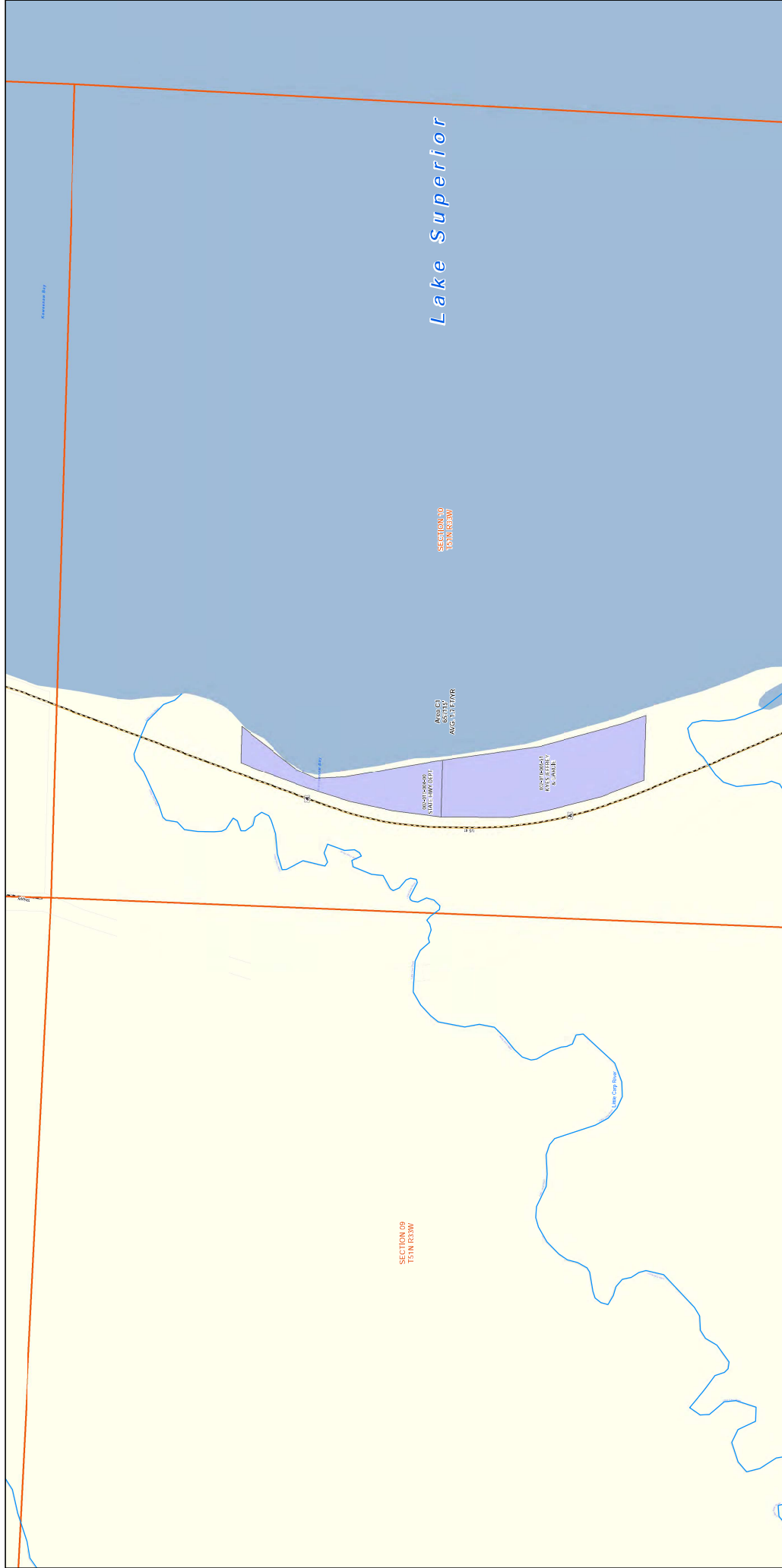
MAP INFORMATION:
 This map identifies potential High-Risk Erosion Areas under Part 323, Shoreline Protection Act, 1994 PA 871, as amended. The shaded areas indicate recession of at least one foot per year. Background imagery, as well as roads and survey data were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.
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High-Risk Erosion Areas
 30 YR/60 YR Projected Recession Distance (Feet)
 Average Annual Rate of Recession (F/T/YR)
 AHE/AB1: 865107 (Avg. 2.4 F/T/YR)

High-Risk Erosion Area Update - 2017
 Baraga Township, Baraga County
 T51N, R33W Section 03
 South of Beartown Road

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 www.michigan.gov/deq



High-Risk Erosion Area Update - 2017
 Baraga Township, Baraga County
 T51N, R33W Section 10
 South of Little Carp Creek

High Risk Erosion Areas
 30 YR/60 YR Projected Recession Distance (Feet)
 Average Annual Rate of Recession (F17/R)

AREA C1: 6071E (Avg. 1.2 F17/R)

Legend:
 Roads
 Sections
 HREA Parcels

Scale: 1 inch = 250 feet

MAP INFORMATION:
 This map identifies potential High-Risk Erosion Areas under Part 323, Shoreline Protection Act, 1994 PA 421, as amended. The shaded areas indicate recession of the least one foot per year. Background imagery, as well as node and survey data were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.
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Lake Superior

Keweenaw Bay

Sand Bay

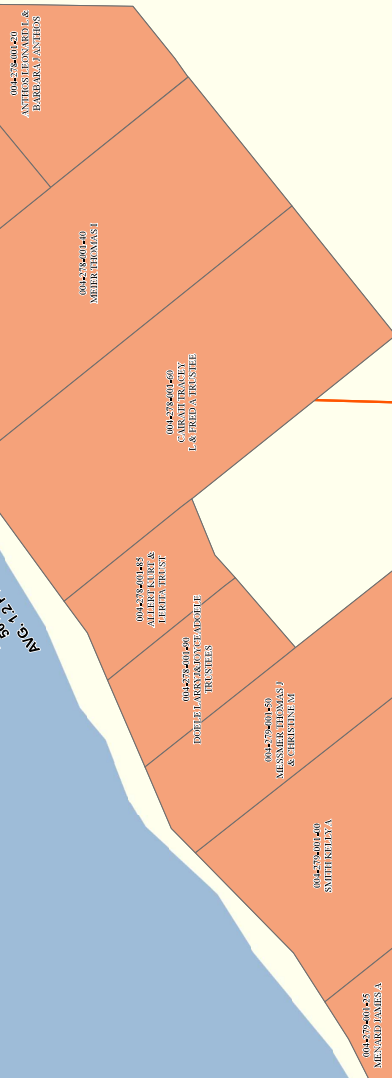
SECTION 29
T52N R32W

SECTION 28
T52N R32W

SECTION 32
T52N R32W

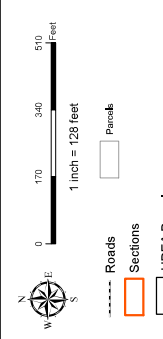
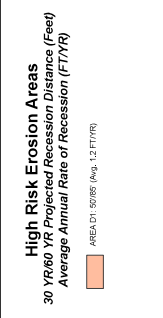
SECTION 33
T52N R32W

Area D1
50'± ETR
ANG 1.2 FT/yr



High-Risk Erosion Area Update - 2017

L'Anse Township, Baraga County
T52N R32W Section 29, 28, 32
Pequaming



MAP INFORMATION:
This map identifies potential High-Risk Erosion Areas under Part 323, Shoreline Protection Act, 1984 PA 421, as amended. The shaded areas indicate recession of at least one foot per year. Background imagery, as well as roads and survey data were provided by the State of Michigan, Center for Shared Solutions and Technology Partnerships.
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Michigan Department of Environmental Quality
Map Created by: Jeremy Johnson
Environmental Quality Center
Michigan Department of Environmental Quality
10/20/17
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Appendix C: Mitigation Funding and Resources

Federal Resources.....1
State Resources.....2
Other – Local Nonprofits & Foundations.....15
Other – National Nonprofits & Foundations.....17

Federal Resources

Economic Development Administration (EDA): Provides grants and technical assistance to generate new employment, help retain existing jobs and stimulate industrial and commercial growth.

Economic Development Assistance: The U.S. Dept. of Commerce solicits applications from applicants in rural and urban areas to provide investments that support construction, non-construction, technical assistance, and revolving loan fund projects under EDA’ Public Works and Economic Adjustment Assistance programs.

Additional Information: <https://www.grants.gov/web/grants/view-opportunity.html?oppId=279842>

Planning Program & Technical Assistance Programs: Develop Economic Development plans, studies, and analysis to build capacity, resiliency, and prosperity, particularly in an economically distressed area or region.

Additional Information: <https://www.grants.gov/web/grants/view-opportunity.html?oppId=301960>

Post-Disaster Economic Recovery: EDA and the International Economic Development Council (IEDC) provide several case studies and tools to assist in post-disaster recovery.

Additional Information: <https://eda.gov/programs/disaster-recovery>

Regional Innovation Strategies: Funding is available for capacity-building programs that provide proof-of-concept and commercialization assistance to innovators and entrepreneurs and for operational support for organizations that provide essential early-stage funding to startups. Under the RIS Program, EDA is soliciting applications for two separate competitions: the 2019 i6 Challenge; and the 2019 Seed Fund Support (SFS) Grant Competition.

Additional Information: <https://www.eda.gov/files/oie/ris/EDA-2019-RIS-Program-NOFO-FINAL.pdf>

Restore Your Economy: This website provides guidance on what to do after a disaster to plan for economic recovery and navigate the federal system post-disaster. Within the Disaster Planning for Economic Recovery Section, this resource provides step-by-step guidance on how to assess and create a plan for economic recovery.

Additional Information: <https://restoreyoureconomy.org/>

Environmental Protection Agency (EPA): Protect human and environmental health

Brownfields Program: Sub-programs include funding to conduct research and to provide training and technical assistance to communities, Targeted Brownfield Assessments, through funding to clean up and sustainably reuse contaminated properties.

Additional Information: <https://www.epa.gov/brownfields>

College/Underserved Community Partnership Program: Students in various courses work with communities to solve different issues by matching local needs to university resources. Students provide technical assistance through internships and capstone projects to help communities gain access to resources.

Additional Information: <https://www.epa.gov/environmentaljustice/collegeunderserved-community-partnership-program>

Environmental Justice Small Grants: EJSG program awards grants that support community-driven projects designed to engage, educate, and empower communities to better understand local environmental and public health issues and develop strategies for addressing those issues, building consensus in the community, and setting community priorities.

Additional Information: <https://www.epa.gov/environmentaljustice/environmental-justice-small-grants-program>

Small Growth in Small Towns & Rural Communities: Provides links to multiple resources targeted to increase sustainability in small towns and rural areas.

Additional Information: <https://www.epa.gov/smartgrowth/smart-growth-small-towns-and-rural-communities>

Federal Emergency Management Agency (FEMA): coordinates the response efforts to disasters when local and state resources are overwhelmed.

Assistance to Firefighters Grants: Grants awarded to fire departments, state fire training academies, and emergency medical service organizations.

Additional Information: <https://www.fema.gov/assistance-firefighters-grant>

Community Rating System: Voluntary incentive program for community floodplain management activities that exceed the minimum National Flood Insurance Program requirements. As a reward, flood insurance premiums are discounted for activities that reflect a reduce flood risk. Activities: (1) reduce flood damage to insurable property; (2) strengthen and support the insurance aspects of the NFIP; (3) encourage a comprehensive approach to floodplain management.

Additional Information: <https://www.fema.gov/national-flood-insurance-program-community-rating-system>

Disaster Assistance: May be provided as financial or direct assistance to individuals and families whose property has been damaged or destroyed from a federally declared disaster.

Additional Information: <https://www.fema.gov/disaster-assistance-available-fema>

Floodplain Management Assistance Program: Nationally competitive grants for the development of comprehensive flood mitigation plans and the implementation of flood mitigation projects to eliminate repetitive losses.

Additional Information: https://www.michigan.gov/msp/0,4643,7-123-72297_60152_69727_69730_69734-15282--,00.html

Hazard Mitigation Grant Program: Implement long-term, cost-effective mitigation actions to eliminate/reduce risk to life and property after a Federal disaster declaration. The amount of funding made available is a percentage of total disaster costs and will vary with each disaster. A project does not have to be in a declared county to be eligible.

Additional Information: https://www.michigan.gov/msp/0,4643,7-123-72297_60152_69727_69730_69734-15282--,00.html#Hazard_Mitigation

National Flood Insurance Program: Community participation in the National Flood Insurance Program is mandatory for homeowners, business owners, and renters to purchase flood insurance. Insurance claims can be paid if a federal disaster is not declared by the president. Cost of insurance is based where property is located in the floodplain (Special Flood Hazard Area).

Additional Information: <https://www.fema.gov/news-release/2006/07/20/fact-sheet-national-flood-insurance-program-nfip>

Port Security Grant Program: Supports the building, sustainment, and delivery of core capabilities essential to achieving the National Preparedness Goal of a secure and resilient nation.

Additional Information: <https://www.fema.gov/port-security-grant-program>

Pre-Disaster Mitigation Program: Pre-disaster planning and direct hazard mitigation projects to cost-effectively reduce overall risk to the population and structures.

Additional Information: https://www.michigan.gov/msp/0,4643,7-123-72297_60152_69727_69730_69734-15282--,00.html

U.S. Army Corps of Engineers (USACE): public engineering, design, and construction management

Continuing Authorities Program: Under the Continuing Authorities Program (CAP), the USACE is authorized to plan, design, and construct certain types of water resource and ecosystem restoration projects without additional and specific congressional authorization. The purpose is to implement projects of limited scope and complexity. Each authority has specific guidelines and total program and per-project funding limits.

Additional Information: <https://www.nae.usace.army.mil/Missions/Public-Services/Continuing-Authorities-Program/>

Floodplain Management Services: Educate individuals on flood hazards and the actions they can take to reduce property damage and prevent the loss of life. Foster public understanding of the options for dealing with flood hazards and promote prudent use and management of the nation's floodplains

Additional Information: Contact Detroit District Area Office: (313) 226-5013

Hazard Mitigation Team (Silver Jacket Team): The Michigan Silver Jackets Team is an interagency team dedicated to creating a collaborative environment to bring together Federal, State, local, and other stakeholders to develop and implement solutions to natural hazards and mitigation by combining available agency resources, which include funding, programs, and technical expertise. The Michigan Silver Jackets Team has been functioning for years, but a team charter was formalized in 2016.

Additional Information: <https://silverjackets.nfrmp.us/State-Teams/Michigan.cfm>

Levee Safety Program: Assess the integrity and viability of levees to ensure that levee systems do not present unacceptable risks to the public, property, and environment. Risk communication activities will be initiated for the state in the fiscal year 2019.

Additional Information: <https://www.lre.usace.army.mil/Missions/Civil-Works/Levee-Safety-Program/>

State Planning Assistance: Provide assistance in preparing comprehensive plans for the development, utilization, and conservation of water and related land resources. Typical studies do not include a detailed design for project construction. The program can encompass many types of studies dealing with water resources issues.

Additional Information:

<https://www.lre.usace.army.mil/Portals/69/docs/Navigation/STAKEHOLDERMTGS/9%20FEB%2012%20-%20Planning%20Assistance%20to%20States%20Fact%20Sheet.pdf>

U.S. Department of Agriculture (USDA): develops and executes federal laws related farming, forestry, rural economic development, and food.

Business & Industry Loan: This program bolsters the availability of credit by guaranteeing loans from local financial institutions (credit unions, banks, etc.) for rural businesses.

