Alcona County
HAZARD MITIGATION PLAN

2021

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HAZARD MITIGATION PLAN
2021

Alcona County, Michigan

Prepared for:

Alcona County
and the
Jurisdictions in Alcona County

Prepared by:

Alcona County Emergency Management

and

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Adopted March 16, 2022

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Chapter 1 Introduction

Introduction

Throughout the world communities are impacted by natural, technological, and human-related hazards. Natural hazards occur when the natural processes of the environment interact with the resources and assets in the communities. These hazards include storms, floods, and wildfires. In 2018, the National Weather Service reported the United States experienced 530 fatalities, 1,378 injuries, $35,849,320,000 in property damage, and $5,102,540,000 in crop damage due to natural hazards. Technological hazards take place when the existing technology fails. These types of hazards include hazardous material spills, structural fires, infrastructure failures, and transportation accidents. The final hazard, human-related, occurs as a product of human activities, such as chemical or biological attacks and cyber-attacks. Depending on many characteristics, such as geographical location and land use practices, these hazards have the potential to cause death, injuries, damage to property, infrastructure and the environment, and disruption to economic and social activities. These hazards also have the potential to become disasters. However, governments, organizations, businesses, and the public can reduce the impacts from hazards through hazard mitigation efforts.

Hazard mitigation planning allows communities to create long-term plans to reduce or eliminate the impacts that hazards have on the community's population, economy, and natural environment. These plans identify and inventory potential hazards, assess the risks and vulnerabilities from hazards, and develop hazard mitigation strategies. Through plan preparation and mitigation efforts, communities are able to better protect public safety and facilities, remove structures from hazard prone areas, accelerate recovery time after disasters, increase hazard education and awareness, and create partnerships.

The Stafford Act, as amended by the Disaster Mitigation Act of 2000, requires state, tribal, and local governments to develop and adopt FEMA-approved hazard mitigation plans to receive certain types of non-emergency disaster assistance. Every five years, jurisdictions must update their plans and re-submit them for FEMA approval to maintain eligibility. To remain eligible, the hazard mitigation plans must be updated, adopted, and re-submitted for FEMA approval every five years. The Northeast Michigan Council of Governments (NEMCOG) assisted seven counties in the Northeastern Lower Peninsula of Michigan to update their 2014 hazard mitigation plans.

In Alcona County, NEMCOG worked with the Emergency Management Coordinator to review and update Alcona County's 2014 Hazard Mitigation Plan. The plan update focused on natural, technological, and human-related hazards to increase public awareness about hazards and hazard mitigation, maintain the county's grant eligibility, maintain the county's compliance with state and federal legislative requirements for hazard mitigation plans, and to develop projects and policies that can be implemented to reduce or prevent future disasters and improve public safety.

Summary of Plan Contents

The 2021 Alcona County Hazard Mitigation Plan Update identifies the county's hazards, analyzes the hazards based on the county's current conditions, assesses its risk and vulnerability, identifies the communities' goals and objectives, identifies, evaluates, and prioritizes the alternatives for hazard

mitigation strategies, selects and recommends feasible mitigation strategies, and documents the plan's progress towards mitigating its hazards. The hazard mitigation strategies within the plan are intended to be integrated into other planning documents.

Specific Plan Updates

Chapter 1: Introduction

- Reviewed and updated the summary of plan contents, specific plan updates, and planning process sections.

Chapter 2: Environment

- Reviewed and updated information in the climate, discharge permits, and sites of environmental contamination sections.

Chapter 3: Community Profile

- Reviewed and updated the population and housing demographics, and economic indicators.

Chapter 4: Land Use Characteristics

- Reviewed and made minor changes to the chapter.

Chapter 5: Community Services and Facilities

- Reviewed and updated the county government, local governments, education system, medical facilities, public safety, utilities, campgrounds, media, special populations, transportation systems, and early warning systems sections.

Chapter 6: Hazard Identification and Assessments

- Reviewed and updated all of the natural, technological, and human-related hazards.
- Combined the Hazard Identification and Risk and Vulnerability Assessments Chapters.
- Reviewed and updated the hazard rankings, and risk and vulnerability assessment summaries.

Chapter 7: Goals and Objectives

- Reviewed and updated the goals and objectives. A goal and its corresponding objectives regarding geographic information system (GIS) data sets was added.

Chapter 8: Mitigation Strategies and Priorities

- Reviewed and updated the mitigation actions and implementation strategies.

Chapter 9: Plan Maintenance

- Reviewed and made minor changes to the chapter.

Hazard Mitigation Planning Process

In 2005, Alcona County prepared its first Hazard Mitigation Plan and updated it in 2014. In 2019, NEMCOG began working with the Emergency Management Coordinator and the Local Planning Team (LPT) to review and update Alcona County's 2014 Hazard Mitigation Plan (Table 1-1). The LPT is made up of representatives from local governments, law enforcement, fire departments, community organizations, and local, state and federal agencies.

Community Involvement

The neighboring and local jurisdictions, stakeholders, and public were involved during the drafting phase of the hazard mitigation plan and during the completion of the draft plan before it was adopted (Table 1-2). Information was disseminated to the communities and public through public meetings, news releases, and email. The local governments assisted in updating the hazard mitigation actions and strategies and reviewing the draft plan. The planning process educated community leaders and residents about hazard awareness, which assisted communities in making informed decisions. Additionally, the process strengthened partnerships between local

governments, planning commissions, emergency services, public agencies and private entities. These partnerships allowed for the facilitation of communication and the pooling of resources.

Table 1-1 Alcona County LEPC Membership	
Name	**Title**
Scott Rice	Emergency Management Coordinator
Ralph Klotz	LEPC Chair/Fire Services
Carolyn Brummund	Alcona County Board of Commissioners
Jeff Brackett	Communications
Toni Rhoads	EMS
Scott Stephenson	Sheriff Department
Rod Cordes	Barton City Fire Chief/Representing Local Governments
DeAnna Morgan	911 Dispatcher, Alcona County Central Dispatch
Keith W. Myers	Undersheriff, Alcona County Sheriff's Office
Carol Rabineau	American Red Cross
Stan Darmofal	Emergency Coordinator and Radio Officer, RACES
Mike Escarino	Public Works, Alcona County Road Commission
Cori Upper	Emergency Preparedness Coordinator, District Health Department #2
Loren Curtis	EGLE
Rich Martin	MSP EMHSD

Table 1-2 Jurisdiction Participation Status		
Jurisdiction	**Representative**	**Participation Status**
City of Harrisville	Jeffrey Gehring, Mayor	Continuing Participant
Village of Lincoln	Sheila Phillips, President	Continuing Participant
Alcona Township	Marlena MacNeill, Supervisor	Continuing Participant
Caledonia Township	Cyndi Apsey, Supervisor	Continuing Participant
Curtis Township	Gary Griffith, Supervisor	Continuing Participant
Greenbush Township	C. Lee Major, Supervisor	Continuing Participant
Gustin Township	Muriel Goddard, Supervisor	Continuing Participant
Harrisville Township	Chad Spitznagel, Supervisor	Continuing Participant
Hawes Township	Rodney L. Cordes, Supervisor	Continuing Participant
Haynes Township	James Effrick, Supervisor	Continuing Participant
Mikado Township	Jesus Yruegas, Supervisor	Continuing Participant
Millen Township	James Burger, Supervisor	Continuing Participant
Mitchell Township	Carla Brimm, Supervisor	Continuing Participant

Public Participation Survey

The Emergency Management Coordinator and LPT commissioned a regionwide survey to gain input and feedback regarding the perceptions and opinions about natural, technological, and human-related hazards, and the preferred methods and techniques to reduce risk and losses from hazards. The region includes Alpena, Alcona, Crawford, Montmorency, Oscoda, Otsego, and Presque Isle Counties. The regionwide survey was available online and hard copies were available at the Alcona County EMS building for the public, neighboring jurisdictions, and stakeholders from August 12, 2019 through November 19, 2019. Press releases were issued to inform the communities about the availability of the survey in *The Alpena News, Weekly Choice, The Montmorency County Tribune,* and the *Petoskey News*. On August 12, 2019, a link to the survey and a request to forward the link to other individuals was sent to the LPT, Alcona County Board of Commissioners, and the local jurisdictions' president, supervisors, and clerks as well as the surrounding counties and local governments.

Fifty-five completed surveys were received for Alpena, Alcona, Crawford, Montmorency, Oscoda, Otsego, and Presque Isle Counties (see results below). See Appendix A for the survey results specific to individuals residing in Alcona County and a link to the regionwide survey. Participants were asked a number of different questions, including their concern levels for natural, technological, and human-related hazards, their perception of the county's preparedness level for each hazard, identification of community assets, and their approval/disapproval of various mitigation approaches. Lastly, participants were asked to provide suggestions to improve hazard mitigation. The county evaluated and incorporated both the regional survey results and the county specific survey results during the plan update.

Approximately 65.5% of respondents have not received information about how to make their household safer from natural, technological, or human-related hazards. The respondents who had received information indicated it came from the American Red Cross, FEMA, the Alpena County Emergency Management Office, Otsego County Emergency Management Office, USDA/Forest Service, DTE Energy, the Firewise program, insurance companies and CERT. The majority of respondents indicated the internet, mail, and television were the most effective ways to distribute information, followed by radio, newspaper, and public workshops/meetings. About 60.0% of respondents indicated they have not experienced a hazard event in the last five years. The respondents who had experienced a hazard indicated they had experienced flooding, snowstorms/winter storms, a hurricane, and straight-line winds/windstorms.

Natural Hazards

Respondents are very concerned or somewhat concerned about the following hazards:

- Snow/ice storms: 78.2%
- Windstorm/high winds: 72.7%
- Extreme cold: 65.5%
- Wildfires: 56.4%
- Tornadoes: 43.6%

Respondents are not very concerned or not concerned about the following hazards:

- Drought: 50.9%
- Floods: 49.1%
- Extreme heat: 41.8%

Approximately 38.2% of respondents were neutral regarding their concern for thunderstorms. Additionally, respondents indicated they were concerned about milfoil in the lakes, earthquakes, mass shootings and disease outbreaks.

Respondents feel the region is best prepared to handle snow/ice storms (74.6%), extreme cold (69.1%), thunderstorms (65.5%), and windstorms/high winds (40.0%). Respondents are unsure if the region is prepared to handle drought (49.1%), extreme heat (40.7%), tornadoes (40.0%), and wildfires (36.4%). About 40.7% of respondents were evenly split (least prepared or unsure) in how prepared the region is to handle flooding.

Technological Hazards

Respondents are very concerned or somewhat concerned about the following hazards:

- Communications failures: 81.8%
- Power failures: 80.0%
- Structural fires: 78.2%
- Oil and gas accidents: 74.5%
- Hazardous material spills: 69.1%
- Road accidents: 67.3%
- Water or wastewater treatment system failures: 44.4%
- Air transportation accidents: 43.6%

Respondents are not very concerned or not concerned about the following hazards:

- Railroad accidents: 66.0%
- Dam failures: 61.1%
- Water transportation accidents: 52.7%
- Terrorism/sabotage: 43.6%

Respondents feel the region is best prepared to handle road accidents (81.8%), structural fires (70.4%), power failures (54.6%), hazardous material spills (48.2%), and oil and gas accidents (48.2%). Respondents feel the region is least prepared to handle terrorism/sabotage (65.5%), water transportation accidents (45.5%), communications failures (38.9%), and air transportation accidents (36.4%). Respondents were unsure how prepared the region is to handle dam failures (53.7%), railroad accidents (51.9%), and water or wastewater treatment system failures (47.3%).

Human-Related Hazards

Respondents are very concerned or somewhat concerned about the following hazard:

- Cyber-attacks: 59.3%

Respondents are not very concerned or not concerned about the following hazard:

- Chemical or biological attacks: 47.3%

Respondents feel the region is least prepared to handle cyber-attacks (58.2%) and chemical or biological attacks (55.6%).

Community Assets
Respondents ranked the following community assets from the most vulnerable to the least vulnerable to the hazard impacts:

1. Human (death/injuries)
2. Infrastructure (damage or loss of bridges, utilities, schools, etc.)
3. Economic (business closures, job losses, etc.)
4. Environmental (damage or loss of forests, waterways, etc.)
5. Governance (ability to maintain order and/or provide public amenities and services)
6. Cultural/Historic (damage or loss of libraries, museums, fairgrounds, etc.)