Additional Information: <https://www.rd.usda.gov/programs-services/business-industry-loan-guarantees>

Community Connect Grants: This program helps fund broadband deployment into rural communities where it is not yet economically viable for private sector providers to deliver service.

Additional Information: <https://www.rd.usda.gov/programs-services/community-connect-grants>

Community Facilities Direct Loan & Grant Program: This program provides affordable funding (low-interest loans, grants, or a combination) to develop essential community facilities in rural areas. An essential community facility is defined as a facility that provides a critical service to the local community for the orderly development of the community in a primarily rural area and does not include private, commercial or business undertakings.

Additional Information: <https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program>

Disaster – Supplemental Nutrition Assistance Program (D-SNAP): Can be authorized by the Food and Nutrition Service during a presidentially declared disaster with individual assistance. The state must request approval to activate the program. The program allows people who don't normally qualify for the Supplemental Nutrition Assistance Program (SNAP) eligible.

Additional Information: <https://www.fns.usda.gov/snap/dsnap/state-agencies-partners-resources>

Emergency Community Water Assistance Grants: Provides grants to rural communities who have a decline in quantity or quality of water. Funds can be used to help reduce or eliminate pollution of water resources and to improve planning for and management of solid waste sites.

Additional Information: <https://www.rd.usda.gov/programs-services/emergency-community-water-assistance-grants>

Emergency Conservation Program: Funding for farmers and ranchers to repair damages to their land from wind erosion, floods, hurricanes, or other natural disasters. The disaster must create new conservation issues, and the land must be returned to a productive agricultural state.

Additional Information: <https://www.fsa.usda.gov/programs-and-services/conservation-programs/emergency-conservation/index>

Emergency Forest Restoration Program: Provides payments to eligible nonindustrial private forest landowners to implement emergency measures to restore damages produced by a natural disaster.

Additional Information: <https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/emergency-forest-restoration/>

Emergency Watershed Protection Program: Provides technical and financial assistance to preserve life and property threatened by excessive erosion and flooding from natural disasters. Owners, managers, and users of public, private, or tribal lands are eligible.

Additional Information:
<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/>

Emergency Watershed Protection Program – Floodplain Easements: Purchase floodplain easements as an emergency measure to restore, protect, maintain, and enhance floodplain functions.

Additional Information:
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/landscape/ewpp/?cid=nrcs143_008216

Foods for Disaster Assistance: For mass feeding sites facilitated by disaster relief agencies. Possibility of delivering food directly to households in need. The program requires a governor's request and a presidential emergency or disaster declaration.

Additional Information: <https://www.fns.usda.gov/disaster/usda-foods-disaster-assistance>

Mutual Self-Help Housing: Provides grants to qualified organizations to help them carry out local self-help housing construction projects. Grant recipients supervise groups of very-low- and low-income individuals and families as they construct their own homes in rural areas.

Additional Information: <https://www.rd.usda.gov/programs-services/mutual-self-help-housing-technical-assistance-grants>

Re-connect Program: Provides grants and loans to buy infrastructure and install equipment needed to provide reliable broadband service.

Additional Information: https://www.rd.usda.gov/files/ReConnect_Program-Factsheet.pdf

Rural Business Development Grants: Support targeted technical assistance, training, and other activities leading to the development or expansion of small and emerging private businesses in rural areas. Programmatic activities are separated into enterprise or opportunity type grant activities.

Additional Information: <https://www.rd.usda.gov/programs-services/rural-business-development-grants>

Rural Economic Development Innovation: Rural communities and regions may apply for technical assistance to implement economic development planning projects. Through Rural Economic Development Innovation, the REDI initiative, USDA, and the cooperators will score, review, and select applications on a competitive basis.

Additional Information: https://www.rd.usda.gov/files/RD_REDI_FactSheet_6519.pdf

Rural Economic Development Loan and Grant Program: The purpose of the program is to promote rural economic development and job creation projects.

Additional Information: <https://www.rd.usda.gov/programs-services/rural-economic-development-loan-grant-program>

Rural Energy for America Program: Provides guaranteed loan financing and grant funding to agricultural producers and rural small businesses for renewable energy systems or to make energy efficiency improvements.

Additional Information: <https://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency>

Rural Microentrepreneur Assistance: Provides loans and grants to Microenterprise Development Organizations (MDOs) to help microenterprises startup and grow through a Rural Microloan Revolving Fund and provide training and technical assistance to microloan borrowers and micro-entrepreneurs.

Additional Information: <https://www.rd.usda.gov/programs-services/rural-microentrepreneur-assistance-program>

U.S. Department of Energy: concerned with policies regarding energy and safe handling of nuclear materials

Tribal Energy Loan Guarantee Program: The Tribal Energy Loan Guarantee Program (TELGP) is a partial loan guarantee program that can guarantee up to \$2 billion in loans to support economic opportunities to tribes through energy development projects and activities. Can guarantee up to 90 percent of the unpaid principal and interest due on any loan made to a federally recognized Indian tribe for energy development. The tribal borrower will be required to invest equity in the project and all project debt will be provided by non-federal lenders.

Additional Information: <https://www.energy.gov/lpo/tribal-energy-loan-guarantee-program>

Weatherization Assistance Program: The U.S. Department of Energy (DOE) Weatherization Assistance Program reduces energy costs for low-income households by increasing the energy efficiency of their homes while ensuring their health and safety. The program supports 8,500 jobs and provides weatherization services to approximately 35,000 homes every year using DOE funds. Through weatherization improvements and upgrades, these households save, on average, \$283 or more every year according to a national evaluation of the program. Since the program began in 1976, WAP has helped improve the lives of more than 7 million families through weatherization services.

Additional Information: <https://www.energy.gov/eere/wipo/weatherization-assistance-program>

U.S. Department of Health and Human Services (HHS): protects the health of all Americans and provides essential human services

Small Health Care Provider Quality Improvement Program: The purpose of the Rural Quality Program is to support planning and implementation of quality improvement activities for rural primary care providers or providers of health care services serving rural residents. These activities include providing clinical health services to residents of rural areas by funding projects that coordinate, expanded access, contain costs, and improve the quality of essential health care services. The program goal is to promote the development of an evidence-based quality improvement culture and to promote the delivery of cost-effective, coordinated health care services in primary care settings.

Additional Information: <https://www.grants.gov/web/grants/view-opportunity.html?oppId=307894>

U.S. Department of Housing and Urban Development (HUD): provide housing with fair and equal access and community development assistance

Disaster Assistance Resources: HUD offers many disaster resources and partners with Federal and state agencies to implement disaster recovery assistance.

Additional Information: <https://www.hud.gov/info/disasterresources>

Rural Capacity Building for Community Development and Affordable Housing: Enhances the capacity and ability of local governments, Indian tribes, housing development organizations, rural Community Development Corporations, and rural Community Housing Development Organizations (CHDOs), to carry out community development and affordable housing activities that benefit low- and moderate-income families and persons in rural areas.

Additional Information: <https://www.hudexchange.info/programs/rural-capacity-building/>

Rural Gateway: The Rural Gateway is an information clearinghouse providing technical assistance, training workshops, and peer learning and resource sharing to support rural housing and economic development.

Additional Information: <https://www.hudexchange.info/programs/rural/>

U.S. Department of the Interior (DOI): responsible for management and conservation of most federal land and natural resources

Invasive and Noxious Plant Management: Funds may be used on public, State county, and private lands for approved projects that prioritize and target undesirable plant species or group of species to be controlled or contained within a specific geographic area.

Additional Information:

https://beta.sam.gov/fal/cf4feb36160a4f11ab376036796925b4/view?keywords=Invasive%20and%20Noxious%20Plant%20Management&sort=-relevance&index=cfda&is_active=true&page=1

Plant Conservation and Restoration Management: Provides leadership in identifying, maintaining, and restoring Western native plant communities on public lands. Focus on more diverse forbs and grasses for the restoration of wildlife habitats and rehabilitation after wildfires. Improve habitat for western big-game winter range and migration corridors, and recovery of lands damaged by wildfire.

Additional Information:

https://beta.sam.gov/fal/c64ad5b621574cf38ea11ccd164e43ce/view?keywords=Plant%20Conservation%20and%20Restoration%20Management&sort=-relevance&index=cfda&is_active=true&page=1

U.S. Department of Labor (DOL): improve working conditions, advance opportunities for profitable employment and assure work-related benefits and rights

Disaster Unemployment Assistance: Financial assistance to individuals whose employment or self-employment has been lost or interrupted as a direct result of a major disaster and who are not eligible for regular employment insurance benefits.

Additional Information: <https://oui.doleta.gov/unemploy/disaster.asp>

U.S. Department of Transportation (DOT): responsible for helping to maintain and develop transportation systems and infrastructure

Emergency Relief Program: Fund for the repair or reconstruction of Federal-aid highways and roads on Federal lands which have suffered serious damage as a result of natural disasters or catastrophic failures from an external cause. Supplements the commitment of resources by States, their political subdivisions, or other Federal agencies to help pay for unusually heavy expenses resulting from extraordinary conditions.

Additional Information: <https://www.fhwa.dot.gov/programadmin/erelief.cfm>

U.S. Small Business Administration (SBA): advocates, aids, assists, and protects the interests of small business concerns

Disaster Loans: Provides low-interest disaster loans to businesses of all sizes, private non-profit organizations, renters, and homeowners. Eligible costs must not be covered by personal insurance or FEMA and include repair or replaced real estate, personal property, machinery & equipment, inventory and business assets that have been damaged or destroyed along with economic losses.

Additional Information: <https://www.sba.gov/funding-programs/disaster-assistance>

Economic Injury Disaster Loans: Small businesses, small agricultural cooperatives, or private nonprofit organization in a declared disaster area who have suffered substantial economic injury, may be eligible for an Economic Injury Disaster Loan.

Additional Information: <https://disasterloan.sba.gov/ela/Information/EIDLLoans>

Home and Personal Property Loans: Homeowners, renters and/or property owners in declared disaster areas may apply for a loan to help recover from disaster-related damages.

Additional Information:

<https://disasterloan.sba.gov/ela/Information/HomePersonalPropertyLoans>

Lender Match: The Lender Match program does not provide loans directly to businesses. Instead, it reduces the risk for participating financial institutions by guaranteeing their loans to small businesses-making it easier for them to obtain loans at competitive rates.

Additional Information: <https://www.sba.gov/funding-programs/loans>

Military Reservists Economic Injury Loans: Provides funds to help an eligible small business meet its ordinary and necessary operating expenses that it could have met, but is unable to, because an essential employee was called-up to active duty in his or her role as a military reservist.

Additional Information: <https://disasterloan.sba.gov/ela/Information/MREIDLLoans>

State Resources

Environment, Great Lakes, and Energy (EGLE): Supports a sustainable environment, healthy communities, and vibrant economies

Brownfield Redevelopment Grants: Brownfield redevelopment grants provide funding to local units of government and other public bodies to investigate and remediate known sites of environmental contamination, which will be used for identified economic redevelopment projects.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-151085--,00.html

Brownfield Redevelopment Loans: Brownfield redevelopment loans facilitate the redevelopment of brownfield properties by providing low-interest loans to local units of government and other public bodies to investigate and remediate sites of known or suspected environmental contamination.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-151086--,00.html

Drinking Water Contaminant Remediation Grants: For drinking water infrastructure, grants shall be awarded to drinking water systems for contaminant remediation efforts or connection to an alternate system.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-492719--.00.html

Michigan Aquatics Invasive Plant Control Grant Program: The grants will assist with the prevention, detection, eradication, and control by chemical, physical, or biological methods of aquatic invasive plant species within Michigan inland lakes.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-498017--.00.html

Nonpoint Source Pollution Control Grants – Clean Michigan Initiative: To provide funding to implement the physical improvements in approved watershed management plans intended to restore impaired waters and protect high-quality waters. Practices must address specific sources of nonpoint source pollution identified by Michigan's Nonpoint Source Program Plan. Physical improvements are structural and vegetative best management practices.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-314499--.00.html

Nonpoint Source Pollution Control Grants – Federal Clean Water Action Section 319: To provide funding to implement nonpoint source activities identified in EGLE-approved watershed management plans. Implementation activities must address specific sources of nonpoint source pollution identified by Michigan's Nonpoint Source Program Plan.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-314500--.00.html

Planning and Construction Grants: Michigan Coastal Management (MCM) Program provides grant funds to promote vibrant and resilient coastal communities. Approximately \$700,000 for planning and on-the-ground, site-specific projects are available annually in partnership with the National Oceanic and Atmospheric Administration.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-314490--.00.html

Scrap Tire Cleanup Grants: To assist property owners and local units of government with the proper removal of abandoned scrap tires and scrap tires at collection sites. Priority will be given to scrap tires accumulated prior to January 1, 1991, and to collection sites that pose an imminent threat to public health, safety, welfare, or the environment.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-314505--,00.html

Scarp Tire Law Enforcement Grants: To issue grants for projects that will result in restricting the illegal dumping or improper disposal of scrap tires.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-495979--,00.html

Scarp Tire Market Development Grants: To issue grants for projects that will result in the development of increased markets for scrap tires.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-314506--,00.html

Source Water Protection Grants: To provide matching funds to public water supply systems for the development and implementation of a source water protection program to help prevent drinking water sources from becoming contaminated. These funds can be used to develop a Surface Water Intake Protection Program for systems utilizing surface water or to develop a Wellhead Protection Program for those systems that use groundwater sources.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-314515--,00.html

State Revolving Loan Fund: Provides low-interest loans for water pollution control projects.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-314509--,00.html

Strategic Water Quality Initiatives Fund: Provides low-interest loans for water pollution control projects involving the on-site upgrade or replacement of failing septic systems or for the removal of groundwater or stormwater from sanitary or combined sewer leads.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-314512--,00.html

Substantial Public Health Risk Project Grants: For projects to address a substantial public health risk from treatment system failure.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-492720--,00.html

Volunteer River, Stream, and Creek Cleanup Grants: Provides funding to local units of government for volunteer cleanups of rivers, streams, and creeks to improve Michigan waterways of human-made trash.

Additional Information: https://www.michigan.gov/egle/0,9429,7-135-3307_3515-314495--,00.html

Michigan Department of Natural Resources (DNR): Maintains natural resources such as parks, state forests, and recreation areas.

Michigan Invasive Species Grant Program: To address strategic issues of prevention, detection, eradication and control for both terrestrial and aquatic invasive species in Michigan. Annually, \$3.6 million in funding is available.

Additional Information: https://www.michigan.gov/invasives/0,5664,7-324-71276_92000---,00.html

Michigan Department of Transportation (MDOT): Maintains all interstate, US and state highways in Michigan.

Emergency Relief: Assists with replacing or repairing roadways or roadway structure damage on ALL federal aid highways (major collectors and above) resulting from a catastrophic failure or natural disaster. Also includes debris removal and emergency protective measures such as traffic control and detour signing.

Additional Information:

https://www.michigan.gov/documents/mdot/FHWA_Emergency_Relief_program_outline_Michigan_022113_418318_7.pdf

Rural Task Force Program: The money is provided within two funding sources: Surface Transportation Program (STP) Rural for improving the federal aid system; and Transportation Economic Development Fund (TEDF) Category D for building an all-season network.

Additional Information: https://www.michigan.gov/mdot/0,4616,7-151-9621_17216_54903-227096--,00.html

State Infrastructure Bank Loan Program: Provide loans to public entities for eligible transportation improvements to meet urgent project financing demands.

Additional Information:

https://www.michigan.gov/documents/mdot/Guidelines_for_Applicants_623329_7.pdf

Michigan Economic Development Corporation (MEDC): Collaborates with other economic partners to assist businesses grow and develop strategies.