Regulatory Approaches
Respondents supported the following approaches to reduce risk and loss associated with disasters:

- Improving the disaster preparedness of local schools (98.2%)
- Taking steps to safeguard the local economy following a disaster (96.4%)
- Creating an inventory of at-risk buildings and infrastructure (94.4%)
- Making their home more disaster-resilient (89.1%)
- Disclosing natural hazard risks on real estate transactions (87.3%)
- Policies to prohibit development in areas subject to natural hazards (83.3%)
- Protecting historical or cultural structures (71.7%)
- The use of tax dollars to reduce risk and losses from natural disasters (70.4%)
- Regulatory approaches (68.5%)
- Non-regulatory approaches (57.4%)

Respondents recommended increasing public outreach and education efforts, improving wildfire protection, bringing specialists into the communities to assist in mitigating hazards, enforcing reasonable and consistent fire codes, increasing funding to enhance essential public safety services, developing a rapid marine response to boaters in danger on Lake Huron, increasing milfoil awareness at local lakes, providing training opportunities, increasing security for cyber communications, installing broadband throughout the entire counties, limiting oil transport under/through/on the Great Lakes, being proactive with trimming and removing trees, strengthening local government partnerships, and increasing support for emergency services.

Meetings

During the preparation of the draft plan, LPT meetings were held for participants to provide input and feedback through facilitated discussions that gained a consensus (Appendix B). Notices of the public meetings were sent to LPT members and local community officials. All LPT meetings are open to the public. In addition to the LPT meetings and discussions, additional meetings were held.

NEMCOG Board of Directors' Meeting

On April 18, 2019, NEMCOG staff gave a brief status update about the hazard mitigation process to the NEMCOG Board of Directors. Attendees included Dan Gauthier (Alcona County Board of Commissioner), Dave Karschnick (Alpena County Board of Commissioner), John Wallace (Cheboygan County Board of Commissioner), James Kargol (Emmet County Board of Commissioner), Kyle Yoder (Oscoda County Board of Commissioner, Chair), Robert Pallarito (Otsego County Board of Commissioner), Carl Altman (Presque Isle County Board of Commissioner, Vice Chair), Adam Poll (City of Alpena Planning and Development Director),

Marisue Moreau (Northeast Michigan Consortium/Michigan Works!), Robert Heilman (NEMCOG Board of Directors' Chair), Doug Baum (City of Grayling, Crawford County, Manager), Dave Post (Village of Hillman, Montmorency County, Manager), Bill Wishart (City of Gaylord, Otsego County, Mayor), Norman Brecheisen (Livingston Township, Otsego County, Supervisor), and NEMCOG staff, Diane Rekowski, Theresa Huff, Karen Cole, and Christina McEmber.

Emergency Management Coordinator Meeting

On April 30, 2019, NEMCOG spoke with the Emergency Management Coordinator to discuss the hazard mitigation plan update and to review and update Chapter 5: Community Services and Facilities.

Kick off Meeting

On October 21, 2019, NEMCOG met with Alcona County's LPT to review and update the 2014 Alcona County Hazard Mitigation Plan. A brief overview of the hazard mitigation planning process, current plan status, and grant match was discussed. Additionally, the committee reviewed and updated the county's hazard rankings based on their social impact, likelihood of occurrence, and administrative potential. The committee elevated the county's risk for extreme temperatures, transportation accidents, dam failure, and hazardous materials-fixed site. It reduced the county's risk for tornadoes, hazardous materials-transportation, hail, nuclear attack, and structural fire. It was determined no additional strategies needed to be added to the plan at this time. The committee also reviewed and updated the plan's goals and objectives and determined a goal and its corresponding objectives regarding the county's geographic information system should be added. Finally, the committee reviewed the hazard mitigation actions and implementation strategies and updated them based on whether or not the mitigation action was still relevant. The committee reviewed and updated each action's priority ranking, current progress, and future status. Several action items were moved to the all-hazard mitigation action table, three hazard actions were deemed no longer relevant in the county (and will be removed from future plans), and multiple action items were determined to be ongoing projects. Attendees included Scott Rice, Stanley Darmofal, DeAnna Morgan, Toni Rhoads, Keith Myers, Carolyn Brummund, Michael Escareno, Ralph Klotz, Carol Rabineau, Ron Rabineau, Cori Upper, Rod Cordes, and NEMCOG staff, Christina McEmber.

NEMCOG Board of Directors' Meeting

On December 19, 2019, NEMCOG staff provided a status of county hazard mitigation plan updates and explained the approval process. Attendees included Dan Gauthier (Alcona County Board of Commissioner), Dave Karschnick (Alpena County Board of Commissioner), Daryl Peterson (Montmorency County Board of Commissioner), Kyle Yoder (Oscoda County Board of Commissioner, Chair), Robert Pallarito (Otsego County Board of Commissioner), Carl Altman (Presque Isle County Board of Commissioner, Vice Chair), Adam Poll (City of Alpena Planning and Development Director), Marisue Moreau (Northeast Michigan Consortium/Michigan Works!), Robert Heilman (NEMCOG Board of Directors' Chair), Bruno Wojcik (Briley Township, Montmorency County, Supervisor), Scott McLennan (City of Rogers City, Presque Isle County, Mayor), Doug Baum (City of Grayling, Crawford County, Manager), Dave Post (Village of Hillman, Montmorency County, Manager), Norman Brecheisen (Livingston Township, Otsego County, Supervisor), and NEMCOG staff, Diane Rekowski, Theresa Huff, Karen Cole, Steve Schnell, Nico Tucker, Denise Cline and Christina McEmber.

Draft Plan

The draft Alcona County Hazard Mitigation Plan was made available to local governments, agencies, and the public for review and comment. A public notice was sent to the local newspaper to inform residents about the draft plan and where it could be reviewed. The draft plan was posted on Alcona County's website and NEMCOG's website. A paper copy will be available at the Alcona County Building. The draft plan was also emailed to the local jurisdictions for review and comment on February 5, 2021.

On February 17, 2021, a public hearing was held to receive comments and suggestions on the draft plan. The comments and suggestions included the following: updates needed to occur for the mitigation strategies, information for the City of Harrisville, and information in the EMS, campground, climate, and warning system sections. Comments and suggestions obtained in the review process were incorporated into the final plan.

The draft plan was submitted to the Michigan State Police and Federal Emergency Management Agency (FEMA) for preliminary review and comment before adoption by the Alcona County Board of Commissioners and local jurisdictions.

Plan Adoption

On March 2, 2022, the Alcona County Hazard Mitigation Plan received "approvable pending adoption" status from the State and FEMA.

On March 16, 2022, the Alcona County Board of Commissioners adopted the plan by resolution. After the Board of Commissioners adopted the plan, the local jurisdictions were notified and requested to also adopt the plan (Appendix C).

Incorporation of Plans, Studies, and Technical Information

NEMCOG staff reviewed relevant plans, maps, studies, and reports. Federal, state, regional, and local government sources were reviewed to update the county's community profile. These sources included the U.S. Census Bureau, zoning ordinances, master plans, recreation plans, capital improvement plans, parcel maps, aerial photography, Michigan Department of Natural Resources' Michigan Resource Information System land use/land cover information, USGS topographic maps, the National Oceanic and Atmospheric Administration's National Centers for Environmental Information Data Center, the USDA's Soil Surveys, NRCS soils maps, Michigan Department of Transportation, Michigan Hazard Analysis, Michigan Hazard Mitigation Plan, local hazard analysis, flood insurance rate maps, emergency management plans, Michigan Department of Environment, Great Lakes, and Energy, U.S. Forest Service, Michigan State Police Emergency Management and Homeland Security Division, and Bureau of Fire Services.

GIS was used as a public education and decision tool throughout the planning process. Data sets were used to analyze existing conditions and potential future scenarios. Specialized maps, such as community hazards, land cover/use and infrastructure, were used during the drafting phase of the plan. The maps assisted in identifying community characteristics, vulnerable populations, and hazard areas.

Chapter 2 Environment

Overview

Alcona County encompasses 679 square miles (approximately 434,560 acres) in Michigan's Northeastern Lower Peninsula and has 27 miles of shoreline along Lake Huron. It measures 24 miles from north to south and 30 miles from east to west. The county is bordered by Iosco, Oscoda, and Alpena Counties and is composed of eleven townships, two incorporated places, and several unincorporated places (Figure 2-1):

- City of Harrisville (county seat; incorporated)
- Village of Lincoln (incorporated)
- Alcona Township
- Caledonia Township
- Curtis Township
- Greenbush Township
- Gustin Township
- Harrisville Township
- Hawes Township
- Haynes Township
- Mikado Township
- Millen Township
- Mitchell Township
- Curran (unincorporated)
- Glennie (unincorporated)
- Curtisville (unincorporated)
- Greenbush (unincorporated)
- Hubbard Lake (unincorporated)
- Spruce (unincorporated)
- Mikado (unincorporated)
- Black River (unincorporated)
- Barton City (unincorporated

Millen Township encompasses approximately 72 square miles with most of the township located in the Huron National Forest. In Millen Township, Barton City is a small resort community located on Jewell Lake. The city is accessed from M-72 on Stout Road. Haynes Township encompasses approximately 34 square miles. Mikado Township encompasses approximately 72 square mile and houses the Town of Mikado, which is located at the intersection of F-30 and F-41. The Town of Mikado has a civic center and small businesses. Greenbush Township encompasses approximately 24 square miles that includes the unincorporated community of Greenbush. Gustin Township encompasses approximately 36 square miles. Hawes Township encompasses approximately 70 square miles. Harrisville Township encompasses approximately 31 square miles. Curtis Township encompasses approximately 70 square miles and houses the unincorporated communities of Curtisville and Glennie. The Village of Lincoln is located north of M-72 in the southern portion of Hawes Township and the northern portion of Gustin Township. Alcona Township encompasses 58 square miles of land and 9 square miles of Hubbard Lake. Caledonia Township encompasses approximately 68 square miles of land and 4.5 square miles of Hubbard Lake. The City of Harrisville is located at the junction of M-72/Main Street and U.S. 23/State Street in Harrisville Township along the coast of Lake Huron. Mitchell Township encompasses approximately 144 square miles and includes over a quarter of the Huron National Forest and Curran. Curran is located at the junction of M-65 and M-72.

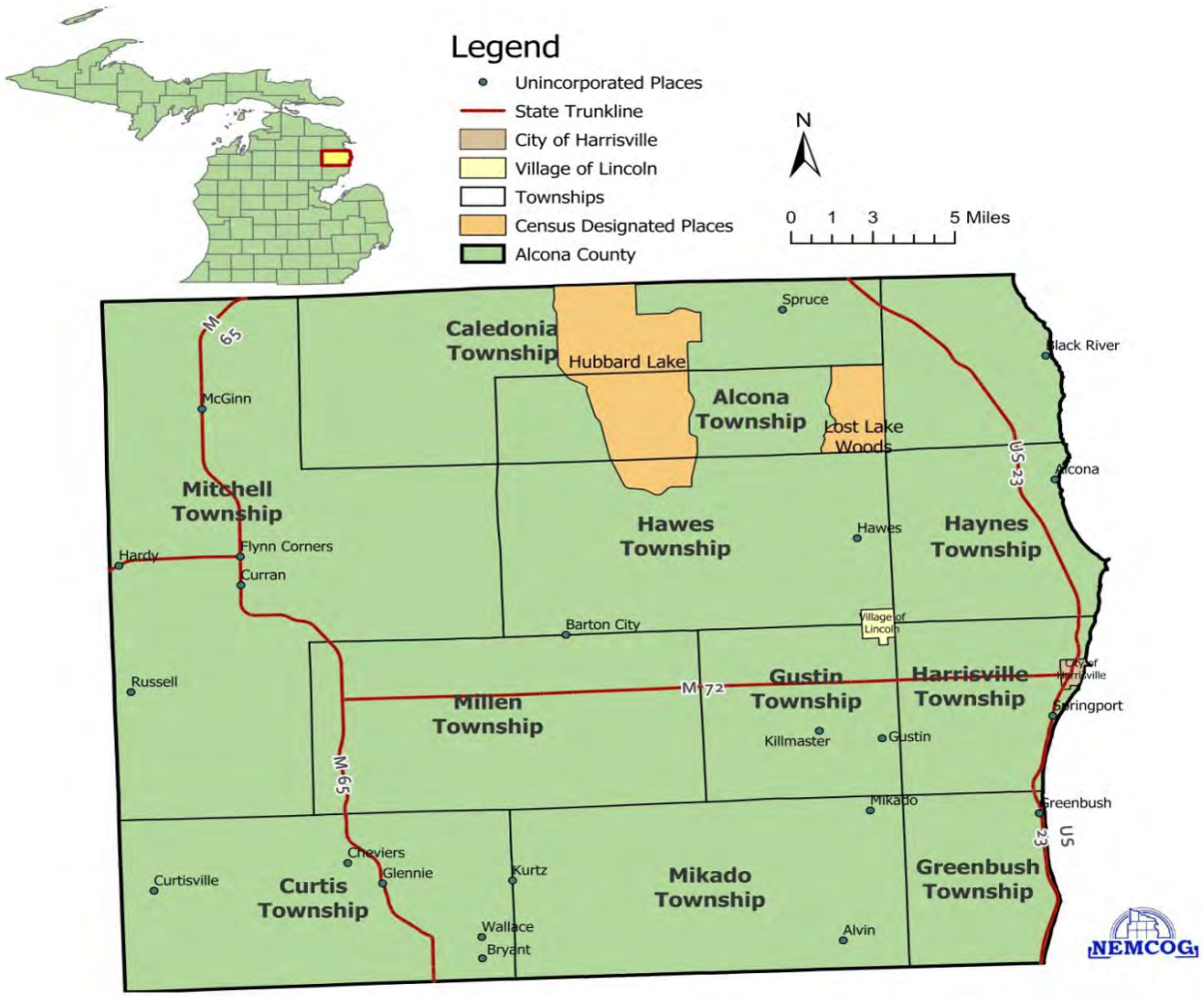


Figure 2-1 Alcona County Location Map

Climate

Since Alcona County shares a boundary with Lake Huron, the weather is influenced by the moderating effect of the lake. Temperature data from the Midwest Regional Climate Center indicates the climate along the immediate Lake Huron shore is semi-marine in nature and lacks many of the temperature extremes found a few miles inland. According to the USDA's *Soil Survey of Alcona County, Michigan*, the average relative humidity is approximately 61% in the afternoon and 83% in the morning.

The temperature ranges between 22- and 59-degrees Fahrenheit in the spring and between 53- and 76-degrees Fahrenheit in the summer. The average annual precipitation is 30.67 inches with approximately 60% of the precipitation falling between April and September.

The temperature ranges between 31- and 68-degrees Fahrenheit in the fall and between 14- and 32-degrees Fahrenheit in the winter. The average annual snowfall is 53 inches. On average, 93 days of the year have at least one inch of snow on the ground according to the *Soil Survey of Alcona County, Michigan.* However, the number of days varies each year.

According to the National Aeronautics and Space Administration, Earth's climate has been warming over the past century at an unprecedented rate due to human activities. Carbon dioxide and other gases are trapping heat, which is causing the earth to warm. According to the *Planning for Community Resilience in Michigan: A Comprehensive Handbook*, Michigan is predicted to experience more frequent and severe storms, increases in winter and spring precipitation, less precipitation as snow and more as rain, reduced ice cover on the Great Lakes, an extended growing season, more flooding events with risks of erosion, an increase in the frequency and length of severe heat events, and an increase in drought and wildfires. Since Alcona County's 2014 Hazard Mitigation Plan Update, the county has seen an increase of 3.5 inches of snowfall and an increase of 1.2 inches of precipitation.

Topography and Geology

Alcona County's topography is classified as level, undulating plains and rolling to hilly moraine areas. The county's elevation ranges from 577 feet above sea level at the shoreline of Lake Huron to 1,273 feet above sea level three miles southwest of Curran. The county has areas (e.g., Alcona Dam Pond) with drastic drops in elevation, which create steep, unstable slopes.

The retreating continental glaciers formed the county's plains, moraines, river valleys, swamps, lakes, and deltas (Figure 2-2). The lake plains are characterized by nearly level to undulating areas dominated by moderately well drained to poorly drained loamy soils according to the USDA's *Soil Survey of Alcona County, Michigan.* In the transition area between the sand deltas and the lake plains, the soils are somewhat poorly drained to very poorly drained sandy, mucky soils. The Au Sable River flows in a glacial river valley. The Jack Pines Delta extends southward and is characterized by broad, nearly level plains, jack pine forests, widely spaced streams and creeks, and excessively drained to somewhat excessively well-drained sandy soils. In the south-central portion of the county, the Mikado Till Plain consists of the Pine River Watershed, which has had historic flooding incidents. In the central and western portions of Alcona County, the Glennie Moraine, West Branch Moraine, and Fletcher Pond Channeled Uplands have rolling to steeply sloping topography with pine, oak, and northern hardwood forests.

Alcona County's sedimentary bedrock consists of sandstone, shale, limestone, and dolomite (Figure 2-3). Within the bedrock, there are economic deposits of natural gas, oil, limestone, gypsum, salt, and brine. Intensive exploration for oil and gas deposits has resulted in numerous producing wells throughout the county.

Soils

The Natural Resource Conservation Service completed a detailed soil survey of Alcona County and the soil survey maps were acquired from the Michigan Department of Natural Resources MIRIS program (MIRIS). The *Soil Survey of Alcona County, Michigan* identified 153 soil types with 68% being classified as well-drained and moderately well-drained, 20% being classified as somewhat poorly drained, and 12% being classified as poorly drained. The soils range widely in texture, natural drainage, slope, and other characteristics.

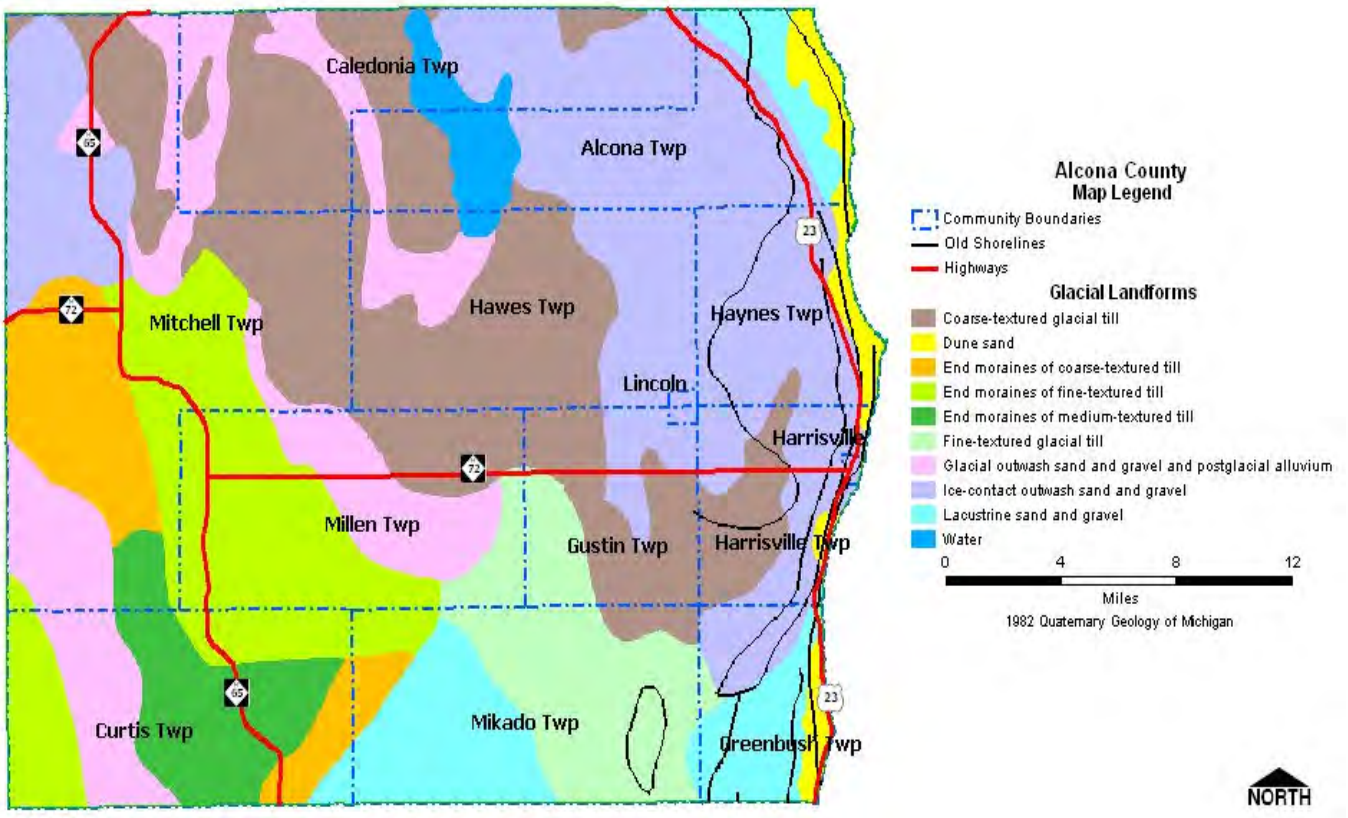


Figure 2-2 Alcona County's Glacial Landforms

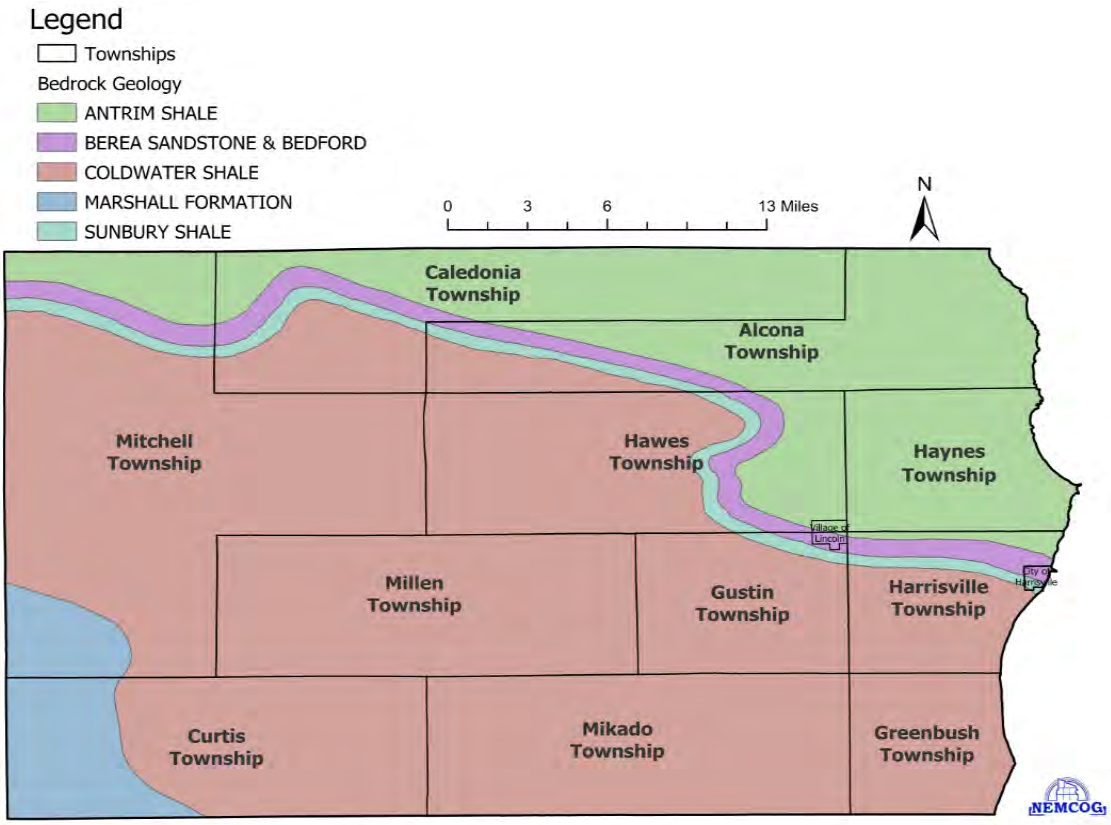


Figure 2-3 Alcona County's Bedrock Geology

Hydric Soils and Steep Slopes

The soil types and slopes should be considered when planning for land use types and intensities (Figure 2-4). Hydric soils can be found southwest of Hubbard Lake, in southeast Alcona County, and along the Lake Huron shoreline. These soils are located adjacent to streams and creeks and are classified as poorly drained and very poorly drained. During part of the growing season, these soils are saturated, flooded or ponded, which makes them poor soils for building site development and sanitary facilities. The high-water table of these soils may classify them as wetlands, which would require a wetland permit for development. According to the *Soil Survey of Alcona County, Michigan,* areas with slopes 18 percent and greater are concentrated in the northwest corner of Mitchell Township, the central portion of the county, and on the west side of U.S. 23 along the coast. The cost to develop areas with hydric soils and steep slopes is greater than the cost of developing in less constrained areas since hydric soils and steep slopes require severe building constraints and special design considerations, such as erosion control measures, slope stabilization, and on-site water retention. If developed improperly, the environmental impacts would be considerable.