Michigan Business Development Program: Provide grants, loans, and other economic assistance to businesses for highly competitive projects in Michigan that create jobs and/or provide investment.

Additional Information:

<https://www.michiganbusiness.org/4a7f60/globalassets/documents/reports/fact-sheets/michiganbusinessdevelopmentprogram.pdf>

Michigan Community Revitalization Program: Promotes community revitalization.

Additional Information:

<https://www.michiganbusiness.org/49a841/globalassets/documents/reports/fact-sheets/communityrevitalizationprogram.pdf>

Other

Local Resources & Programs

Baraga County Community Foundation: Funding and scholarships available to address community needs. Provide support for non-profits and volunteer organizations in Baraga County.

Additional Information: <http://baragacountyfoundation.org/>

Baraga, Houghton, and Keweenaw Community Action Agency: Has programs such as Western Upper Peninsula Food Bank, weatherization, emergency programs, Commodity Supplemental Food Program (CSFP), The Emergency Food Assistance Program (TEFAP), transportation, furnace and chimney cleaning/minor roof repairs and much more.

Additional Information: 926 Dodge St. Houghton, MI 49931 | (906) 482-5528
<http://www.keweenaw.org/list/member/community-action-agency-houghton-71> ;
<http://bhkcaa.org/index.html>

Copper County Habitat for Humanity - Homeownership Program: For families and individuals in need of decent, affordable housing. Application selection based on level of need, willingness to partner with Habitat for Humanity and the ability to repay mortgage through an affordable payment plan.

Additional Information: <https://www.habitat.org/us-mi/houghton/copper-country-hfh>

Dickinson Iron Community Action Agency: Focus and coordinate all available resources that empower individuals to obtain the opportunities to become self-sufficient. Provides 14 different human services including in-home senior services, transportation, weatherization, nutrition and food services. Reach out to the agency to see what other services they provide.

Additional Information: <https://www.dicsami.org/>

Duck Lake Riparians' Association: (Gogebic County) Improve, conserve, and safeguard overall welfare of the air, water, and shorelines of Duck Lake in Gogebic County. Assists local government in development and administration of regulations to protect the environment and promote social and recreational activities.

Additional Information: <http://www.ducklakeriparians.org/index.cfm>

Gogebic Ontonagon Community Action Agency: Provides food, weatherization, housing, and community development programs. Visit their website or call the agency to find out more.

Additional: http://www.gocaa.org/index.cfm?fuseaction=dep_list

Gogebic Salvation Army Service Extension: Disaster and emergency response services are provided by a committee of volunteers through the Salvation Army:

Additional Information: Tom Bremer (715) 554-0177

Habitat for Humanity Menominee River: Build and repair homes in Iron and Dickinson County. Make home improvements such as repairs and replacements of roofs, furnaces, water heaters, septic systems, and siding.

Additional Information: <http://www.habitatmr.com/index.html>

Hancock Salvation Army: Provides emergency financial assistance and disaster services for Houghton, Keweenaw, and Ontonagon counties.

Additional Information: <https://centralusa.salvationarmy.org/hancock>

Ishpeming Salvation Army: Provides emergency financial assistance and disaster services to Baraga County

Additional Information: (906) 486-8121

Keweenaw Community Foundation: Strengthen all aspect of the Keweenaw and assist donors in achieving their philanthropic goals. Various grant applications are available.

Additional Information: <http://keweenawcommunityfoundation.org/>

Keweenaw Economic Development Alliance: Private-public partnership local economic development organization serving Baraga, Houghton, and Keweenaw Counties. Provides leadership and staffing to implement the Keweenaw Economic Dev. Strategic Plan with the goals of fostering business growth, improving infrastructure, revitalizing our communities, developing and attracting talent, and enhancing cultural and recreational opportunities.

Additional Information: <https://kedabiz.com/about/>

Keweenaw Land Trust: Focus on protection of land, water, and quality of life through conservation, stewardship, and education. Current projects include preservation of wetlands, watersheds, and natural habitat, conservation easements. and educational outreach.

Additional Information: <http://www.keweenawlandtrust.org/about.php>

Lake Superior Community Development Corp: Non-profit Native Community Development Financial Institution. Loan programs available to assist with access to home mortgages and decent, safe, and sanitary housing for low- and very-low-income individuals.

Additional Information: <https://www.lakesuperiorcdc.com/>

Portage Health Foundation: Offers grants and sponsorships for projects implementing and promoting health education, health research, community health, healthcare leaders and access to care. Also raises funds to help those in need after disasters.

Additional Information: <http://phfgive.org/grants.php>

Superior Health Foundation: Assists in meeting unmet health needs through education, programs, and research on illness prevention and health promotion. Several grants are provided through the foundation for non-profit health-centered organizations.

Additional Information: <http://superiorhealthfoundation.org/>

Superior Watershed Partnership and Land Conservancy: Implements a variety of conservation and public education projects including pollution prevention, invasive species removal and prevention, water quality and stormwater management, habitat protection and restoration, native plant restoration, climate change adaptation planning and implementation, alternative energy and energy conservation, land protection, watershed restoration, and education programs.

Additional Information: <https://superiorwatersheds.org/projects>

Western U.P. Planning & Development Region (WUPPDR): Offers planning support for the counties of Baraga, Gogebic, Houghton, Iron, Keweenaw, and Ontonagon. Services and technical assistance on Hazard Mitigation planning are available. Additionally, information on mitigation and community development funding and resources is also provided.

Additional Information: <https://www.wupldr.org/>

Other

National Resources & Programs

Community Restoration & Resiliency: Keep America Beautiful Community Restoration and Resiliency Fund benefits Keep America Beautiful Affiliates that serve communities directly affected by natural and environmental disasters. The fund provides immediate and long-term support for initial and ongoing cleanup efforts and helps rebuild vital public spaces: parks, greenways, community gateways, Main Street/downtown areas, open spaces, and more. Funds will help improve resiliency physically — as green infrastructure — and socially — to build community.

Additional Information: <https://www.kab.org/>

Grants for Indigenous Peoples: Seventh Generation Fund is an Indigenous identity-based organization dedicated to the self-determination of Native Peoples and tribal sovereignty. It mobilizes financial, technical, and informational resources directly to Native communities to empower action. Grant awards in several categories ranging from \$250 to \$50,000. An organization may apply for a single large grant per year, with the possibility of additional Traveling Song Initiative or Mini-Grants.

Additional Information: <http://www.7genfund.org/apply-grant>

National Low-Income Housing Coalition: The National Low-Income Housing Coalition is dedicated solely to achieving socially just public policy that assures people with the lowest incomes in the United States have affordable and decent homes.

Additional Information: <https://nlihc.org/issues/disaster>

Planning for Post Disaster Recovery - Next Generation: American Planning Association provides tools and guidance with briefing papers, case studies, a comprehensive report, and model pre-event recovery ordinance.

Additional Information: <https://www.planning.org/research/postdisaster/>

Rebuilding Together: Rebuilding Together helps people and communities in need by bringing together its national network of local Rebuilding Together affiliates, corporate and individual donors, skilled trades individuals and associations, and almost 100,000 volunteers each year.

Additional Information: www.rebuildingtogether.org

Voluntary Organizations Active in Disasters: Association of organizations that mitigate and alleviate disaster impact. The website has a list of national partners that provide various services and programs for communities affected by disasters.

Additional Information: <https://www.nvoad.org/voad-members/national-members/>



Produced by: Western U.P. Planning & Development Region

Appendix D: County Letter to Commit Match

BARAGA COUNTY CLERK
Register of Deeds



2 South Main Street • L'Anse, MI 49946-1085
906.524.6183 • Fax: 906.524.6432

Wendy J. Goodreau
CLERK/REGISTER

Carrie Verbanac
DEPUTY

Kim Fedie
DEPUTY

December 10, 2018

Jerald Wuorenmaa, Executive Director
Western Upper Peninsula Planning and Development Region (WUPPDR)
400 Quincy St 8th Floor
Hancock, MI 49930

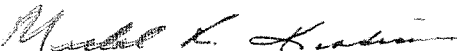
Dear Mr. Wuorenmaa:

Baraga County understands that WUPPDR intends to apply, or already has, for Federal Emergency Management Agency (FEMA) funding to update the Baraga County Hazard Mitigation Plan beginning in late 2018 or early 2019. The funding source, the Hazard Mitigation Grant Program, requires a nonfederal local share of at least 25 percent of the total project budget.

As the County will benefit significantly from this project through a plan of action to mitigate future hazards and disasters, as well as through establishment of eligibility for future FEMA pre- or post-disaster funding, the County Board commits to a local cost share not to exceed \$3,000. This amount may be provided through in-kind services (facilitated and documented with assistance from the County Emergency Manager), a cash contribution, or a combination of both.

Baraga County looks forward to working with you to complete its Hazard Mitigation Plan update.

Sincerely,


Michael R. Koskinen
Chairman

BOARD OF COMMISSIONERS

Gale Eilola
DISTRICT 1

Michael Koskinen
DISTRICT 2

Patrick Reilley
DISTRICT 3

William Menge
DISTRICT 4

William C. Rolof
DISTRICT 5

Appendix E: Public Participation

2019 Baraga County Hazard Mitigation Public Opinion Survey

We need your help!

Baraga County is currently updating their five year hazard mitigation plan as required by the Federal Emergency Management Agency (FEMA). A committee and staff in Baraga County are working with the Western Upper Peninsula Planning & Development Region (WUPPDR) to update the County's Hazard Mitigation Plan. Hazard mitigation is any action taken before, during, or after a disaster to eliminate or reduce the risk to human life and property from natural, technological, or human-related hazards. This survey provides an opportunity for you to share your knowledge and participate in the hazard mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that help lessen the impact of future hazard events.

You can either fill out the attached paper survey or participate online at:

<https://www.surveymonkey.com/r/BaragaHazMitPublicInput>

Although participation in this survey is optional, we strongly encourage you to respond. All responses will be kept confidential. **Please respond by Friday, July 12, 2019.** If you have questions regarding this survey or would like to learn about more ways that you can participate in the planning process, please contact:

Rachael Pressley, *Assistant Regional Planner*, WUPPDR, (906)482-7205 ext. 116
rpressley@wuppdr.org

Thank you for your time and participation!

Key Definitions:

Hazard - Something that is potentially dangerous or harmful, often the root cause of an unwanted outcome.

Mitigation - The action of reducing the severity, seriousness, or painfulness of something.

Risk - A situation involving exposure to danger; the possibility that something unpleasant or unwelcome will happen.

Vulnerability - The quality or state of being exposed to the possibility of being attacked or harmed, either physically, emotionally, financially, etc.

1. Where do you live in Baraga County?

- | | | |
|--|--|---|
| <input type="checkbox"/> Arvon Township | <input type="checkbox"/> Baraga Township | <input type="checkbox"/> Covington Township |
| <input type="checkbox"/> L'Anse Township | <input type="checkbox"/> Spurr Township | <input type="checkbox"/> Village of Baraga |
| <input type="checkbox"/> Village of L'Anse | <input type="checkbox"/> L'Anse Reservation & Off
Reservation Trust | <input type="checkbox"/> Other _____ |
- Outside Baraga County; please specify: _____

2. During the past five (5) years, have you or someone in your household directly experience a hazard in Baraga County, such as a severe windstorm, flood, or other type of hazard?

- Yes No (**skip logic here**)

If yes, which of hazards have you or someone in your household experienced in the past five (5) years?

3. How concerned are you about the following hazards affecting your home and community?

Hazards	Very Concerned	Somewhat Concerned	Neutral	Not Very Concerned	Not Concerned
Civil Disturbances (e.g. rioting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dam Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drought	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extreme Weather Temperatures (hot/cold)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous Materials, Fixed Site (e.g. buildings or industrial site)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous Materials, Transportation-Related (e.g. waste spill from traffic accident)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ice/Sleet Storms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Infrastructure failure & resulting hazards (e.g. power outage)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landslide /Mudslide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lightning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Petroleum/Natural Gas Pipeline Incident (e.g. rupture/leak resulting in outage)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public Health Emergency (e.g. disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

epidemic)					
Flooding due to precipitation event or snowmelt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sabotage / Terrorism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Severe Winds / Wind Storms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Hazards	Very Concerned	Somewhat Concerned	Neutral	Not Very Concerned	Not Concerned
Shoreline Flooding and Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Snowstorms / Blizzards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Structural Fires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subsidence (sink holes or ground collapse)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tornadoes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transportation Accidents (car crashes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildfires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Have you taken any actions to make your home or community more resistant to hazards?

- Yes No

IF YES, please explain:

5. Is your home located in a floodplain? Yes No Don't know

6. Does your street or home flood regularly during significant rain events? Yes No

IF YES, provide cross street name and/or specific location(s) on street:

7. If your street or home **does flood regularly** during significant rain events, how many times did it flood in the past 12 months?

- 1 time 2 times 3 times 4 times 5 or more times

8. Do you have flood insurance? Yes No; ***please indicate reason(s) below*** Don't know

- | | |
|--|--|
| <input type="checkbox"/> Not Located in a floodplain | <input type="checkbox"/> Property is elevated or otherwise protected |
| <input type="checkbox"/> Too expensive | <input type="checkbox"/> Insurance company will not provide |
| <input type="checkbox"/> Property never floods | <input type="checkbox"/> Never considered / didn't know about it |
| <input type="checkbox"/> Other (specify): _____ | |

9. What are the most effective ways for you to receive information during or immediately following a hazard emergency?

- | | |
|--|---|
| <input type="checkbox"/> Newspaper | <input type="checkbox"/> Mailings |
| <input type="checkbox"/> Television | <input type="checkbox"/> Public Forums / Meetings |
| <input type="checkbox"/> Radio | <input type="checkbox"/> Phone |
| <input type="checkbox"/> Internet – Social Media (Facebook or Twitter) | Other (specify): _____ |
| <input type="checkbox"/> Internet – Government Website Postings | _____ |
| | _____ |

10. In your opinion, what are some steps or projects your local government could take to reduce or eliminate the risk for future hazard damages to your community?

11. Several community-wide activities can reduce our risk from hazards. In general, these activities fall into one of six broad categories. Please tell us how important you think each one is for your community to consider doing:

Category	Very Important	Somewhat Important	Not Important
1. <u>Prevention</u> Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning & zoning, building codes, open space preservation, and floodplain regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. <u>Property Protection</u> Modification or removal of existing buildings to protect them from a hazard. Examples include government purchase, relocation, raised elevation, and structural retrofits (updates).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. <u>Natural Resource Protection</u> Preservation or restoration of the functions of natural systems while minimizing hazard losses. Examples include floodplain protection, forest management, and slope stabilization.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. <u>Structural Projects</u> Modification of the natural conditions for or progression of a hazard. Examples include dams, levees, seawalls, detention/retention basins, channel modification, retaining walls, and storm sewers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. <u>Emergency Services</u> Protection of people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of emergency facilities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. <u>Public Education and Awareness</u> Informing of citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach, school education, library materials, and demonstration events.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please feel free to provide any additional comments in the space provided:

THANK YOU FOR YOUR PARTICIPATION!



PRESS RELEASE

Western Upper Peninsula Planning and Development Region
400 Quincy St., 8th Floor
Hancock, MI 49930
906-482-7205
info@wuppdr.org

Release Date: June 14, 2019

Baraga County Hazard Mitigation Plan – Public Input Survey

Hazard mitigation is any action taken before, during or after a disaster to eliminate or reduce the risk to human life and property from natural, technological, or human-related hazards. Officials in Baraga County along with the Baraga County Emergency manager are contracting the Western Upper Peninsula Planning & Development Region to update the County-wide Hazard Mitigation Plan.