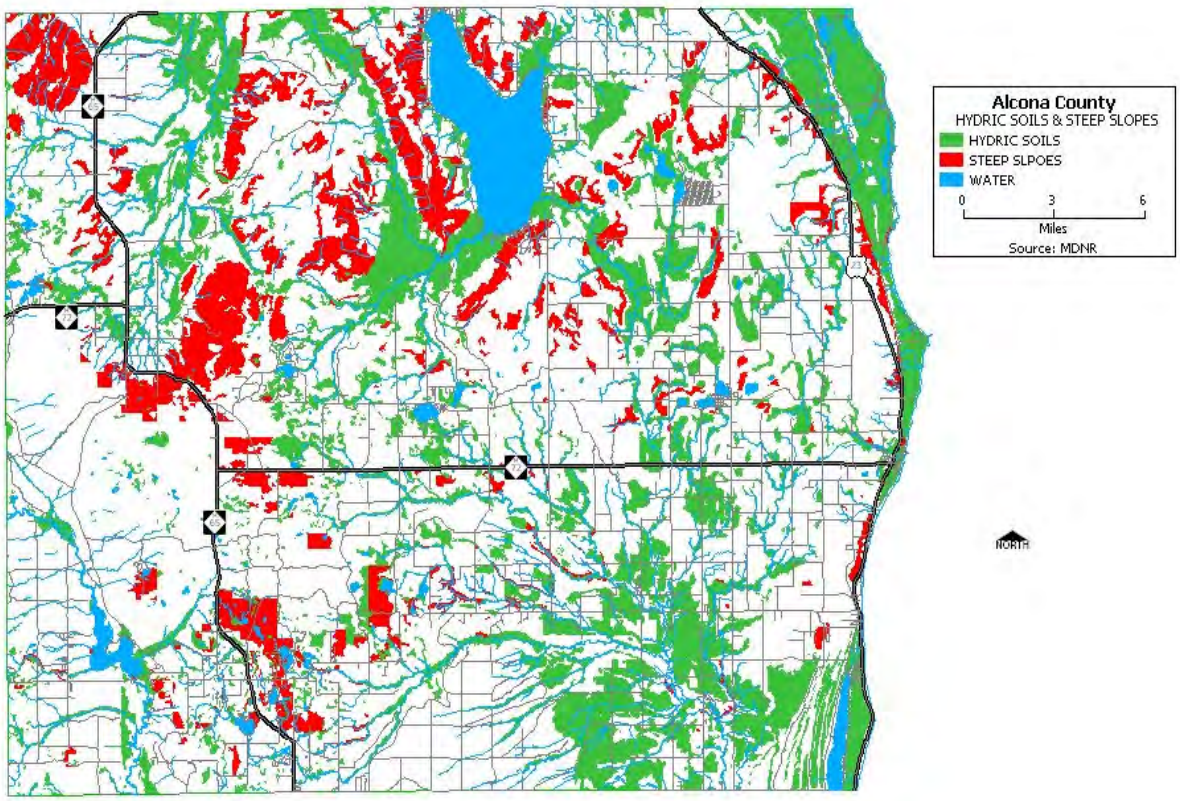


Figure 2-4 Alcona County's Hydric Soils and Steep Slopes

Forestlands

Over 73% of Alcona County is forested with various tree species due to the soils, moisture, and past activities (e.g., logging, fires, and land clearing). Aspen-birch, red -white oak, and jack-red-white pine are the most common forest types and are concentrated in Mikado, Curtis and Mitchell Townships. Deer, grouse, woodcock, rabbit, waterfowl, and squirrel populations can be found in the forestlands.

Along with Alpena, Montmorency, Oscoda, and Presque Isle Counties, Alcona County is located within the Bovine Tuberculosis outbreak area that effects the local deer population and other wild animals. The Michigan DNR created a deer management unit (DMU 452) to manage and prevent the spread of the disease through the enforcement of special regulations regarding deer hunting and feeding. The long-term effect of Bovine Tuberculosis on the area's hunting is unknown.

The Michigan Resource Information System's 1978 Land Cover/Use Inventory (MIRIS) and the Michigan DNR's pre-settlement vegetation map were used to analyze the county's forest types to assist in defining the vulnerable areas and populations (Figure 2-5). A review of the pre-settlement vegetation map shows extensive areas covered with pine and oak forests, which means the area has a history of wildfires. Approximately 36% of the county was jack pine-red pine forest, white pine-red pine forest, pine barrens and pine/oak barrens. In the late 1800's, extensive logging and subsequent wildfires converted the white pine-red pine forests into oak-aspen forests in Caledonia, Alcona,

Hawes, Millen, and Mitchell Townships. Today, residential developments are located within these wildfire prone areas. The MIRIS data reports approximately 14% of the land is jack pine-red pine forests and 20% is oak and white pine forests.

Wetlands

Wetlands function as water quality buffers, wildlife habitat, and are prone to flooding during periods of high lake levels, spring snow melt, and periods of heavy rain. These areas tend to be adjacent to water features and support vegetation, such as northern white cedar, tamarack, balsam fir, black spruce, eastern hemlock, white pine, balsam poplar, trembling aspen, paper birch, black ash, speckled alder, and shrub willows. Wildlife species found in wetlands include the red shouldered hawk, barred owl, kingfisher, northern oriole, red-headed woodpecker, pileated woodpecker, woodcock, wood duck, great blue heron, deer, raccoon, northern flying squirrel, water vole, mink, river otter, turtles, frogs, snakes, salamanders, and newts.

Wetlands are found in Curtis, Mikado, Greenbush, Hawes, Mitchell, Caledonia and Alcona Townships (Figure 2-6). Since property owners tend to clear brush, aquatic vegetation, and trees along lake and river shorelines, riparian wetlands are a finite resource in the county. Therefore, land use planning should focus on preserving these features to improve water quality and wildlife habitat.

Water Resources

According to the *Alcona County Resource Plan*, there are 233 bodies of water, 301 miles of rivers and streams, and 27 miles of Lake Huron shoreline in Alcona County. The county's water drains into the Au Sable, Pine, and Comstock River systems, which drains into either Hubbard Lake or Lake Huron. The county's largest lakes include Hubbard Lake (9,200 acres; Alcona Township and Hawes Township), Alcona Dam Pond (1,008 acres), Cedar Lake (775 acres; Greenbush Township), Jewell Lake (193 acres), Vaughn Lake (115 acres), Crooked Lake (97 acres), Brownlee Lake (90 acres), Badger Lake (88 acres), North Lake (86 acres), McCollum Lake (81 acres), and Lincoln Lake (77 acres). The Van Etten Creek flows through the Town of Mikado (Mikado Township). The Au Sable River, Hubbard Lake, and Lake Huron provide many recreational opportunities. Some lakes have been stocked with tiger musky and warmer lakes have bluegill, bass, perch, and pike.

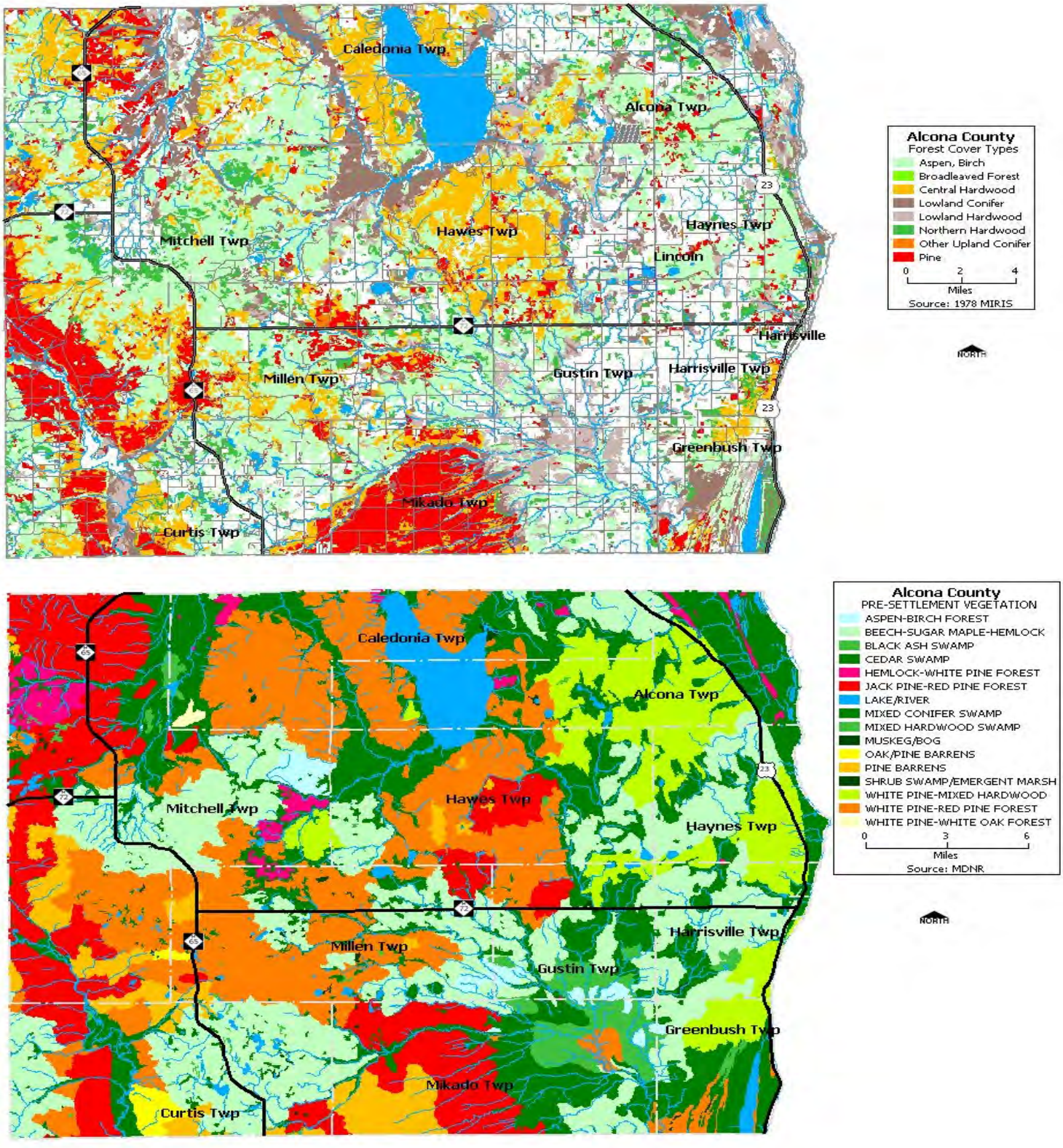


Figure 2-5 Alcona County's Forest Cover and Pre-settlement Vegetation

Red, jack and white pine forest types are included in the pine forest category. Bigtooth aspen, quaking aspen, white birch, red maple and red oak are included in the aspen-birch type. Red oak, white oak, black oak and northern pin oak are included in the oak forests. Northern hardwoods include sugar maple, red maple, American beech, basswood and yellow birch.

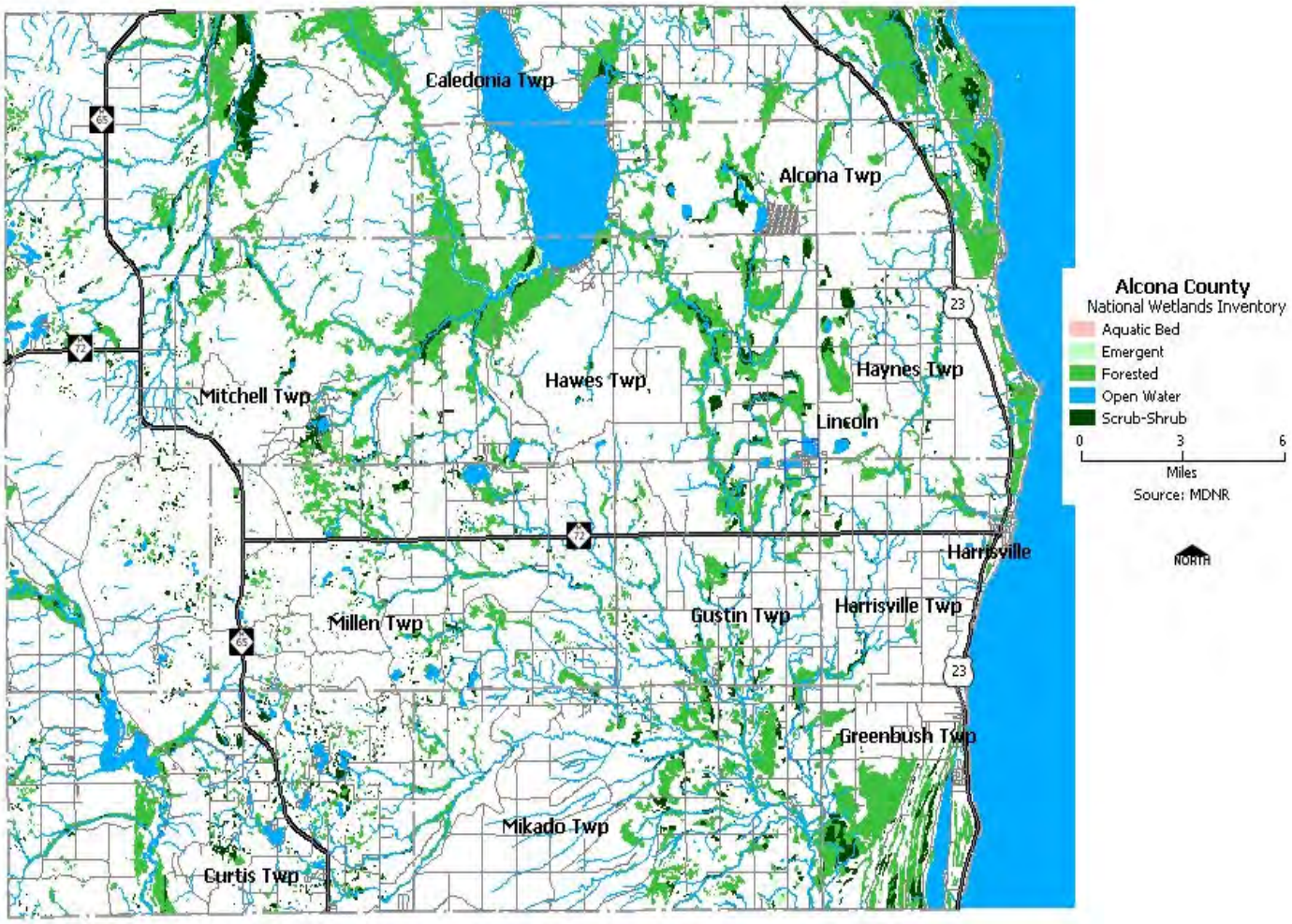


Figure 2-6 Alcona County's Wetlands Inventory
Source: US Fish and Wildlife Service National Wetlands Inventory

Discharge Permits

Surface Water (National Pollutant Discharge Elimination System) Permits
The State of Michigan controls the discharge of pollutants from waste and wastewater into Michigan's surface waters through the National Pollutant Discharge Elimination System (NPDES) permitting process. This process imposes effluent limitations and other necessary conditions to protect the environment and meet State and Federal regulations. There are six NPDES permits issued in Alcona County (Table 2-1).

Table 2-1 Surface Water (NPDES) Permits				
Name	**Address**	**Site Type**	**Permit Number**	**Expiration Date**
Alcona CRC-Barlow Rd	Barlow Road	Construction Site	MIR115423	1/14/2024
Alcona CRC-F41	F-41, from Kings Corner Road to Goddard Road	Construction Site	MIR113776	1/22/2021
Bamfield Road, from Demott Road to Garrett Road	Bamfield Road	Construction Site	MIR113698	11/4/2020
CECO-Alcona Hydro Plt	6950 Bamfield Road	Industrial; Power Plant	MIG250377	4/1/2018
Harrisville WWSL	Clark	Municipal Sanitary-Public	MIG580280	4/1/2019
Viking Energy-Lincoln Plant	509 W. State St.	Industrial	MI0044407	10/1/2022
Source: Michigan Department of Environment, Great Lakes, and Energy, Retrieved May 2019				

Groundwater Discharge Permit
The State of Michigan regulates the discharge of wastes and wastewaters into the ground or groundwater system through the groundwater discharge permit program. Field staff review effluent and groundwater data and inspect discharge facilities. The issuance of a groundwater permit does not authorize the violation of local, state, or federal regulations, nor does it remove the obligation to obtain other permits or government approvals. According to the Michigan Department of Environment, Great Lakes, and Energy (EGLE), there is one groundwater discharge permit issued for the Village of Lincoln's Wastewater Treatment Plant.

Air Discharge (Renewable Operating Permit/ Title V) Permits
The State of Michigan administers the Renewable Operating Permit (ROP) system to regulate air emissions for facilities that emit more than a certain amount of air contaminants. According to EGLE, there is one ROP issued in Alcona County: Viking Energy of Lincoln, LLC.

Sites of Environmental Contamination

The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended regulates facilities of environmental contamination in Michigan. The Remediation and Redevelopment Division of EGLE works toward managing and revitalizing sites of environmental contamination to protect the environment. The division administers two programs: Environmental Remediation (release of hazardous substances from facilities) and Leaking Underground Storage Tanks (release of hazardous substances from underground storage tanks).

The facility inventory database has information for Sites of Environmental Contamination (Part 201), Leaking Underground Storage Tanks (Part 213), and Baseline Environmental Assessments (BEA). The Baseline Environmental Assessments document the existing contamination and allows a facility to be acquired and/or operated without being held liable for the existing contamination. In Alcona County, the facility inventory database reports the following:

- 12 sites with completed Baseline Environmental Assessments (BEA)
- 16 sites listed as Sites of Environmental Contamination (Part 201)
- 13 sites listed as Leaking Underground Storage Tanks (Part 213)

Chapter 3 Community Profile

Alcona County History

While Native Americans were travelling to trading posts north of Greenbush, they would camp along Lake Huron's shoreline. In 1840, the Michigan Legislature created Alcona County and the county's government was established in 1869 with Harrisville becoming the county seat. The county's main economic drivers in the 1880's were logging and commercial fishing with the first settlement located at Springport. Greenbush was a lumber and commercial fishing town; while, Curran, Curtisville, Glennie, Lincoln, Mikado, and Barton City were lumber towns, and Spruce was a commerce center for nearby farms.

To accommodate the growing lumber industry and fishing fleet, ports were established at Alcona, Black River, and Harrisville, and railroads ran through Curran and Lincoln. In 1870, the Sturgeon Point Lighthouse was opened to aid vessels in navigating the coastline's treacherous rocks, shoals, and reefs. In 1876, the Life Saving Station opened to provide rescue services to distressed vessels.

Population

According to the U.S. Census Bureau, Alcona County's population has experienced an 11.1% decline between 2000 and 2017 and has a population density of 15.4 people per square mile (Table 3-1). The majority of the municipalities have also seen a population decline except for Alcona Township, which had a 2.7% population increase. The City of Harrisville and Millen Township saw the greatest population declines.

Table 3-1 Population for Alcona County and its Municipalities, 2000-2017

Municipality	2000 Population	2010 Population	2017 Population	Percent Change 2000-2017	Numeric Change 2000-2017
Alcona County	11,719	10,942	10,413	-11.1%	-1,306
Alcona Township	1,089	968	1,118	2.7%	29
Caledonia Township	1,203	1,161	1,005	-16.5%	-198
Curtis Township	1,378	1,236	1,162	-15.7%	-216
Greenbush Township	1,499	1,409	1,356	-9.5%	-143
Gustin Township	832	795	769	-7.6%	-63
Harrisville Township	1,411	1,348	1,310	-7.2%	-101
Hawes Township	1,167	1,107	1,010	-13.5%	-157
Haynes Township	724	722	656	-9.4%	-68
Mikado Township	1,043	947	953	-8.6%	-90
Millen Township	463	404	353	-23.8%	-110
Mitchell Township	396	352	330	-16.7%	-66
City of Harrisville	514	493	391	-23.9%	-123
Village of Lincoln*	364	337	353	-3.0%	-11

Source: U.S. Census Bureau
Note: Green text indicates an increase; Red text indicates a decline
*Village of Lincoln numbers factor into township numbers

Seasonal Population Estimate

Since the seasonal population fluctuates based on the county's tourism and local events, it is difficult to determine the number of seasonal residents and visitors. However, an approximate estimate for the number of seasonal residents can be obtained by multiplying the number of seasonal housing units (5,483) by the average number of persons per household (2.06) to get a seasonal population estimate of 11,295 persons. When the seasonal population estimate is combined with the U.S. Census Bureau's population figure, the county's population becomes approximately 21,708 persons. Unfortunately, this estimate does not include seasonal visitors who stay in motels, campgrounds, or family homes.

Age Distribution

The median age of the county's residents increased from 49 years in 2000 to 57.9 years in 2017; while the median age for the State increased from 32.5 to 39.6 years (Figure 3-1). Since the county is aging at a faster rate than the State, it appears the county's residents are aging in place and will need accessible social, emergency response, and medical services.

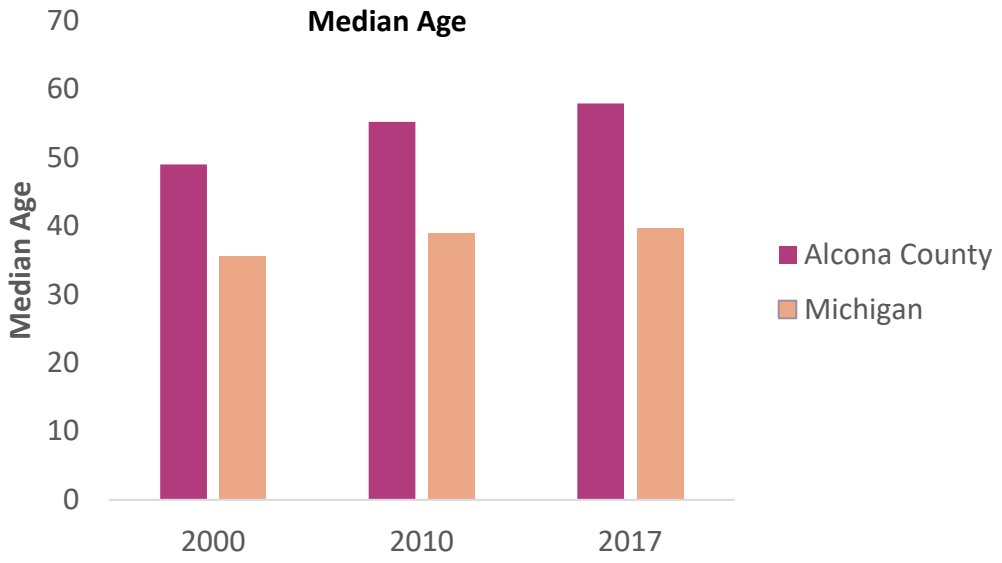


Figure 3-1 Median Age

According to the U.S. Census Bureau, the 65 years and older age group is the most populous in the county, while the second most populous group is aged 45-64 years old (Table 3-2). The most populous age group in Alcona, Caledonia, Curtis, and Greenbush Townships and the City of Harrisville is the 65 years and older group; while the most populous age group in Gustin, Harrisville, Hawes, Haynes, Mikado, Millen, Mitchell, and the Village of Lincoln is the 45-64 years old age group. The Village of Lincoln has the highest percentage of persons under the age of five in the county, while Harrisville has the highest percentage of persons between the ages of five and nineteen. Alcona Township has the highest median age at 64.2 years, while the Village of Lincoln has the lowest median age at 47.7 years.