We are asking that any Baraga County resident take a short online survey. The paper survey and flyers with the online-link are available at the city and township halls, county clerk's office, public libraries, as well as www.wuppdr.org/surveys and will be available until Friday, July 12, 2019.

The survey link is as follows:

<https://www.surveymonkey.com/r/BaragaHazMitPublicInput>

The information you provide will help us better understand local hazard concerns and can lead to mitigation activities that help lessen the impact of future hazard events in your community.

For more information or for a paper survey contact:

Rachael Pressley, rpressley@wuppdr.org
WUPPDR Project Coordinator
1-906-482-7205, ext. 116

BARAGA, HOUGHTON, & KEWEENAW COUNTY HAZARD MITIGATION PLANS – PUBLIC INPUT SURVEYS

🕒 June 14, 2019 📁 Featured, Local News 👁 184 Views

The following press release was issued by WUPPDR:

Hazard mitigation is any action taken before, during or after a disaster to eliminate or reduce the risk to human life and property from natural, technological, or human-related hazards.

Officials in Baraga, Houghton, and Keweenaw County along with the Emergency managers are contracting the Western Upper Peninsula Planning & Development Region to update each of these County Hazard Mitigation Plans.

We are asking that any Baraga, Houghton, and Keweenaw County resident take a short online survey. The paper survey and online-link is available at the city and township halls, county clerk's office, public libraries, as well as

www.wuppdr.org/surveys and will be available until Friday, July 19, 2019.

The survey links for each County are as follows:

Baraga: ***<https://www.surveymonkey.com/r/BaragaHazMitPublicInput>***

Houghton: ***<https://www.surveymonkey.com/r/HoCoHazMitPublicInput>***

Keweenaw: ***<https://www.surveymonkey.com/r/KewCoHazMitPublic>***

The information you provide will help us better understand local hazard concerns and can lead to mitigation activities that should help lessen the impact of future hazard events in your community.

For more information or for a paper survey contact:

Rachael Pressley, ***rpressley@wuppdr.org***

WUPPDR Project Coordinator

1-906-482-7205, ext. 116

Results of 2019 Baraga County Hazard Mitigation Survey – Summary

The county survey received 16 responses to the 2019 Baraga County Hazard Mitigation Public Survey. Printed copies of the survey were available to residents at a variety of locations through the county. The survey was also accessible online with notices published in Your Daily Globe and Eagle Radio and some jurisdictional websites.

All respondents were residents of Baraga County. The majority (31.25% or 16 people) live in the Village of L’Anse. Almost all the seven jurisdictions in Baraga county were represented in the survey except for Spurr Township and the Village of Baraga.

When asked if they or someone in their household directly experienced a hazard in Baraga County over the last five years, 60.0% (9 people) said yes. Several comments listed more than one hazard. The most commonly mentioned hazard that their household experienced was flooding (36.4%; 4 people). The second most common hazard mentioned was blizzard.

Respondents were asked how concerned they were about the following potential hazards that could affect their home and community in the next five years. The most commonly mentioned hazard that their household experienced was shoreline flooding at 56.35%. The other top hazards that concerned citizens in Baraga County were flooding due to precipitation event or snowmelt (50.0%), invasive species (50.0%), snowstorms and blizzards (50.0%), and public health emergencies (56.3%). The respondents were either not very concerned or not concerned at all about earthquakes (87.5%), fog (50.0%), and scrap tire fires (50.0%).

Respondents were also asked whether they had taken actions to make their home or community more resistant to hazards. Over half (60.0%; 9 people) said yes and 10 explained what they had completed. Responses included the following:

- Home improvements projects, including installing smoke detectors, carbon monoxide detectors, and fire extinguishers, purchasing electric heaters and a new furnace, and implementing preventative sump pump maintenance.
- Other comments mentioned culvert upgrades and replacements.

13 respondents (86.7%) said that their home was not located on a floodplain, while 2 (13.3%) did not know if their property was on a floodplain. Most respondents (92.9%; 13) said that their street or home do not flood regularly with significant rain events and only 1 responded yes. However, the survey went on to ask them about specific cross streets and how many times it flooded in the past year. One location in the Village of L’Anse was mentioned. Out of 4 people who answered, their listed location flooded:

1 time	1(25.0%)
2 times	2 (50.0%)
3 times	1 (25.0%)
4 times	0

5 or more times	0
-----------------	---

Most who responded, reported not having flood insurance (100.0%; 15 people). One respondent did not answer the question. The top reasons listed for not having coverage was because they were not located in a floodplain (45.5%), their property is elevated or otherwise protected (27.3%), they never considered or did not know about it (18.2%), or their property never floods (18.2%). Two stated that their insurance company will not provide flood insurance.

When asked what the most effective ways are to receive information during or immediately following a hazard emergency (they could check all that apply), 13 people (81.3%) said radio, 10 (62.5%) said television, and 8 (50.0%) said they utilize social media. Other responses say they use their phone (43.8%), government websites (25.0%), newspaper (18%), and public forums/meetings (6.3%). No respondents said they use mailings.

The last question in the survey was an additional comment box for the LPT containing 1 response. These data are also attached to this survey summary.

Attached:

Q14 In your opinion, what are some steps or projects your local government could take to reduce or eliminate the risk for future hazard damages to your community? 10 Comments

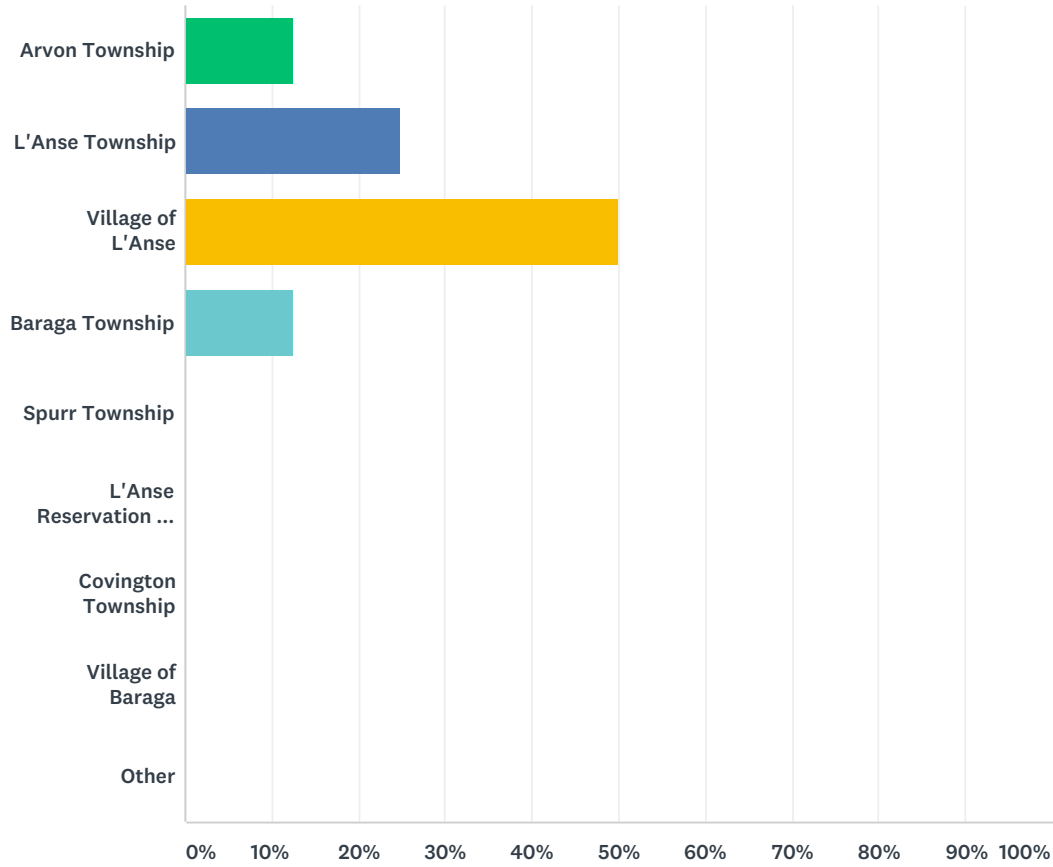
Q14 In your opinion, what are some steps or projects your local government could take to reduce or eliminate the risk for future hazard damages to your community?

Answered: 6 Skipped: 2

#	RESPONSES	DATE
1	Culvert repairs, tree removal near power lines, security in public buildings and public events	6/27/2019 7:13 PM
2	Shut down Warden Plant.	6/25/2019 6:25 AM
3	Identify and work toward alternate travel routes off US 41 at head of the bay especially during winter months	6/19/2019 2:16 PM
4	establish an year round alternate route around the head of Keweenaw bay.	6/17/2019 10:46 AM
5	Develop Incident Action Plans with countermeasures for potential events. Have a standing incident command team.	6/14/2019 9:32 AM
6	Inform the public of dangers & provide safe alternatives	6/14/2019 7:17 AM

Q1 Where do you live in Baraga County?

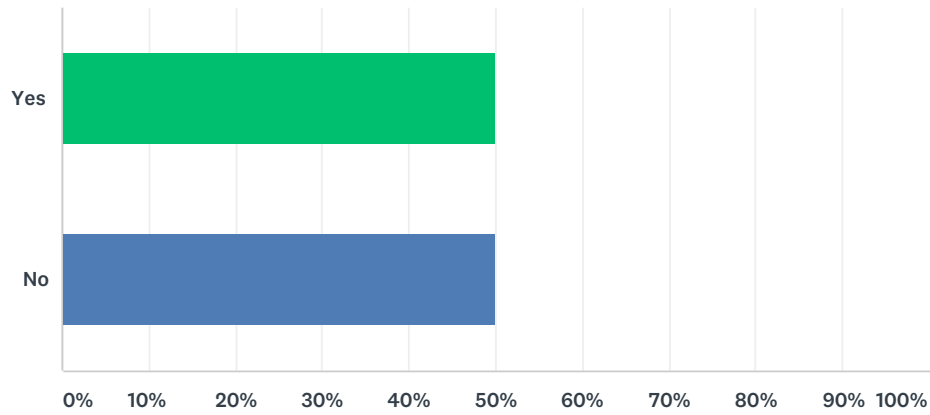
Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES	
Arvon Township	12.50%	1
L'Anse Township	25.00%	2
Village of L'Anse	50.00%	4
Baraga Township	12.50%	1
Spurr Township	0.00%	0
L'Anse Reservation & Off Reservation Trust	0.00%	0
Covington Township	0.00%	0
Village of Baraga	0.00%	0
Other	0.00%	0
TOTAL		8

Q2 During the past five (5) years, have you or someone in your household directly experienced a hazard in Baraga County, such as a severe windstorm, flood, or other type of hazard?

Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	50.00%	4
No	50.00%	4
TOTAL		8

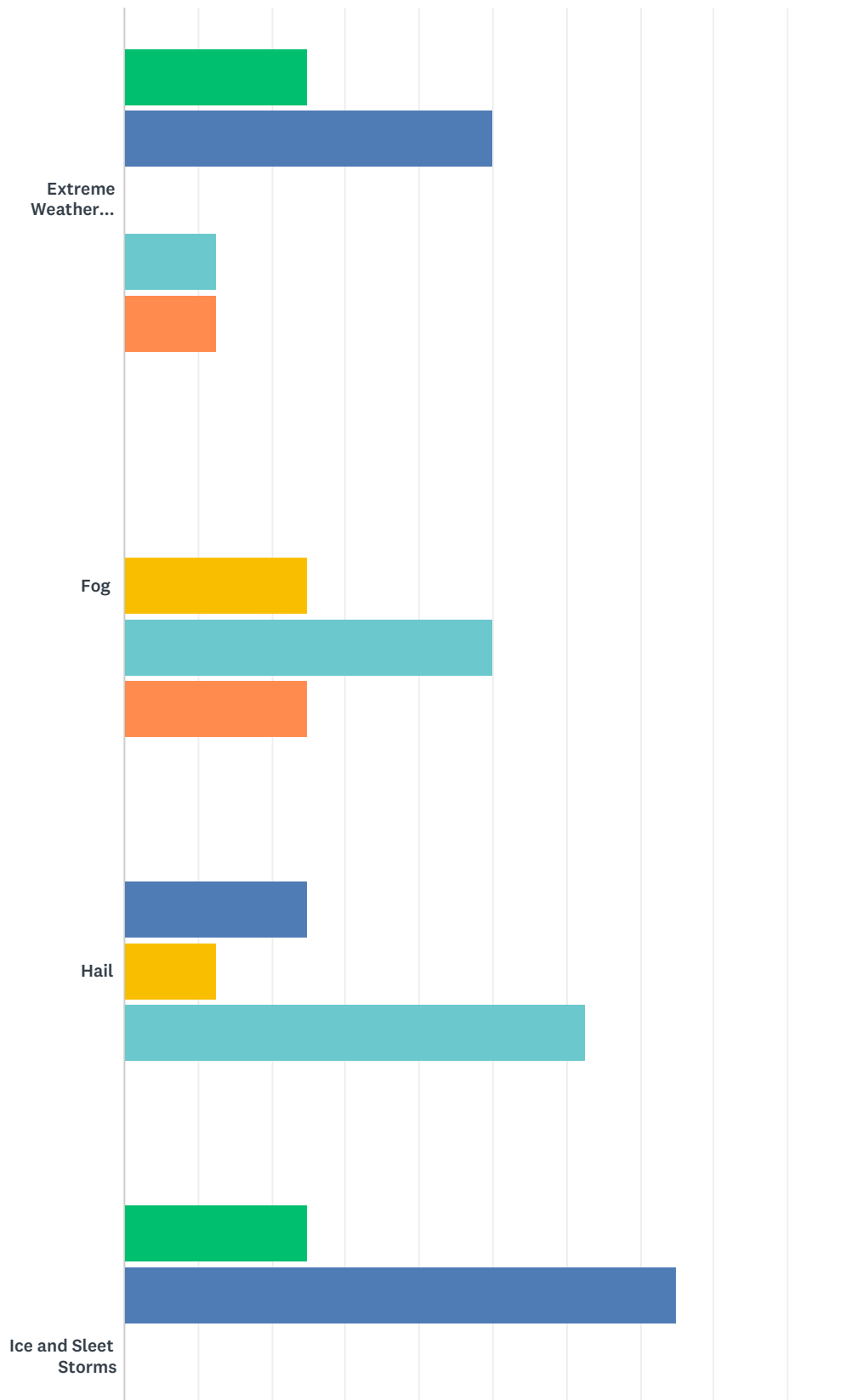
Q3 IF YES, which hazard(s) have you or someone in your household experienced in the past five (5) years?

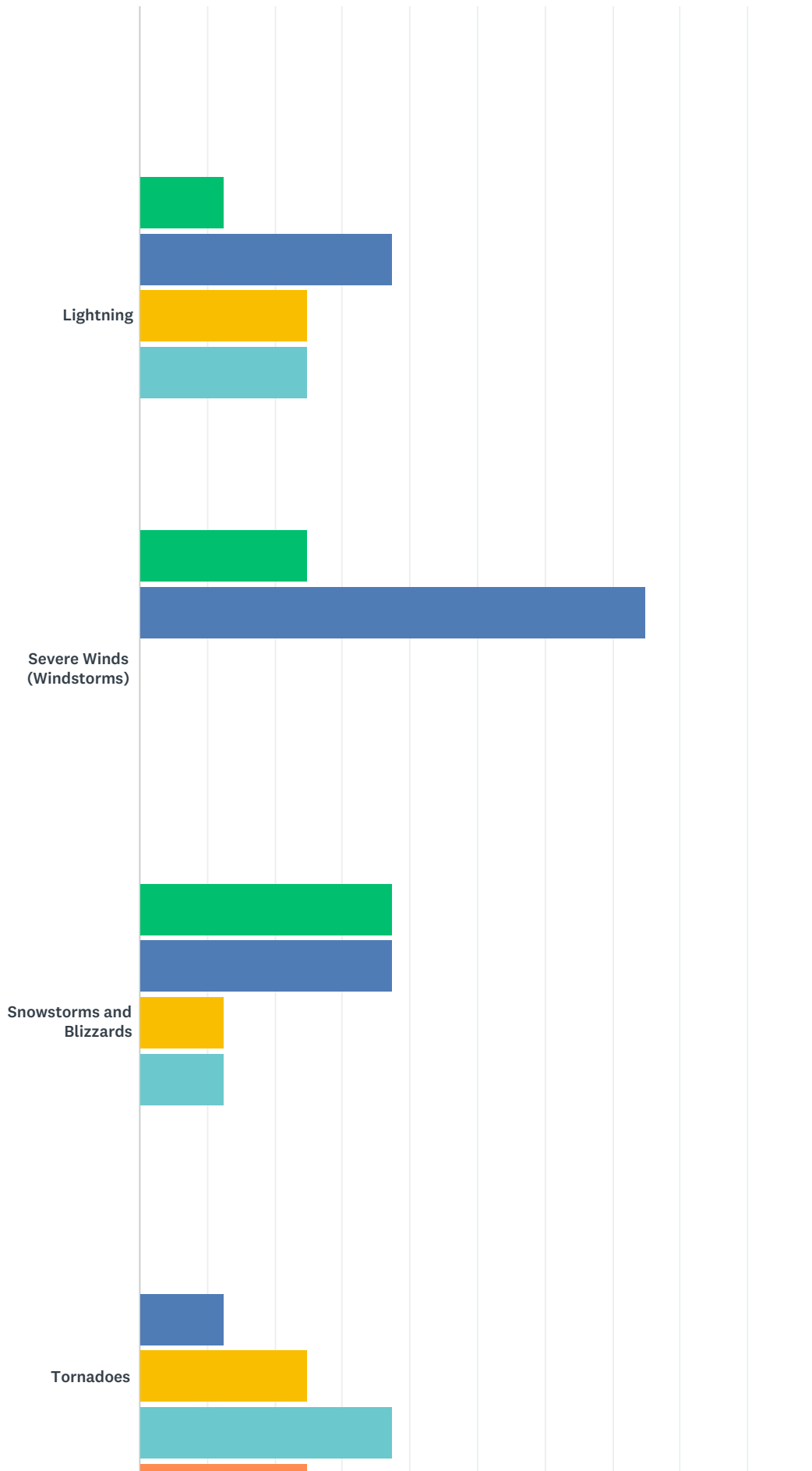
Answered: 6 Skipped: 2

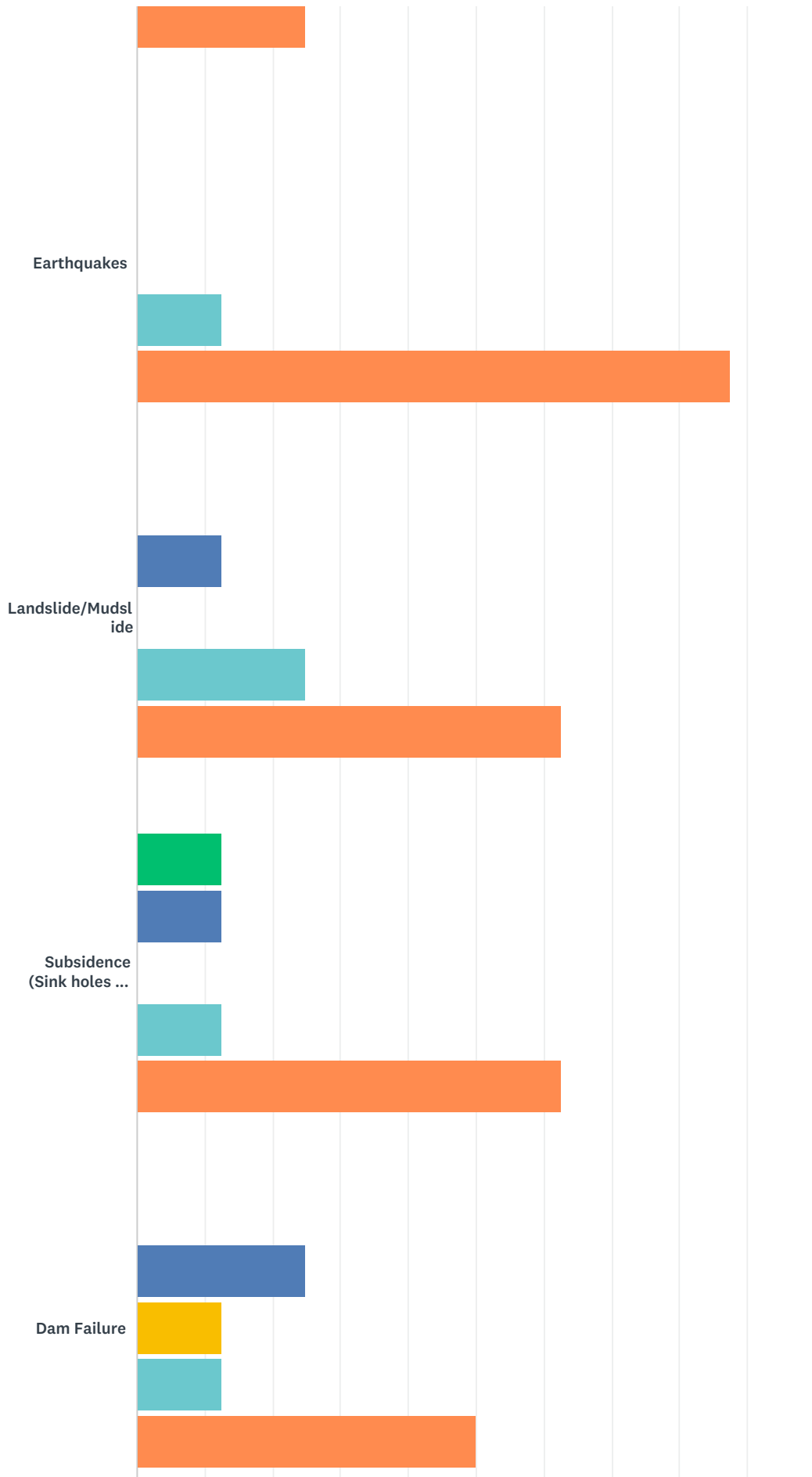
#	RESPONSES	DATE
1	Flood	6/27/2019 7:13 PM
2	Blizzard	6/25/2019 6:25 AM
3	na	6/19/2019 8:52 PM
4	high winds, highway closure	6/19/2019 2:16 PM
5	Gogebic? or Baraga? Baraga County: -Straight line wind storm -Flood -Natural Gas outage during the winter -Power Outage -Lightning has struck our neighbor's tree twice in the last few years. Our yard is a little higher than their yard..We are next. -A potential sinkhole in our yard that may be related to public water or sewer lines.	6/14/2019 9:32 AM
6	0	6/14/2019 7:17 AM

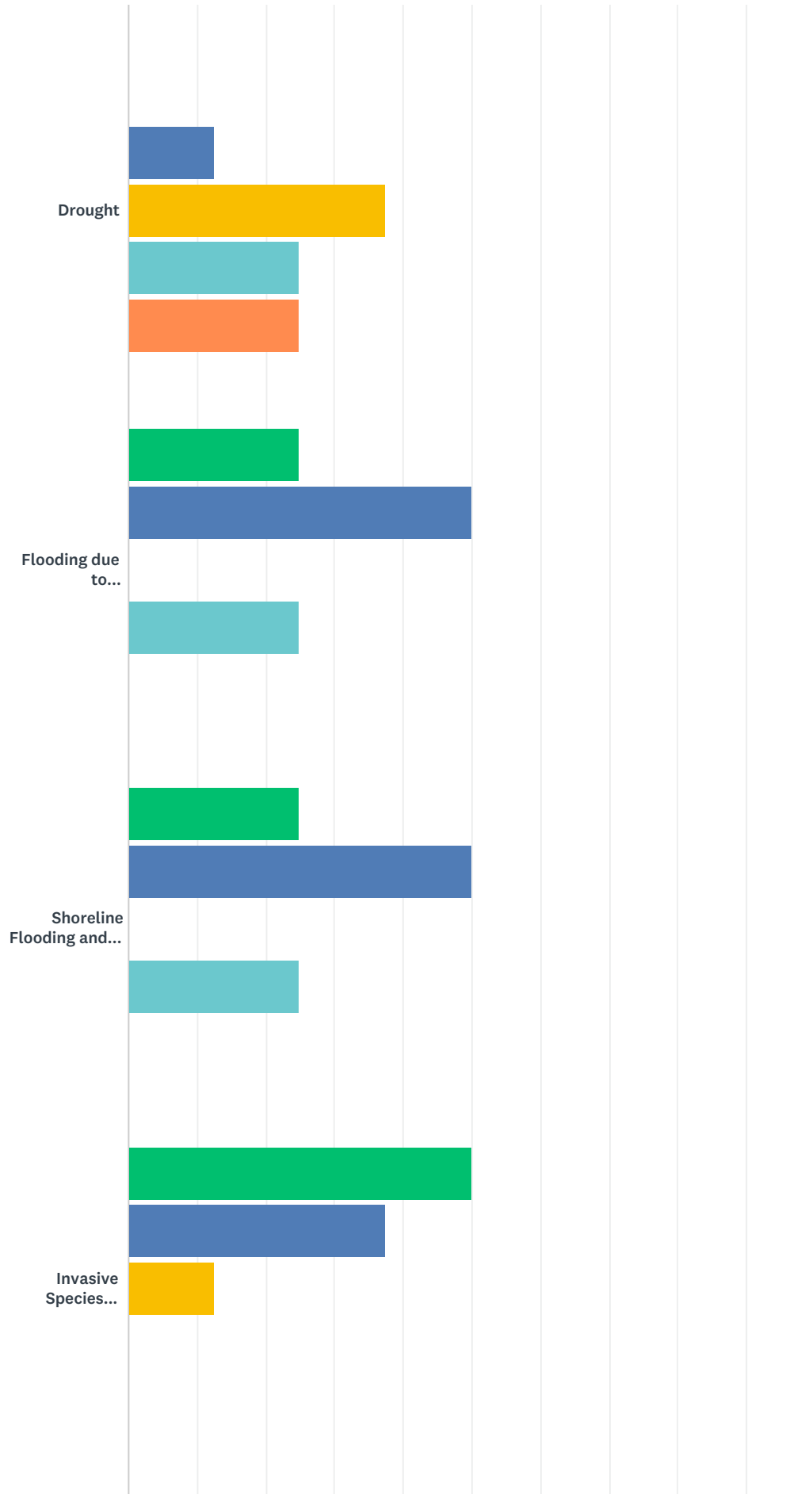
Q4 How concerned are you about the following hazards affecting your home and community in the next five (5) years?