Table 3-2 Age Distribution by Municipality, 2017													
Municipality	**< 5 Yrs.**	**%***	**5-19 Yrs.**	**%***	**20-24 Yrs.**	**%***	**25-44 Yrs.**	**%***	**45-64 Yrs.**	**%***	**65 Yrs. & >**	**%***	**Median Age**
Alcona County	**317**	**3.0**	**1,223**	**11.8**	**363**	**3.5**	**1,419**	**13.6**	**3,442**	**32.9**	**3,652**	**35.1**	**57.9**
Alcona Township	33	3.0	64	5.7	20	1.8	104	9.2	354	31.6	543	48.6	64.2
Caledonia Township	19	1.9	128	12.8	15	1.5	89	8.9	349	34.7	405	40.3	60.3
Curtis Township	29	2.5	125	10.8	17	1.5	134	11.6	364	31.3	493	42.4	60.9
Greenbush Township	36	2.7	153	11.2	27	2.0	196	14.4	421	31.0	523	38.5	60.7
Gustin Township	41	5.3	101	13.2	68	8.8	135	17.6	221	28.7	203	26.5	49.0
Harrisville Township	29	2.2	233	17.8	32	2.4	220	16.8	420	32.0	376	28.6	53.7
Hawes Township	29	2.9	126	12.5	45	4.5	132	13.1	383	37.9	295	29.2	54.5
Haynes Township	30	4.6	77	11.8	33	5.0	88	13.4	217	33.1	211	32.2	56.5
Mikado Township	48	5.0	142	15.0	73	7.7	142	15.0	343	35.9	205	21.4	49.4
Millen Township	10	2.8	27	7.7	12	3.4	51	14.4	129	36.6	124	35.1	59.7
Mitchell Township	9	2.7	19	5.7	8	2.4	43	12.9	128	38.7	123	37.3	59.7
City of Harrisville	4	1.0	28	7.1	13	3.3	85	21.7	110	28.1	151	38.5	57.8
Village of Lincoln	24	6.8	60	17.0	33	9.3	49	13.9	100	28.3	87	24.7	47.7
Michigan	**571,999**	**5.8**	**1,910,417**	**19.3**	**723,180**	**7.3**	**2,396,359**	**24.1**	**2,748,380**	**27.7**	**1,575,233**	**15.8**	**39.6**

*Figure shows the percentage each age grouping represents of the local unit's total population.
Source: U.S. Census Bureau

Disability Status

Disabled status data is estimated by the American Community Survey and is based on a sample (Table 3-3). A person was classified as having a disability if they had a sensory, physical, mental, self-care, going outside the home or an employment disability. Approximately 44.8% of Alcona County's population is classified as having some type of disability. The most common disabilities among the 18-64 years old age group are ambulatory and cognitive disabilities. The high percentage of disabilities in Northeast Michigan indicates a need for disabled services.

Table 3-3 Disability Status in Alcona County

Status Type	Number of Persons
Population under 5 years with a disability	**0**
With a hearing difficulty	0
With a vision difficulty	0
Population 5-17 years with a disability	**99**
With a hearing difficulty	8
With a vision difficulty	4
With a cognitive difficulty	63
With an ambulatory difficulty	13
With a self-care difficulty	11
Population 18-64 years with a disability	**2,148**
With a hearing difficulty	231
With a vision difficulty	108
With a cognitive difficulty	499
With an ambulatory difficulty	608
With a self-care difficulty	235
With an independent living difficulty	467
Population 65+ years with a disability	**2,413**
With a hearing difficulty	607
With a vision difficulty	144
With a cognitive difficulty	299
With an ambulatory difficulty	712
With a self-care difficulty	261
With an independent living difficulty	390

Source: American Community Survey 2017

Housing Characteristics

According to the U.S. Census Bureau, Alcona County has 11,117 housing units with 4,979 occupied housing units and 6,138 vacant housing units (Table 3-4). Curtis Township has the most housing units at 1,726 units, while the Village of Lincoln has the least amount of housing units at 250. Communities with lakes, rivers, and private forestlands tend to have higher numbers of seasonal housing, which presents challenges when mitigating hazards due to their geographic location. In Alcona County, approximately 89.3% of the vacant housing units are classified as seasonal with the majority of the units located in Mitchell (73.6%) and Curtis (60.1%) Townships.

Table 3-4 Housing Counts and Occupancy Status, 2017

Municipality	Total	Occupied	Vacant	Percent Vacant	Seasonal	Percent Seasonal*
Alcona County	**11,117**	**4,979**	**6,138**	**55.2**	**5,483**	**49.3**
Alcona Township	1,398	583	815	58.3	741	53.0
Caledonia Township	1,183	492	691	58.4	659	55.7
Curtis Township	1,726	600	1,126	65.2	1,037	60.1
Greenbush Township	1,503	661	842	56.0	742	49.4
Gustin Township	524	352	172	32.8	115	21.9
Harrisville Township	863	563	300	34.8	231	26.8
Hawes Township	1,030	465	565	54.9	533	51.7
Haynes Township	621	298	323	52.0	293	47.2
Mikado Township	623	386	237	38.0	194	31.1
Millen Township	561	204	357	63.6	311	55.4
Mitchell Township	784	176	608	77.6	577	73.6
City of Harrisville	301	199	102	33.9	50	16.6
Village of Lincoln	250	166	84	33.6	66	26.4

*Percent of total housing
Source: US Census Bureau

Generally, older housing units are more likely to need renovations. In Alcona County, the majority of the structures were built between 1960 and 1979 (Table 3-5). However, 26.6% of the structures were built prior to 1960 and 7.2% were built prior to 1940. Approximately 20.5% of the structures were built after 1990.

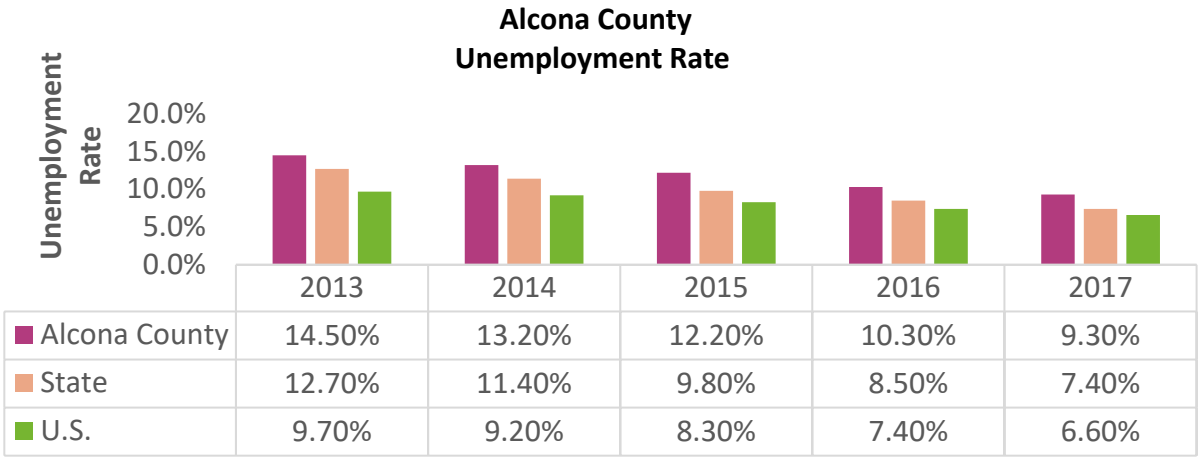
Table 3-5 Year Structure Built in Alcona County

Year Structure Built	Percentage of Structures
2000 or later	7.4%
1990-1999	13.1%
1980-1989	12.9%
1960-1979	40.0%
1940-1959	19.4%
1939 or earlier	7.2%

Source: American Community Survey 2017

Selected Economic Indicators

According to the U.S. Census Bureau, the number of employed people has decreased from 4,467 persons in 2000 to 3,702 persons in 2017. The county's unemployment rate increased from 6.8% in 2000 to 9.3% in 2017 and has been consistently higher than the State and national rates (Figure 3-2).



	2013	2014	2015	2016	2017
Alcona County	14.50%	13.20%	12.20%	10.30%	9.30%
State	12.70%	11.40%	9.80%	8.50%	7.40%
U.S.	9.70%	9.20%	8.30%	7.40%	6.60%

Figure 3-2 Alcona County's Unemployment Rate

Median Household Income

Median household income is a reliable measure of the economic health of families. In the eight counties in Northeast Michigan, the median income has steadily increased over the past several decades. However, the median income in Northeast Michigan lags behind the State. The U.S. Census Bureau reports Alcona County's median household income is $39,424, which was 74.9% of the State's median household income and 68.4% of the national median household income (Table 3-6). In Alcona County, 29.7% of households have a total income with benefits less than $25,000 and 43.5% of the households have an income with benefits less than $35,000 (Table 3-7).

Table 3-6 Northeast Michigan Median Household Income

Place	2017
Alcona County	$39,424
Alpena County	$40,954
Cheboygan County	$42,876
Crawford County	$42,666
Montmorency County	$39,152
Oscoda County	$36,833
Otsego County	$50,823
Presque Isle County	$43,758
State of Michigan	$52,668
United States	$57,652

Source: U.S. Census Bureau– American Community Survey

The median household incomes in Northeast Michigan are expected to remain lower than the State as the region has a higher proportion of older individuals than the State and the region's economy is becoming reliant on the service and tourism industries, which tend to have seasonal employment opportunities and lower incomes. As younger people move out of the region in search of steady, year-round employment with higher incomes, the region may experience a continued decrease in median household income and an increase in an older population.

Table 3-7 Income and Benefits per Household, 2017	
Income and Benefits	**Percentage of Households**
Less than $10,000	9.4%
$10,000 - $14,999	6.2%
$15,000 - $24,999	14.1%
$25,000 - $34,999	13.8%
$35,000 - $49,999	18.9%
$50,000 - $74,999	18.3%
$75,000 – $99,999	10.6%
$100,000 +	8.7%
Source: U.S. Census Bureau - American Community Survey	

Poverty Rates

Poverty remains an issue in Alcona County with approximately 10.5% of families living in poverty (Table 3-8). The poverty rate increases to 19.8% when children are present. The poverty rate for a female householder with no husband is 27.1%; however, the rate increases to 40.9% when children are present.

Table 3-8 Alcona County's Poverty Rates, 2017	
Category	**Percent of Population**
Families	10.5
All families w/related children under 18	19.8
Married couple families	7.7
Married couple families w/related children under 18	11.8
Female householder, no husband present	27.1
Female householder, no husband present w/ related children under 18	40.9
Householder 65+ years	3.8
Source: U.S. Census Bureau– American Community Survey	

Agriculture

According to the USDA's 2012 Census of Agriculture County Profile for Alcona County, the number of farms in Alcona County has decreased from 281 (45,395 acres) in 2007 to 235 (38,309 acres) in 2012. Despite the decrease in acreage, the average farm made $48,509 in 2012 as opposed to $30,890 in 2007. The 2012 County Profile found the market value of products sold to be $11,400,000 with $4,591,000 in crop sales and $6,808,000 in livestock sales.

Table 3-9 Alcona County's Agricultural Statistics	
Total farmland	38,309 acres
Total farm production expenses	$10,631,000
Organic Program certified farms	6 farms
Revenue by cattle and calves	$1,522,000
Revenue by milk from cows	$4,744,000
Total livestock inventory	5,799 animals
Source: 2012 USDA Census of Agriculture	

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Chapter 4 Land Use Characteristics

Land Divisions and Ownership

The Huron National Forest is the largest landowner (311 square miles) in the southern portion of Alcona County (Figure 4-1). Negwegon State Park is a day use park in Alcona Township. Harrisville State Park is a popular campground in Harrisville Township, south of the City of Harrisville. Other state lands are located in Caledonia, Greenbush and Mikado Townships.

Most of the county's privately-owned land is divided into tracts that are ten acres or larger. In the northwest portion of the county, there are large hunt clubs that own several sections of land (e.g. Golden Arrow). In the Village of Lincoln, the City of Harrisville, Barton City (Millen and Hawes Townships), Curran (Mitchell Township), Spruce (Caledonia Township), Black River (Alcona Township), Glennie (Curtis Township), Mikado (Mikado Township), Greenbush (Greenbush Township), and along Lake Huron and the county's lakes are small lots and subdivisions. Minimal development has occurred in the county, which means no significant changes in development have occurred since the previous plan update.

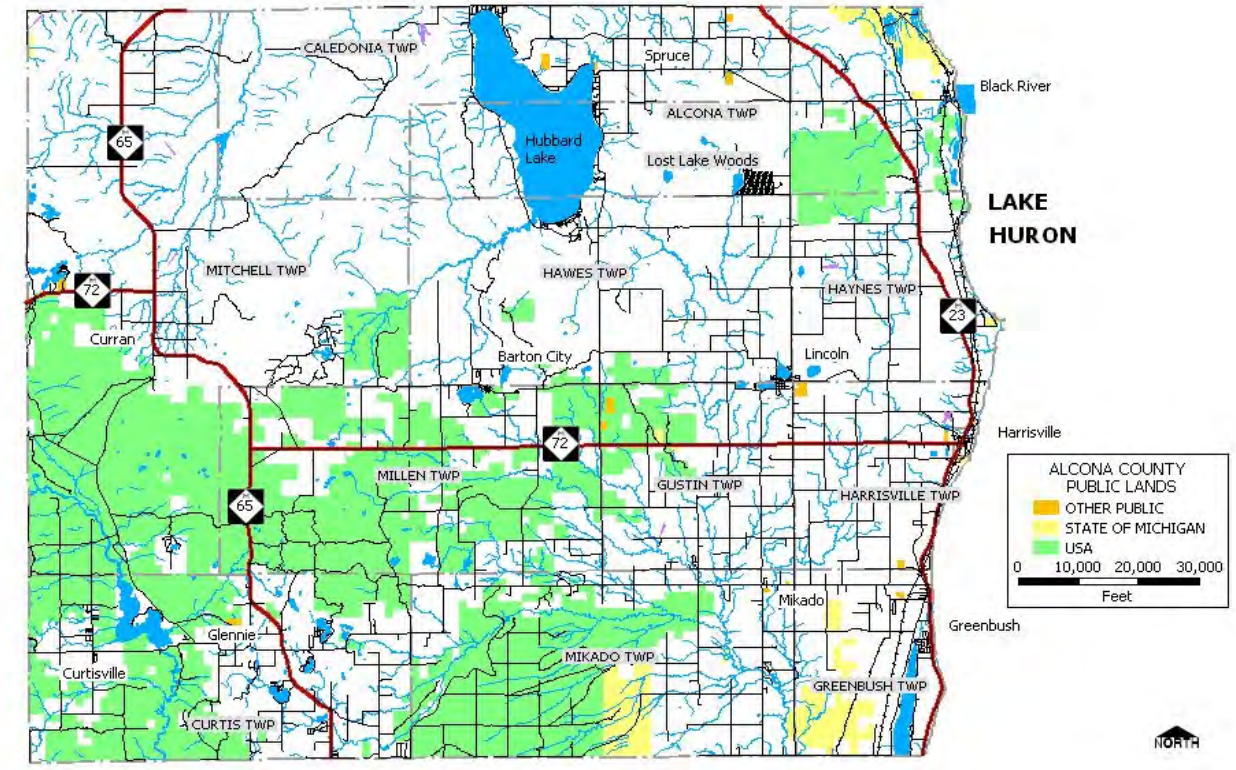

Figure 4-1 Alcona County Public Lands

Land Cover/Use

The Michigan DNR's 1978 Michigan Resource Information Systems (MIRIS) land cover/use data was used to determine the existing land use in the county (Figure 4-2, Table 4-1). The county's primary land cover/use is upland forest. Upland forests, lowland forests, agriculture, non-forested upland openings, and non-forested wetlands account for 95% of the county's land cover/use.

Table 4-1 Alcona County Land Cover/Use

Category	Acres	Percent of Total
Residential	7,820	1.8%
Commercial	223	0.1%
Industrial/Extractive/Transportation	988	0.2%
Institutional/Recreational	1,014	0.2%
Agricultural	41,621	9.4%
Non-Forested Uplands	38,023	8.6%
Upland Forests	252,660	56.9%
Lowland Forests	71,926	16.2%
Wetlands	16,382	3.7%
Surface Water	13,135	3.0%
Beaches and Dunes	534	0.1%
Total	**444,326**	**100%**

Source: Michigan Department of Natural Resources - MIRIS: 1978

Residential

Residential use occupied approximately 2% (7,820 acres) of the county's land. Residential development was concentrated in the City of Harrisville, the Village of Lincoln, Greenbush, Curtisville, Glennie and Barton City. Seasonal residential developments are located adjacent to inland lakes and along the Lake Huron Shoreline. Residential areas are concentrated along M-65 in Millen Township, along F-30 and F-41 in Mikado Township, along the eastern section of M-72 in Gustin Township, along the Lake Huron Shoreline and M-72 in Harrisville Township, along the Lake Huron shoreline and on either side of the commercial areas in the City of Harrisville, along M-65 and the shorelines of lakes in the northwest portion of Mitchell Township, along the southern half shoreline of Hubbard Lake in Hawes Township, around Brownlee Lake and Twin Lake and along the commercial areas in the Village of Lincoln, along the Lake Huron shoreline and along U.S. 23 in Haynes Township, along the shoreline of Hubbard Lake, in Lost Lake Woods (a large residential development on the east side of Badger Lake), and near Black River (a coastal community) in Alcona Township, along the east and west shores of Hubbard Lake, along Spruce Road, and along U.S. 23 in Caledonia Township, and near Greenbush and along the Lake Huron shoreline, east and west Cedar Lake shorelines, and along Mikado Road in Greenbush Township.

There have been three trends in Alcona County's residential development:

- Primary or secondary homes are being constructed on lots that are two acres or greater
- Housing around lakes and along Lake Huron are transitioning from year-round residences to seasonal residences
- Residential developments are being located along major roads

Commercial

Commercial use occupied 0.1% of the county's land area. The largest concentrations of commercial uses are found in the Village of Lincoln, Barton City, and the City of Harrisville. Strip commercial development and motels and bed & breakfast establishments are located in the City of Harrisville along U.S. 23 and Main Street. Most of the commercial land uses are service and retail. Small pockets of commercial uses can be found in several rural locations around the county that consist of convenience retail uses. Commercial areas are concentrated along M-65 in Millen Township. Commercial areas are concentrated along F-30 and F-41 in Mikado Township. In Gustin Township, commercial areas are concentrated along the eastern section of M-72. In Greenbush Township, commercial development is located along U.S. 23 near Lake Huron's shoreline. Commercial uses are located along Lake Street in the Village of Lincoln. In Alcona Township, commercial areas are located along the shoreline of Hubbard Lake, in Lost Lake Woods, and near Black River. Commercial developments are located along M-65 in Mitchell Township. Commercial development is located in Spruce at the intersection of Gillard Road and Spruce Road in Caledonia Township.

Industrial/Extractive/Transportation

Land cover/use in this category includes industrial, extractive (e.g., sand and gravel pits), and transportation (e.g., airports). Industrial/Extractive/Transportation accounts for 0.2% of the land area. Industrial development can be found in the Village of Lincoln and the City of Harrisville. Industrial areas are generally limited to small extractive areas in Millen, Mitchell, and Mikado Townships. Gustin Township has small extractive areas in the eastern section of the township. There is an extractive area near the Village of Lincoln and a wood-burning generator that assists in supplying power to the area. Greenbush Township has a large industrial extraction area. Extractive areas are located to the west and the north of the City of Harrisville. Hawes Township has small shops. Curtis Township has several small extractive areas in the northeast of Curtisville. In Alcona Township, a small extractive area is located northeast of Sand Hill Road and Black River Road.

Institutional/Recreational

Land cover/use in this category includes schools, churches, cemeteries, and recreational areas. Institutional/Recreational use accounts for 0.2% (1,014 acres) of the land area in the county. Approximately 29% of Alcona County is in the Huron National Forest (Figure 4-1). While the National Forest was not mapped as recreational land, it provides opportunities for fishing, hunting, cross country skiing, and snowmobiling. The Curtis Township Hall and Post Office are located in Glennie. Harrisville State Park is located south of the City of Harrisville and offers camping and swimming on Lake Huron. Harbor Park (City of Harrisville) is located north of Main Street and is used as a day use picnic area. Greenbush Township has preserved its historical Township Hall and a one-room schoolhouse.

Agricultural

The majority of the agricultural lands are concentrated in the eastern part of the county. Caledonia, Haynes, Hawes, Harrisville, Gustin and Mikado Townships have the largest amount of agricultural land, while Greenbush and Curtis Townships have smaller amounts of agricultural lands. Since there has been a downward trend in the county's agriculture, these lands are lying idle and are converting into non-forested uplands. Mikado Township has agriculture lands, pasturelands, and rangelands on the eastern half of the township. Agricultural and open pastureland is located in the eastern portion of Gustin Township. Hawes Township has agriculture located in the southeast portion of the township. Greenbush Township has agricultural areas in the northwest portion of the township. Harrisville Township has agricultural areas on the western side of the township. Agriculture areas and rangelands are located in Hawes Township. Curtis Township has agricultural

areas in the southeast portion of the township. The Village of Lincoln has agricultural lands in its northwest corner. In Alcona Township, agricultural areas are located in the eastern third of the township around Black River Road. Mitchell Township has agricultural lands, pasturelands, and rangelands in the middle of the township. Caledonia Township has agriculture areas east of Hubbard Lake between Spruce and Swede Roads.

Non-Forested Uplands

Land cover/use in this category includes herbaceous open and shrub land. Non-Forested Uplands account for 8.6% (38,023 acres) of the county's land. This land cover/use was scattered throughout the county with large concentrations in the central part. Since there has been a downward trend in the county's agriculture, much of the land is lying idle and is being converted into non-forested uplands.

Upland Forests

Upland forests accounted for 57% (252,660 acres) of the land cover/use in the county. The most prevalent forest types were aspen, oak, and jack pine. Other forest types include red and white pine, and northern hardwoods. The predominant land cover in Millen Township are uplands with deciduous forests that are evenly distributed throughout the township and coniferous forests that are in the central and southwest portions of the township. Mikado, Mitchell, and Greenbush Townships' predominant land cover is upland forests. Gustin Township's predominant land cover is upland forests, where deciduous forests are located in the western portion of the township and coniferous forests are located along the rivers. The predominant land cover in Hawes Township is upland forests with deciduous forests located in the central portion of the township and coniferous forests located in the northwestern portion of the township. Harrisville Township has upland forests on the eastern side of the township that consist of deciduous forests. Hawes Township has deciduous forests. Curtis Township's predominant land cover is upland forests with deciduous forests spread evenly throughout the township and coniferous forests along the Au Sable River on the western portion of the township. The City of Harrisville has coniferous and deciduous forests located on either side of Mill Creek in the northern third of the city and around wetlands in the southern third of the city. Alcona County has deciduous forests throughout the township and coniferous forests in the north and eastern 1/6 of the township. The majority of Caledonia Township is covered by deciduous forests located west of Hubbard Lake.

Lowland Forests and Wetlands

The wetland category comprises non-forested types, such as lowland brush (e.g., tag alder and willow), cattail marshes, bogs, and wet meadows. Non-forested wetlands account for 3.7% (16,382 acres) of the county's land. Lowland forests are often classified as wetlands since they grow on soils with seasonally high-water tables. These forests account for 16% (71,926 acres) of the county's area and support lowland hardwoods and conifers, such as northern white cedar, black spruce, balsam fir, elm, red maple, ash and aspen species.

Surface Water

According to the *Alcona County Resource Plan*, there are 233 bodies of water in Alcona County. Lakes and impoundments were mapped as open water and accounted for 3% of the county's area. The county's lakes include Hubbard Lake (9,200 acres in Caledonia, Alcona, and Hawes Townships), Alcona Dam Pond (1,008 acres in Curtis Township), Cedar Lake (775 acres in Greenbush Township), Jewell Lake (193 acres in Millen Township), Vaughn Lake (115 acres in Curtis Township), and McCollum Lake (81 acres in Mitchell Township). The county's major waterways include the Au Sable River, Pine River, Black River and Thunder Bay River.