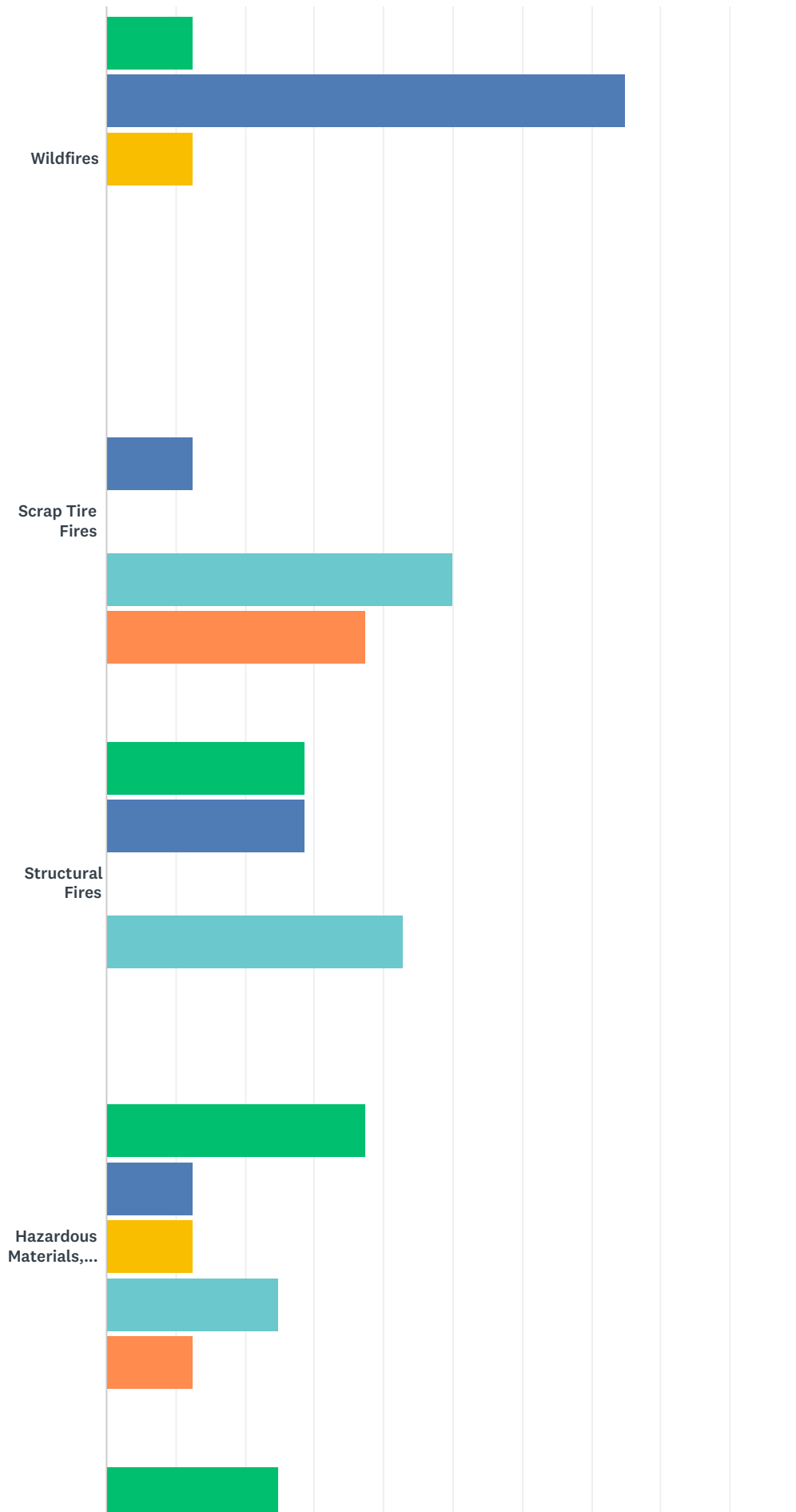
Answered: 8 Skipped: 0

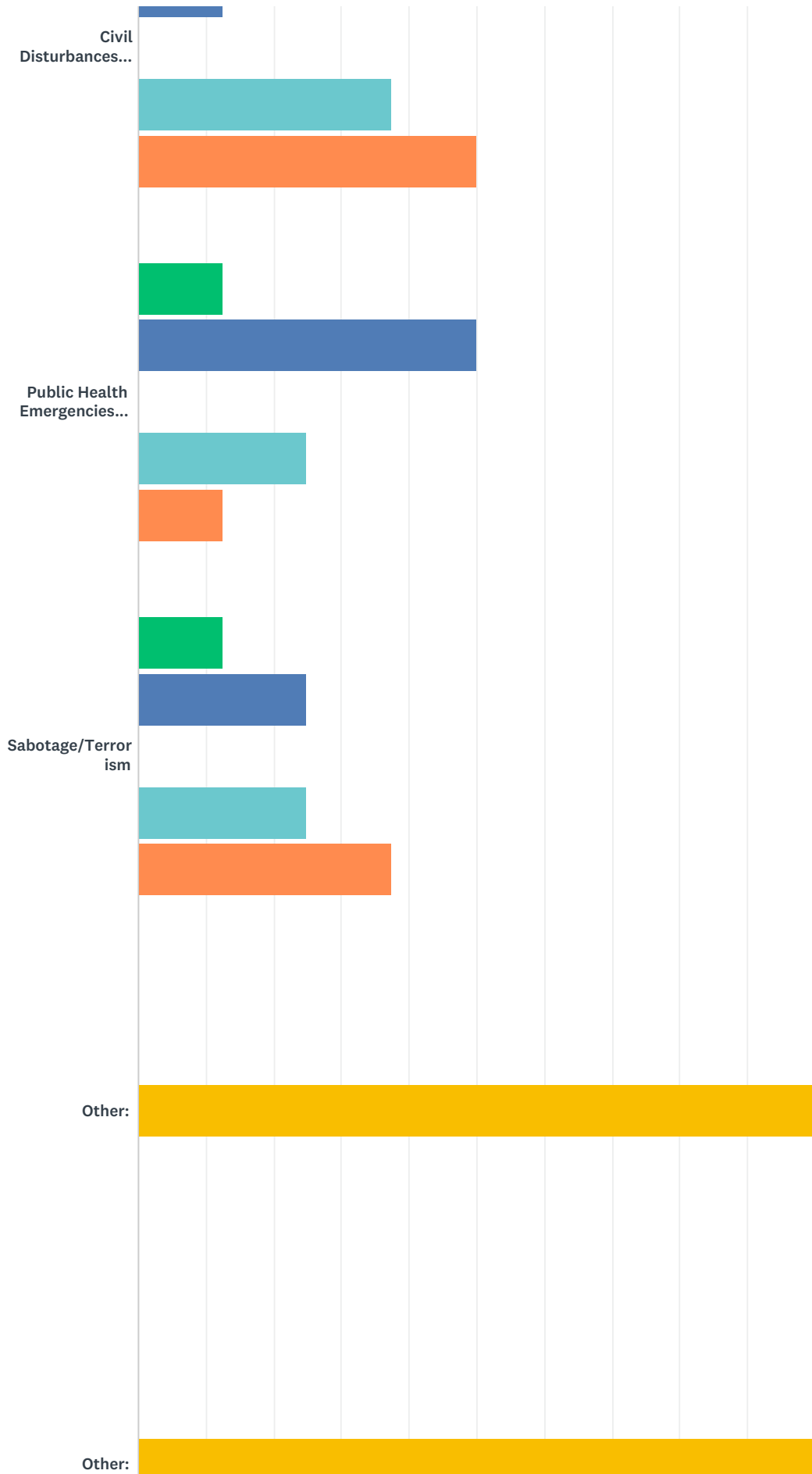


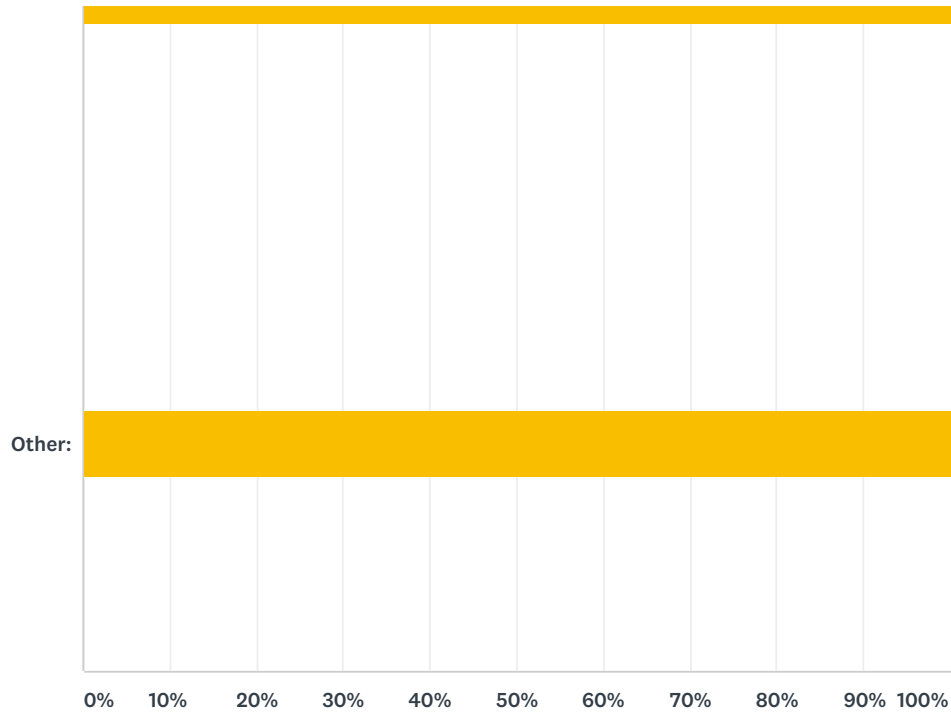












■ Very Concerned
 ■ Somewhat Concerned
 ■ Neutral
■ Not Very Concerned
 ■ Not Concerned

	VERY CONCERNED	SOMEWHAT CONCERNED	NEUTRAL	NOT VERY CONCERNED	NOT CONCERNED	TOTAL
Extreme Weather Temperatures (hot/cold)	25.00% 2	50.00% 4	0.00% 0	12.50% 1	12.50% 1	8
Fog	0.00% 0	0.00% 0	25.00% 2	50.00% 4	25.00% 2	8
Hail	0.00% 0	25.00% 2	12.50% 1	62.50% 5	0.00% 0	8
Ice and Sleet Storms	25.00% 2	75.00% 6	0.00% 0	0.00% 0	0.00% 0	8
Lightning	12.50% 1	37.50% 3	25.00% 2	25.00% 2	0.00% 0	8
Severe Winds (Windstorms)	25.00% 2	75.00% 6	0.00% 0	0.00% 0	0.00% 0	8
Snowstorms and Blizzards	37.50% 3	37.50% 3	12.50% 1	12.50% 1	0.00% 0	8
Tornadoes	0.00% 0	12.50% 1	25.00% 2	37.50% 3	25.00% 2	8
Earthquakes	0.00% 0	0.00% 0	0.00% 0	12.50% 1	87.50% 7	8
Landslide/Mudslide	0.00% 0	12.50% 1	0.00% 0	25.00% 2	62.50% 5	8
Subsidence (Sink holes or ground collapse, mine-related or not)	12.50% 1	12.50% 1	0.00% 0	12.50% 1	62.50% 5	8
Dam Failure	0.00% 0	25.00% 2	12.50% 1	12.50% 1	50.00% 4	8

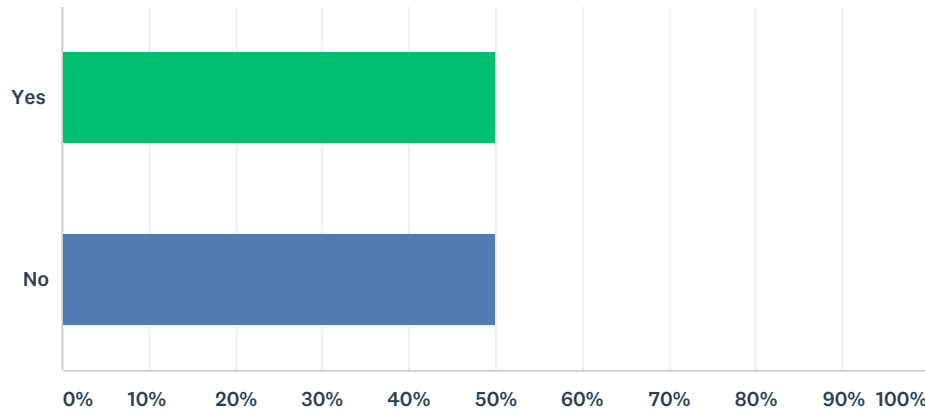
Baraga County Hazard Mitigation Public Input Survey

SurveyMonkey

Drought	0.00% 0	12.50% 1	37.50% 3	25.00% 2	25.00% 2	8
Flooding due to precipitation event or snowmelt	25.00% 2	50.00% 4	0.00% 0	25.00% 2	0.00% 0	8
Shoreline Flooding and Erosion	25.00% 2	50.00% 4	0.00% 0	25.00% 2	0.00% 0	8
Invasive Species (Emerald Ash Borer/Asian Carp)	50.00% 4	37.50% 3	12.50% 1	0.00% 0	0.00% 0	8
Wildfires	12.50% 1	75.00% 6	12.50% 1	0.00% 0	0.00% 0	8
Scrap Tire Fires	0.00% 0	12.50% 1	0.00% 0	50.00% 4	37.50% 3	8
Structural Fires	28.57% 2	28.57% 2	0.00% 0	42.86% 3	0.00% 0	7
Hazardous Materials, Fixed Site (e.g. buildings or industrial site)	37.50% 3	12.50% 1	12.50% 1	25.00% 2	12.50% 1	8
Hazardous Materials, Transportation-related (e.g. waste spill from traffic accident)	25.00% 2	25.00% 2	12.50% 1	25.00% 2	12.50% 1	8
Petroleum/Natural Gas Pipeline Incident (e.g. rupture/leak resulting in outage)	12.50% 1	50.00% 4	25.00% 2	12.50% 1	0.00% 0	8
Infrastructure Failure & resulting hazards (e.g. power outage)	25.00% 2	62.50% 5	12.50% 1	0.00% 0	0.00% 0	8
Transportation Accidents (car crashes)	37.50% 3	25.00% 2	37.50% 3	0.00% 0	0.00% 0	8
Civil Disturbances (rioting)	0.00% 0	12.50% 1	0.00% 0	37.50% 3	50.00% 4	8
Public Health Emergencies (disease epidemic)	12.50% 1	50.00% 4	0.00% 0	25.00% 2	12.50% 1	8
Sabotage/Terrorism	12.50% 1	25.00% 2	0.00% 0	25.00% 2	37.50% 3	8
Other:	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
Other:	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
Other:	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1
#	OTHER (PLEASE SPECIFY & RATE YOUR CONCERN)					DATE
1	Violence due to drug abuse very concerned Major highway closure very concerned					6/19/2019 2:16 PM

Q5 Have you taken any actions to make your home or community more resistant to hazards?

Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	50.00%	4
No	50.00%	4
TOTAL		8

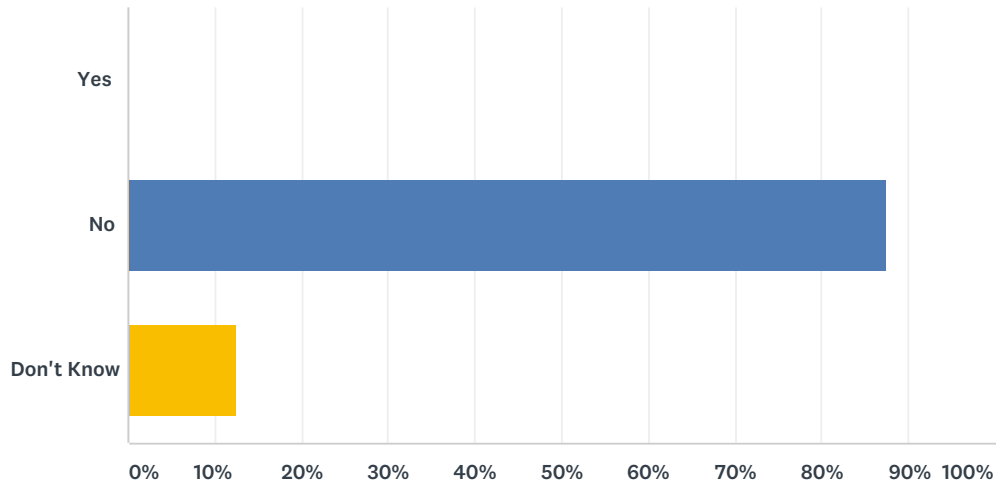
Q6 IF YES, please explain:

Answered: 6 Skipped: 2

#	RESPONSES	DATE
1	N/a	6/27/2019 7:13 PM
2	na	6/19/2019 8:52 PM
3	snow plow Identifying alternate routes on major highway	6/19/2019 2:16 PM
4	we have food and water stored and alternate heat source	6/17/2019 10:46 AM
5	-Purchased Electric Heaters -Preventive Maintenance on Sump Pump -Our Sump Pump is in a manhole in our yard, giving a little extra protection. -asked Lanse Village to look into the potential sinkhole.	6/14/2019 9:32 AM
6	New furnace, smoke detectors, fire extinguishers	6/14/2019 7:17 AM

Q7 Is your home located on a floodplain?

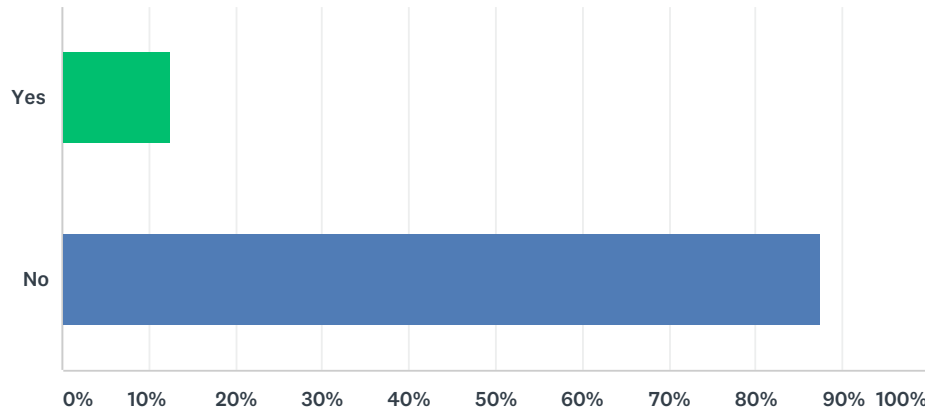
Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes	0.00% 0
No	87.50% 7
Don't Know	12.50% 1
TOTAL	8

Q8 Does your street or home flood regularly during significant rain events?

Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	12.50%	1
No	87.50%	7
TOTAL		8

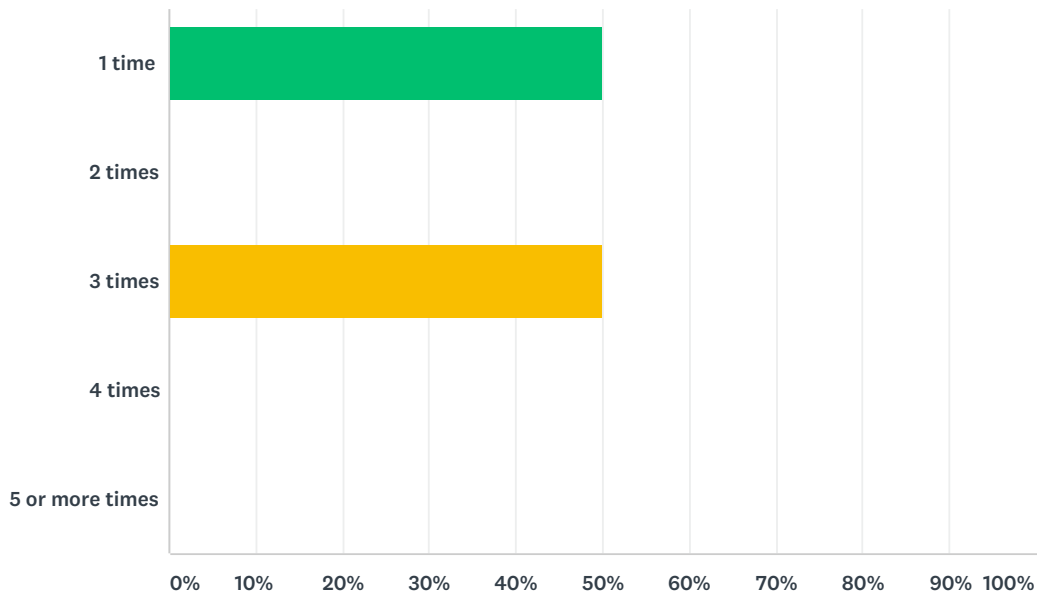
Q9 IF YES, what are the closest major cross streets to this location?

Answered: 3 Skipped: 5

#	RESPONSES	DATE
1	N/a	6/27/2019 7:13 PM
2	na	6/19/2019 8:52 PM
3	Fifth St	6/14/2019 7:17 AM

Q10 If your street or home does flood regularly during significant rain events, how many times did it flood in the past 12 months?

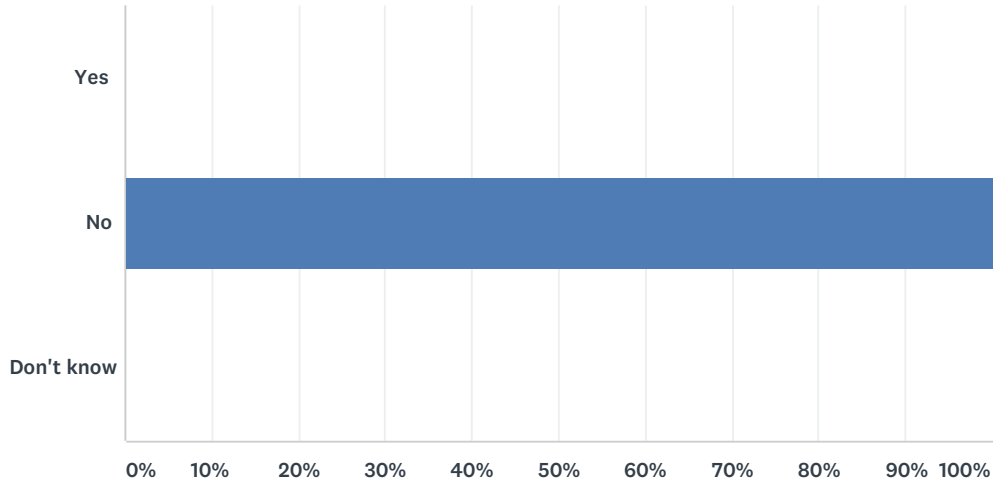
Answered: 2 Skipped: 6



ANSWER CHOICES	RESPONSES	
1 time	50.00%	1
2 times	0.00%	0
3 times	50.00%	1
4 times	0.00%	0
5 or more times	0.00%	0
TOTAL		2

Q11 Do you have flood insurance?

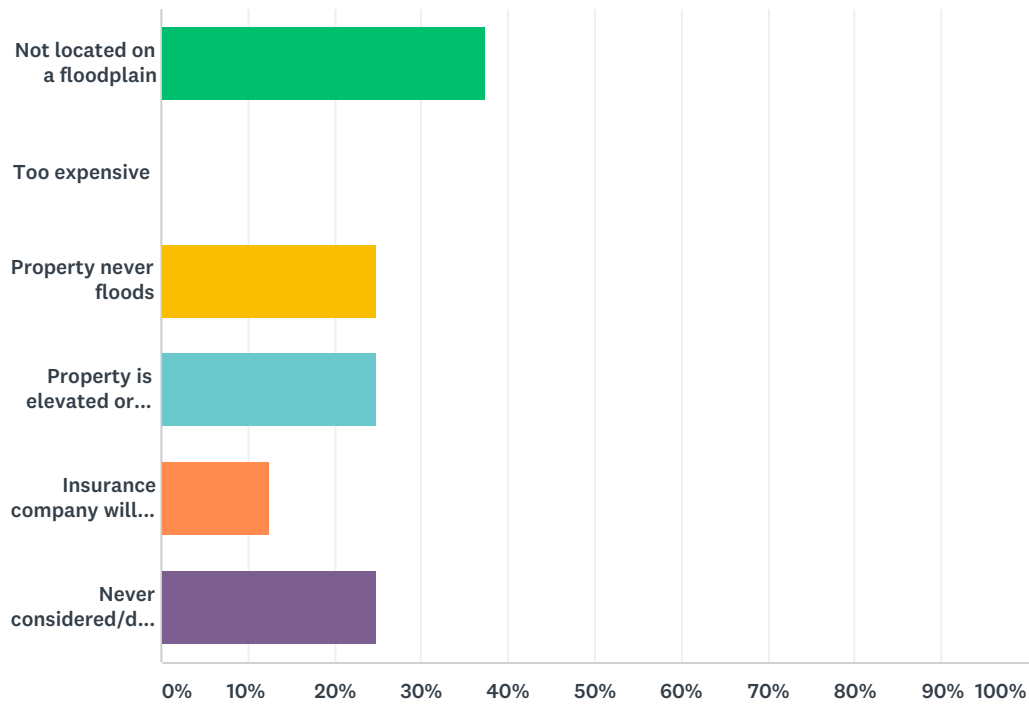
Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes	0.00% 0
No	100.00% 8
Don't know	0.00% 0
TOTAL	8

Q12 If you do NOT have flood insurance, please indicate reason(s) below.

Answered: 8 Skipped: 0

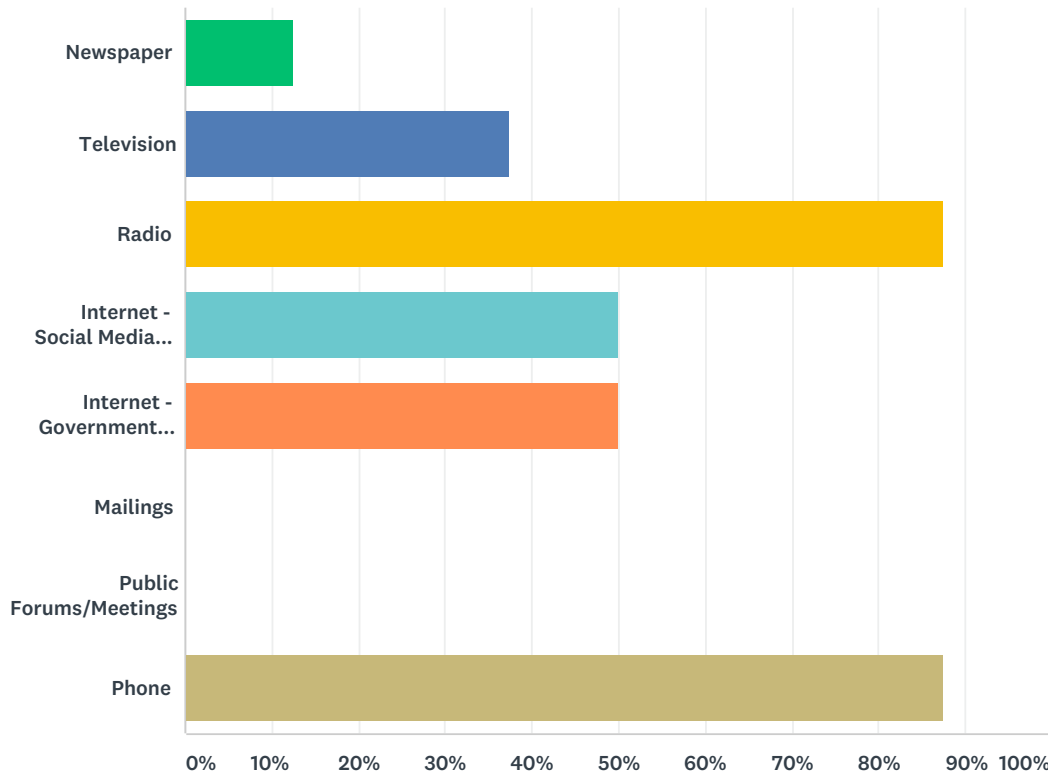


ANSWER CHOICES	RESPONSES
Not located on a floodplain	37.50% 3
Too expensive	0.00% 0
Property never floods	25.00% 2
Property is elevated or otherwise protected	25.00% 2
Insurance company will not provide	12.50% 1
Never considered/didn't know about it	25.00% 2
Total Respondents: 8	

#	OTHER REASON (PLEASE SPECIFY)	DATE
1	Although I am concerned about a flood related to local water sewer failure	6/14/2019 9:32 AM

Q13 What are the most effective ways for you to receive information during or immediately following a hazard emergency? (Check all that apply)

Answered: 8 Skipped: 0



ANSWER CHOICES	RESPONSES	
Newspaper	12.50%	1
Television	37.50%	3
Radio	87.50%	7
Internet - Social Media (Facebook or Twitter)	50.00%	4
Internet - Government Website Postings	50.00%	4
Mailings	0.00%	0
Public Forums/Meetings	0.00%	0
Phone	87.50%	7
Total Respondents: 8		

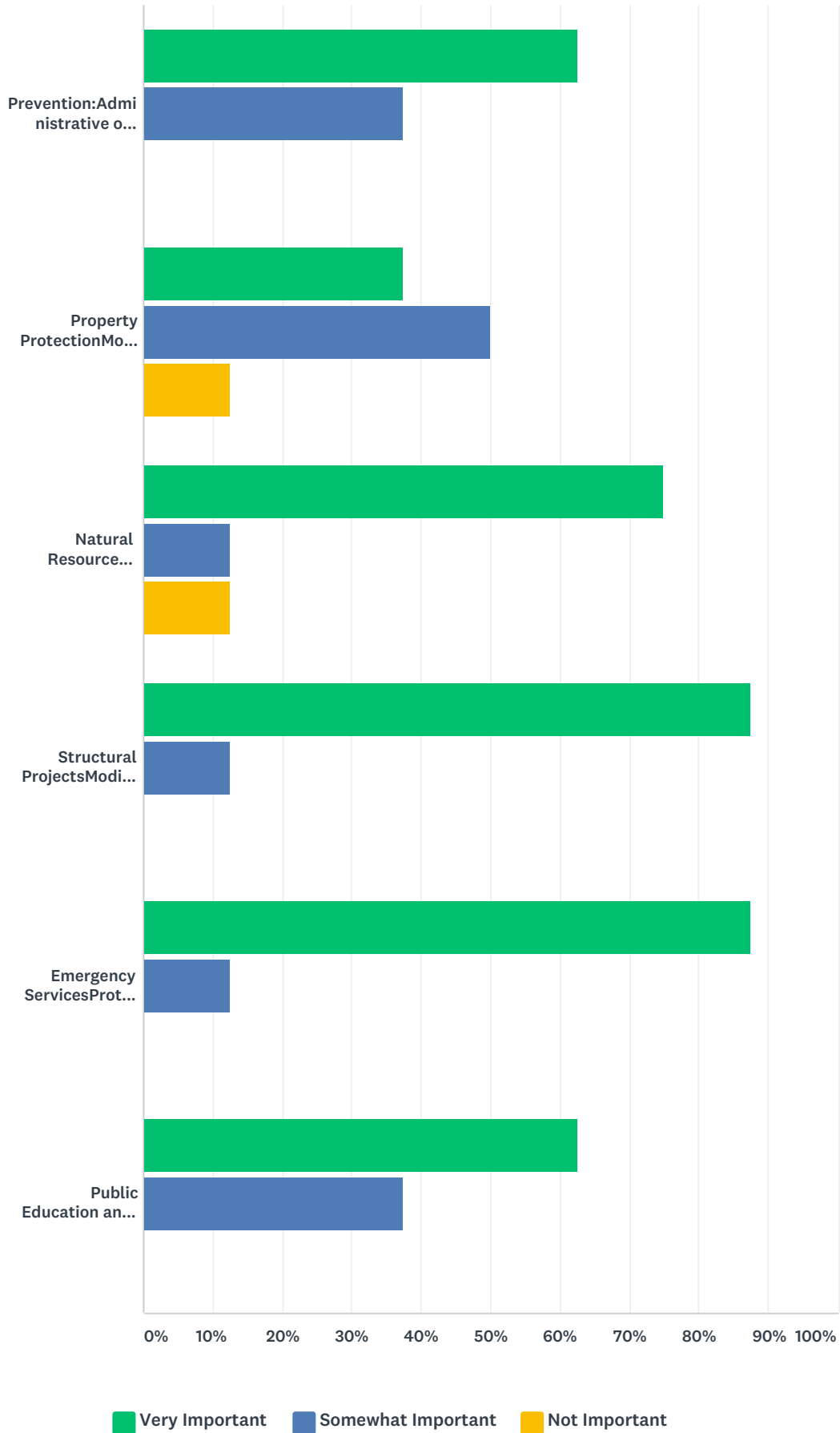
Q14 In your opinion, what are some steps or projects your local government could take to reduce or eliminate the risk for future hazard damages to your community?

Answered: 6 Skipped: 2

#	RESPONSES	DATE
1	Culvert repairs, tree removal near power lines, security in public buildings and public events	6/27/2019 7:13 PM
2	Shut down Warden Plant.	6/25/2019 6:25 AM
3	Identify and work toward alternate travel routes off US 41 at head of the bay especially during winter months	6/19/2019 2:16 PM
4	establish an year round alternate route around the head of Keweenaw bay.	6/17/2019 10:46 AM
5	Develop Incident Action Plans with countermeasures for potential events. Have a standing incident command team.	6/14/2019 9:32 AM
6	Inform the public of dangers & provide safe alternatives	6/14/2019 7:17 AM

Q15 Several community-wide activities can reduce our risk from hazards. In general, these activities fall into one of six broad categories. Please tell us how important you think each one is for your community to consider doing:

Answered: 8 Skipped: 0



	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT	TOTAL
Prevention:Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning & zoning, building codes, open space preservation, and floodplain regulations.	62.50% 5	37.50% 3	0.00% 0	8
Property ProtectionModification or removal of existing buildings to protect them from a hazard. Examples include purchase, relocation, raised elevation, and structural retrofits (updates)	37.50% 3	50.00% 4	12.50% 1	8
Natural Resource ProtectionPreservation or restoration of the functions of natural systems while minimizing hazard losses. Examples include floodplain protection, forest management, and slope stabilization.	75.00% 6	12.50% 1	12.50% 1	8
Structural ProjectsModification of the natural conditions for or progression of a hazard. Examples include dams, levees, seawalls, detention/retention basins, channel modification, retaining walls, and storm sewers.	87.50% 7	12.50% 1	0.00% 0	8
Emergency ServicesProtection of people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of emergency facilities.	87.50% 7	12.50% 1	0.00% 0	8
Public Education and AwarenessInforming of citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach, school education, library materials, and demonstration events.	62.50% 5	37.50% 3	0.00% 0	8

Q16 Additional comments:

Answered: 1 Skipped: 7

#	RESPONSES	DATE
1	We live in an amazing place!	6/14/2019 9:32 AM

2019 County Hazard Mitigation Local Government/Institutions Survey

The Western Upper Peninsula Planning and Development Region is updating Hazard Mitigation Plans for all six (6) counties in the Western Upper Peninsula. Update and adoption of the plan is **required** by the Federal Emergency Management Agency (FEMA) as a pre-condition for organization and/or local government to apply for federal mitigation grant funding.

The goal of the Hazard Mitigation Plan is to recommend strategies on a pre-disaster basis for the purpose of reducing adverse effects caused by natural, man-made, and technological disasters, including flooding, dam failures, wildfires, severe weather events, public health emergencies, terrorism, and hazardous materials and gas pipeline incidents.

We need your assistance in providing input into the County Hazard Mitigation Plan update through the enclosed survey. FEMA **requires** a certain level of participation of local units of government for the plan to be approved, and this survey will help to meet that requirement. Please fill out the survey as completely as possible and return it. Feel free to attach additional pages if necessary.

Contact rpressley@wuppd.org with any questions.

Thank you for your time and participation!

Key Definitions:

Hazard - Something that is potentially dangerous or harmful, often the root cause of an unwanted outcome.

Mitigation - The action of reducing the severity, seriousness, or painfulness of something.

Risk - A situation involving exposure to danger; the possibility that something unpleasant or unwelcome will happen.

Vulnerability - The quality or state of being exposed to the possibility of being attacked or harmed, either physically, emotionally, financially, etc.

2019 County Hazard Mitigation Local Government/Institutions Survey

Local Government/Establishment: _____

Completed by: _____

1. Please specify the degree to which you think your jurisdiction is at risk of the following hazards occurring:

Hazards	Very Concerned	Somewhat Concerned	Neutral	Not Very Concerned	Not Concerned
WEATHER HAZARDS					
Extreme Weather Temperatures (hot/cold)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fog	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ice and Sleet Storms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lightning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Severe Winds (Windstorms)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Snowstorms and Blizzards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tornados	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GEOLOGIC HAZARDS					
Earthquakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landslide /Mudslide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subsidence (sink holes or ground collapse)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HYDROLOGICAL HAZARDS					
Dam Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drought	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flooding due to precipitation event or snowmelt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shoreline Flooding and Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ECOLOGICAL HAZARDS					
Invasive Species (Emerald Ash Borer/Asian Carp)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildfires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
INDUSTIRAL HAZARDS					
Scrap Tire Fires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Structural Fires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous Materials, Fixed Site (e.g. buildings or industrial site)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous Materials, Transportation-Related (e.g. waste spill from traffic accident)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Petroleum/Natural Gas Pipeline Incident (e.g. rupture/leak resulting in outage)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Hazards	Very Concerned	Somewhat Concerned	Neutral	Not Very Concerned	Not Concerned
INFRASTRUCTURE HAZARDS					
Infrastructure failure & resulting hazards (e.g. power outage)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transportation Accidents (car crashes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HUMAN RELATED					
Civil Disturbances (rioting)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public Health Emergencies (disease epidemic)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sabotage/Terrorism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

For any of the hazards in the table for which you responded “**very**” or “**somewhat concerned,**” are there any that you feel would cause particularly severe property damage or loss of life if they occurred? Please explain.

2. Is your government agency/institution involved in any hazard mitigation projects? Yes No

IF YES, please explain:

3. What hazard mitigation activities/projects has your government agency/institution implemented since 2013? **If any**, please describe:

4. Has your agency applied for any mitigation funding from federal, state, local, and/or private sources since 2013?
 Yes No

IF YES, please explain:

IF YES (on question 4), was the funding request successful? Yes No

5. What are the most important community assets to protect from damage during a hazard event?

6. How is growth and development in the community contributing to natural hazard events?

7. What activities will assist the community in reducing risk and preventing loss from future natural hazard events?

8. Do you see any gaps in the current system for reducing risk? Yes No

Do you see new ways for agencies, organizations, or individuals to participate/coordinate to reduce risk from hazards?

9. How, if at all, does your institution educate the public concerning mitigation and preparedness projects, programs and activities?

Newspaper

Television

Radio

Internet – Social Media (Facebook or Twitter)

Internet – Website Postings

Mailings

Public Workshops / Meetings

Other (specify): _____

10. Please feel free to provide any additional comments in the space provided:

THANK YOU FOR YOUR PARTICIPATION!



Western Upper Peninsula Planning & Development Regional Commission

400 Quincy St., 8th Floor, Hancock, MI 49930
906-482-7205 info@wuppdr.org

News Release

Release Date: June 8, 2020

Media Contact:

Rachael Pressley, Assistant Regional Planner

906.482.7205 ext. 116

rpressley@wuppdr.org

Baraga County Hazard Mitigation Plan available for review

The Western Upper Peninsula Planning and Development Region (WUPPDR) has recently made updates to the Baraga County Hazard Mitigation Plan. Hazard mitigation is any action taken before, during or after a disaster to eliminate or reduce the risk to human life and property from natural, technological, or human-related hazards. The plan's purpose is to identify hazard risks throughout the county and to become better prepared for them.

The draft of the Baraga County 2020-2025 Hazard Mitigation Plan Update will be available through July 6, 2020 for public review and comment prior to plan adoption by all local governments at regular meetings. A formal public hearing will also be held at a County Board meeting to be announced.

Copies of the plan draft will be available at WUPPDR (400 Quincy St.) in Hancock and at the Baraga County Administration Building (2 S. Main St.) in L'Anse, and; online at www.wuppdr.org.

Written comments will be considered by WUPPDR in cooperation with Baraga County and local governments, as appropriate. Comments must be received by July 6, 2020 and may be mailed to WUPPDR, 400 Quincy St., 8th Floor, Hancock, MI 49930 or emailed to Rachael Pressley, Assistant Regional Planner, at rpressley@wuppdr.org.

###

Screenshots of public notification for commenting on hazard mitigation plan draft:

WUPPDR Western Upper Peninsula Planning & Development Region
Michigan Planning Region 13 | Fax 906.482.9032 | Ph 906.482.7205

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2020-2025 Baraga County Hazard Mitigation Plan Draft Available for Review – CLOSED

June 8, 2020 by Jerry Wuorenmaa ·

The Western Upper Peninsula Planning and Development Region has recently updated Baraga County's Five-Year Hazard Mitigation Plan.

The draft of the 2020-2025 Baraga County Hazard Mitigation Plan Update will become available on June 8, 2020 for a 30-day public review and comment period. Physical copies of the plan will be available for review at the Baraga County Administration Building located at 2 S. Main St in L'Anse and the WUPPDR office located at 400 Quincy Street, 8th Floor, Hancock, Michigan. The digital copy plan is also available for viewing here: [2020-2025 Baraga County Hazard Mitigation Plan](#)

Written comments must be received by July 6, 2020 and may be mailed to: WUPPDR, 400 Quincy Street, 8th Floor, Hancock, Michigan 49930. They may also be dropped off at the WUPPDR office or e-mailed to Rachael Pressley, Assistant Regional Planner at rpressley@wuppdr.org.

Filed Under: [Uncategorized](#) ·

Upcoming Events

There are no upcoming events.

[View Calendar →](#)

Recent News

[Results Released from Gogebic County Broadband Survey](#)

[Job Posting for Economic Development Planner](#)

[2020-2025 Keweenaw Bay Indian Community Hazard Mitigation Plan Draft Available for Review – Open July 1st](#)

[2020-2025 Baraga County Hazard Mitigation Plan Draft Available for Review – CLOSED](#)

[2020-2024 Gogebic County Hazard Mitigation Plan Draft Available for Review – CLOSED](#)

WUPPDR
June 8 · 🌐

WUPPDR has recently updated Baraga County's Five-Year Hazard Mitigation Plan. The plan's purpose is to identify hazard risks throughout the county and to become better prepared for them. The draft is now available for a 30-day public review and comment period. See link below for more details, including how to submit your comments:
<https://www.wuppdr.org/.../2020-2025-baraga-county-hazard-mi.../>

WUPPDR.ORG
2020-2025 Baraga County Hazard Mitigation Plan Draft Available for Review – OPEN

The Western Upper Peninsula Planning and Development Region has recently updated Baraga County's Five-Year Hazard Mitigation Plan. The draft of the 2020-2025 Baraga County Hazard Mitigation Plan Update will...

👍 1

[Share](#)

Western UP Planning
@WUPPDR

Baraga County's 5-year Hazard Mitigation Plan draft is now available for public review and commenting. Click the link to read the draft and learn where to submit your comments:

2020-2025 Baraga County Hazard Mitigation Plan Draft Availa...
The Western Upper Peninsula Planning and Development Region has recently updated Baraga County's Five-Year Hazar...
[wuppdr.org](#)

9:59 AM · Jun 8, 2020 · [Twitter Web App](#)

Appendix F: Meeting Materials



County Hazard Mitigation Plan Update – Local Planning Team
May 2019

AGENDA

Introductions
Community Survey
Overview of the process
Timeline
Community Profile
Hazard Worksheet and Discussion
Government/Institution Survey

Action: Submit past/present/future mitigation activities to Project Coordinator
(rpressley@wupdr.org)

Next meeting (August 2019): Survey results, review mitigation strategies, and update recommendations/implementation goals

WUPPDR Hazard Mitigation Team:
Executive Director – Jerald Wuorenmaa, jwuorenmaa@wupdr.org
Project Coordinator – Rachael Pressley, rpressley@wupdr.org
Planning Support – Angela Yu, ayu@wupdr.org
GIS Support – Alanna Mingay, amingay@wupdr.org
Hazard Mitigation Intern – Celine Carus, ccarus@wupdr.org



2020 Baraga County Hazard Mitigation Plan
 Local Planning Team Meeting #1 – May 22, 2019 (10:00am)
 Baraga County Hospital Conference Room

Last Name	First Name	Representing	Email Address	Phone
Lahvi	Nathan	BCMH	nlahvi@bcmh.org	906-524-3354
HUBBARA	JEFF	BARAGA County E.M.	BARAGAEM@AOL.NET	906 524-7240
JOHNSON	Rick	BARAGA Co. SHERIFF	johnsonr@baragacounty.org	906-524-6177
MIRON	HAROLD	BARABR Co. ROAD		906-355-2187
MILLS	DOUGLAS	BARAGA CRC	dmills@baragacountyroads.org	906 524-7270
Price	Dione	KBIC	dprice@kbic-usn.gov	906-524-5757 x 20
LaFave	Bob	Village of L'Anse	manager@lansemi.org	906-524-6116
KASAZA	KEVIN	MSP - CHARUMET	RATRAK2@MichiganGov	906-337-5145

County Hazard Analysis Priority Checklist

Name & Email:	Representing Organization:
---------------	----------------------------

Worksheet Instructions:

Please circle the following hazards in concern from 1-10. If any relevant historic occurrences are known, please note in the comment box. If at the end of the checklist any information or hazards are missing please take note of it and contact: rpressley@wuppdrr.org

Helpful Definitions:

Hazard - Something that is potentially dangerous or harmful, often the root cause of an unwanted outcome.

Mitigation - The action of reducing the severity, seriousness, or painfulness of something.

Risk - A situation involving exposure to danger; the possibility that something unpleasant or unwelcome will happen.

Vulnerability - The quality or state of being exposed to the possibility of being attacked or harmed, either physically, emotionally, financially, etc.

Location – The geographic areas in the county planning area that are affected by the hazard. Note whether the hazard is present on county lands; if the hazard is localized, please write the hazard’s specific location

Maximum Extent – The strength or magnitude of the hazard. How is the hazard measured in your organization and list the extent of the hazard?

Impact – the consequence or effect of the hazard on the county government and its assets. List specific vulnerable agencies/populations/property that might be more susceptible to the hazard

Probability: a numerical index of risk; it is a measure of the likelihood that the undesirable event will occur.

Hazard	Overall Concern	Comments
Extreme Temperature	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Fog	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Hail	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Ice/Sleet Storms	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Lightning	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Severe Winds	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Snowstorms & Blizzards	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Tornadoes	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Dam Failures	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Riverine & Urban Flooding	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Shoreline Flooding & Erosion	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Drought	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Wildfires	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	
Invasive Species	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10	

Earthquakes	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Subsidence/Ground Collapse/Sinkhole	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Scrap Tire Fires	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Structural Fires	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Hazardous Materials: Fixed Site Incidents	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Hazardous Materials: Transportation Incidents	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Petroleum & Gas Pipeline Accidents:	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Infrastructure Failure & Secondary Technological Hazards	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Transportation Accidents	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Civil Disturbances	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Public Health Emergencies	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Sabotage & Terrorism	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10

Write additional comments on back of page.



County Hazard Mitigation Plan Update – Local Planning Team
November 2019

AGENDA

Introductions

Survey Results

Risk Assessment

Mitigation Action Plan

- Goals
- Past Mitigation Activities
- Current Projects
- Future Recommendations

Final Plan Adoption Process

Action: Review Draft when released and submit comments to Rachael Pressley
(rpressley@wuppdr.org)

WUPPDR Hazard Mitigation Team:

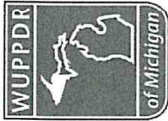
Executive Director – Jerald Wuorenmaa, jwuorenmaa@wuppdr.org

Project Coordinator – Rachael Pressley, rpressley@wuppdr.org

Planning Support – Angela Yu, ayu@wuppdr.org

GIS Support – Alanna Mingay, amingay@wuppdr.org

Hazard Mitigation Intern – Celine Carus



2020 Baraga County Hazard Mitigation Plan
 Local Planning Team Meeting #2 – November, 4, 2019 (10:00am Eastern)
 Baraga County Memorial Hospital

Last Name	First Name	Representing	Email Address	Phone
BLANCO	MCKE	LAUSE FIRE		395 7089
Dawson	Randal	MSP-Cabinet		
MILLS	Doug	Baraga C.R.E.	dwill@baragacountyroads.org	524-7220
Coabr	Jim	BSC		524-6177
Hosey	Michael	Sparrr		
OSTERMAN	PAT	BC EQUALIZATION	OSTERMANP@BARAGACOUNTY.ORG	524-6100 ext 697
Chosa	Thomas	KBIK	tchosa@kbiiknsn.org	906-201-1740
Sohi	JAMES	Bever Town		906-524-7316
HUBBARD	JEFF	BARAGA Co. 911	BARAGA911@BARAGACo.ORG	906 524-6911

Past Mitigation Activities: Baraga County

2005 Mitigation Program Action Items

2005 Item	Status
Drainage Improvements and Maintenance	
Update Stormwater Management Plans and Flood Maps	
Bank Stabilization	
Improved Emergency Response	
KBIC Comprehensive Emergency Response Plan	
Update Shoreline Erosion Map	
Review Plans and Development Regulations	
Retrofit Underground Pipes	
Insurance	
Public Information/Education Program	
Adopt Hazard Mitigation Plan and Update Regularly	

2013 Mitigation Program Action Items

2013 Items	Status
Implement Baraga County Community Wildfire Protection Plan (CWWP) Action Items	
Install Emergency Power Source at L'Anse Area School	
Drainage Improvements and Maintenance	Ongoing
Update Storm Water Management Plans	Ongoing
Bank Stabilization	Ongoing
Improved/Continuing Emergency Response	Ongoing
Update Shoreline Erosion Map	
Review Plans and Development Regulations	Ongoing
Retrofit Underground Pipes	Ongoing
Identify and Remediate Hazardous Materials Sites	
Insurance	Ongoing
Public Information/Education Program	Ongoing
Distribute Weather Radios	Ongoing
Coordinate with Keweenaw Bay Indian Community (KBIC)	Ongoing
Plan for Emergency Detour Routes	
Adopt Hazard Mitigation Plan and Update it Regularly	Ongoing

Action Items: An important step in the mitigation process is to build upon the general recommendations for mitigations activities and identify specific action items for Baraga County. All activities should be consistent with developed Mitigation Goals.

Appendix G: State Document Review

Appendix H: Plan Adoption