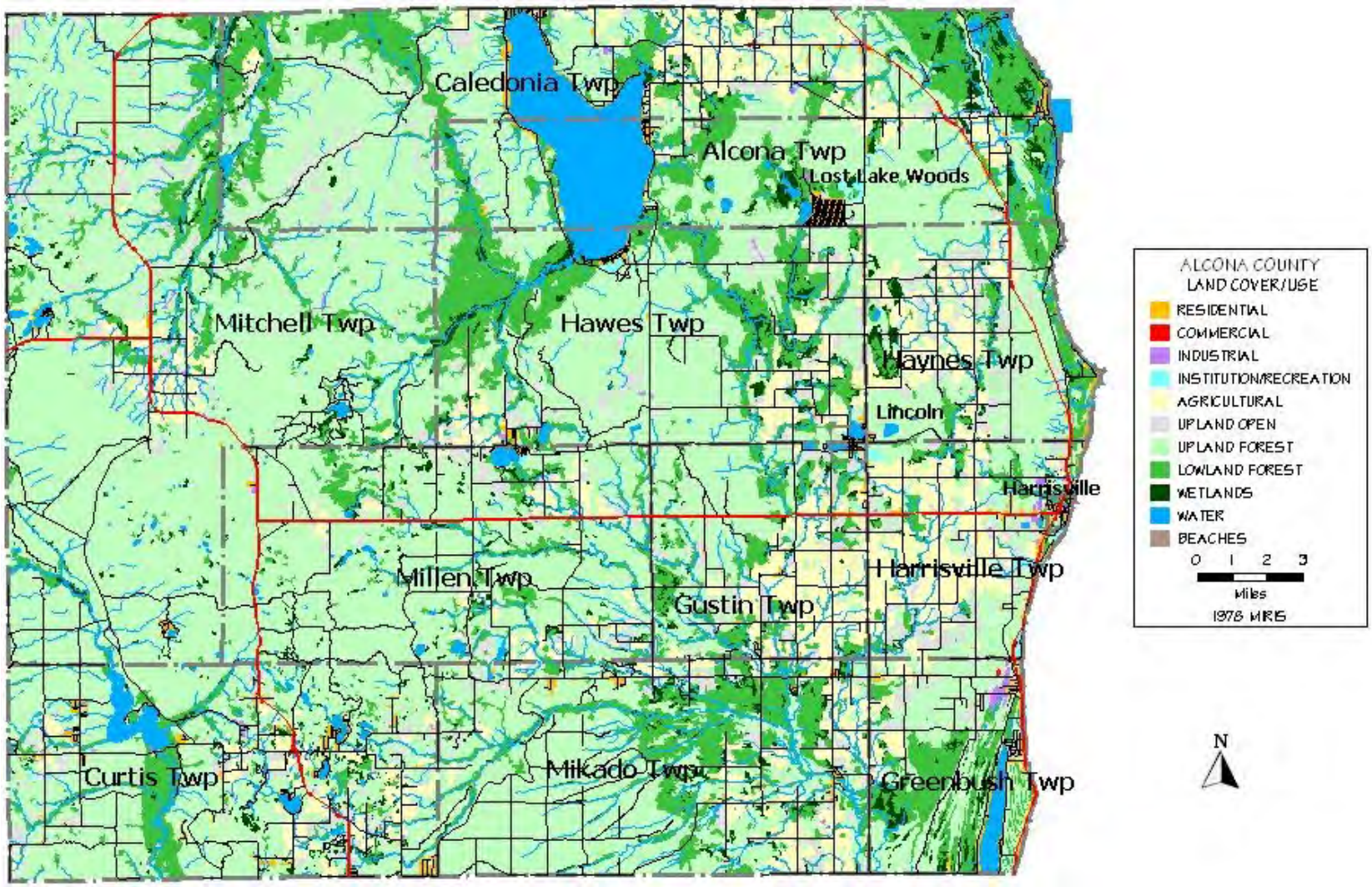

Figure 4-2 Alcona County Land Cover/Use

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Chapter 5 Community Services and Facilities

Overview

Community services and facilities play an important role in maintaining and improving quality of life (Figure 5-1). The location and level of services, such as public water, public wastewater, and fiber optic lines, determine the types and intensities of development within a community. Alcona County is a rural community with a relatively low population density, which presents challenges in providing facilities and services to county residents and mitigating hazard impacts. Since the population is scattered throughout the county, local communities work cooperatively to provide essential services, such as fire and ambulance.

County Government

The Alcona County Board of Commissioners meets on the first and third Wednesday every month at the Alcona County building in Harrisville, unless posted otherwise. The county is represented by five commissioners. The county departments include the clerk, treasurer, register of deeds, courts, equalization, road commission, building, housing commission, and emergency management.

Local Government

Alcona County has eleven townships, one city and one village.

- The City of Harrisville is located at 200 North 5th Street in Harrisville
- The Village of Lincoln is located at 117 W. Fiske in Lincoln
- Alcona Township is located at 4892 Lavergne Road in Black River
- Caledonia Township is located at 6461 Gillard Road in Spruce
- Curtis Township is located at 4875 F-30 in Glennie
- Greenbush Township is located at 5039 Campbell Street in Greenbush
- Gustin Township is located 113 S. Second Street in Lincoln
- Harrisville Township is located at 114 S. Poor Farm Rd. in Harrisville
- Hawes Township elected officials work from home and hold township meetings at the VFW Post at 8135 Trask Lake Road in Barton City
- Haynes Township is located at 3939 E. McNeil Road in Lincoln
- Mikado Township is located at 2291 S. F-41 in Mikado
- Millen Township is located at 671 Sanborn Road in Barton City
- Mitchell Township is located at 6849 W. Tower Road in Curran

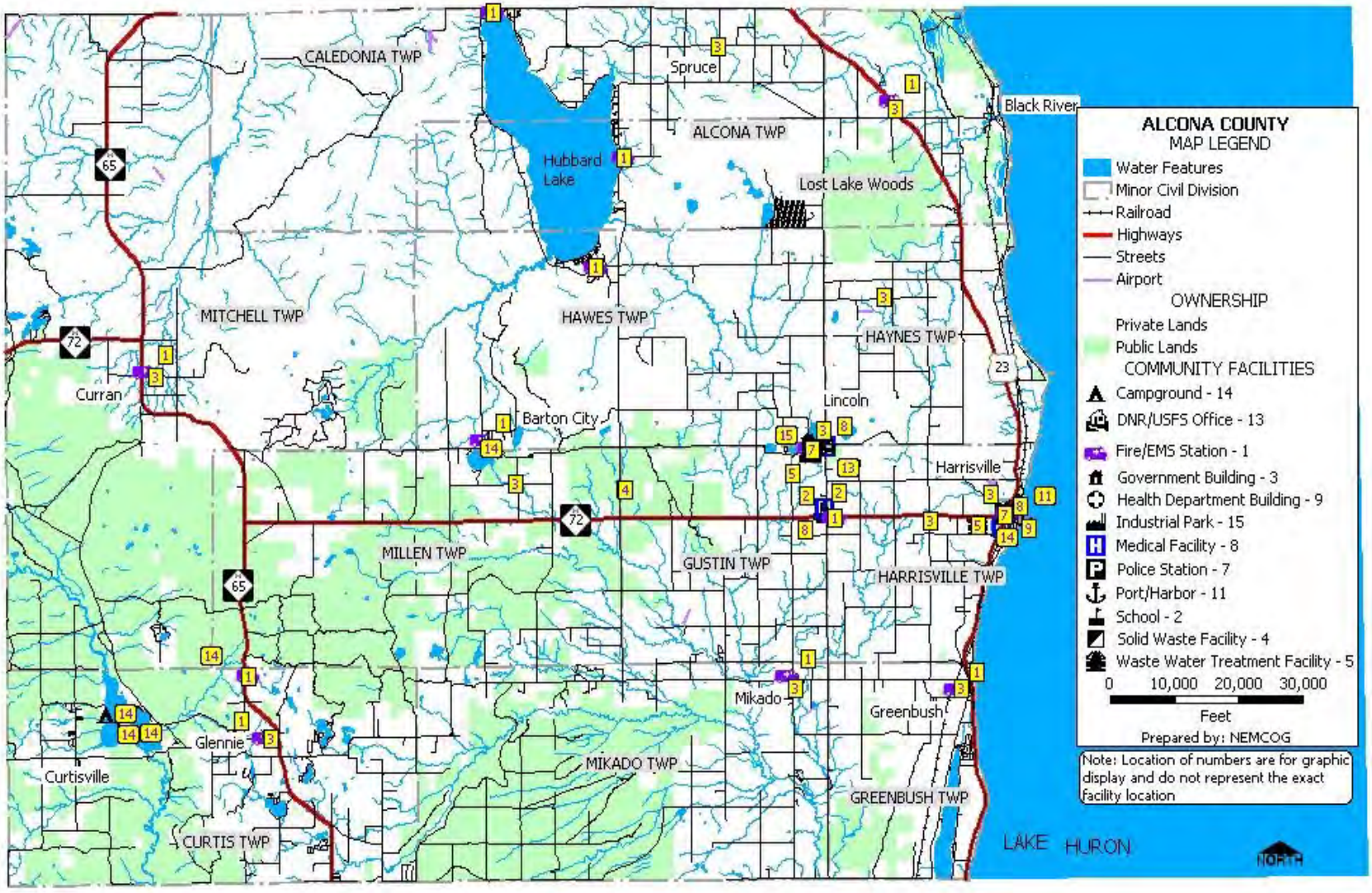

Figure 5-1 Community Facilities and Land Ownership

Educational System

Alcona County consists of three school districts: Alcona Community Schools, Oscoda Area Schools, and Fairview Area School District (Figure 5-2). The Alcona Community School District is part of the Alpena-Montmorency-Alcona Education Service District. The Alcona Elementary School and Alcona High School are located north of M-72 on Barlow Road. The Oscoda School District is part of the Iosco Regional Educational Service Agency. The Oscoda Area High School, Richardson Elementary School, and Richardson Middle School are in Oscoda in Iosco County. The Fairview Area School District is part of the C.O.O.R. (Crawford, Oscoda, Ogemaw, Roscommon) Intermediate School District. The school buildings are in Fairview in Oscoda County. The Greenbush Christian Academy is a private school in Greenbush.

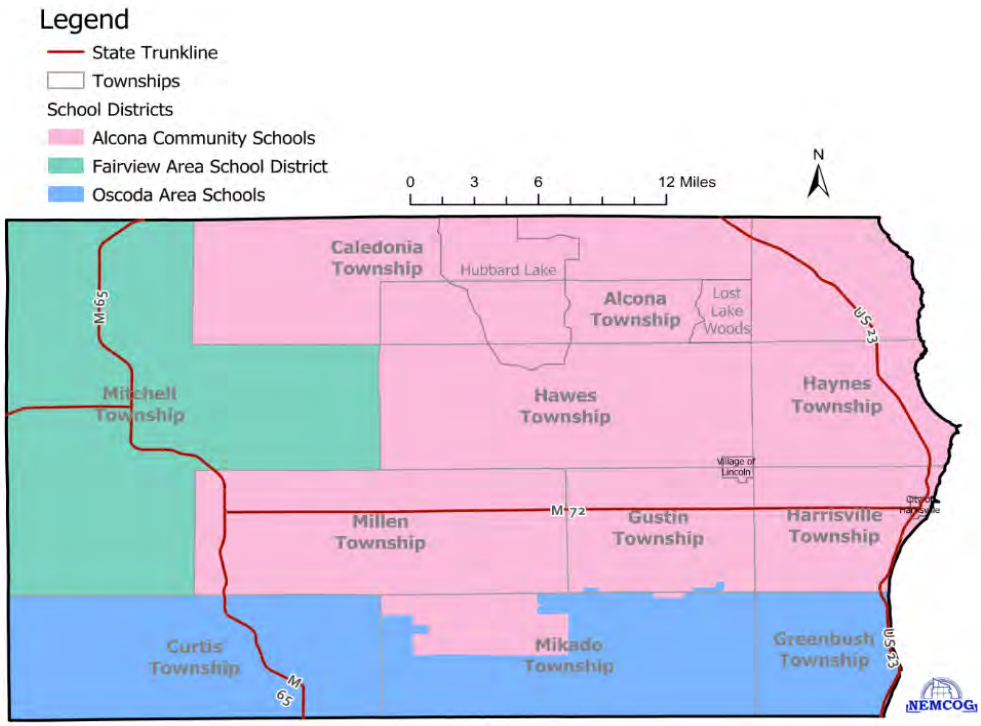

Figure 5-2 Alcona County School Districts

Medical Facilities

Alcona County does not have a hospital. The Alcona Health Center provides medical, dental, behavioral health, pediatric services, and a pharmacy in its clinics in Lincoln and Harrisville. For services not provided by the Alcona Health Center, residents travel to the Oscoda VA Clinic in Oscoda, Grayling VA Clinic in Grayling, MidMichigan Medical Center-Alpena in Alpena, Munson Healthcare Grayling in Grayling, MidMichigan Medical Center-West Branch in West Branch, Ascension St. Joseph Hospital in Tawas City, Northern Michigan Hospital in Petoskey and Munson Healthcare in Traverse City.

District Health Department #2 serves Alcona, Iosco, Ogemaw, and Oscoda Counties and is located in Harrisville in Alcona County. The Health Department provides home health care services, environmental health services, and personal health services.

The Northeast Michigan Community Mental Health Authority serves Alpena, Alcona, Montmorency, and Presque Isle Counties. The Health Authority provides support services to developmentally disabled persons as well as persons needing mental health services.

Public Safety

Law Enforcement

The Alcona County Sheriff's Office is located at 214 W. Main Street in Harrisville and provides marine patrol and 24-hour road patrol services to the entire county (674 square miles). The road patrol division consists of three command sergeants, and twelve sworn officers. The Michigan State Police in Alpena provide assistance, if necessary. Additionally, the jail is part of the Sheriff's Office and is operated by a jail administrator and eight staff members. The jail has 31 beds. The Alcona County Courthouse is located at 106 5th Street in Harrisville.

Emergency Medical Services

Alcona County provides full time, advanced emergency medical services to 10,942 people in 694 square miles of the county. Station 1 is located at 2600 E. M-72 in Harrisville, while Station 2 is located at 2300 S. State in Glennie. These stations have 32 staff members, and their available equipment includes a 2008 Chevy ambulance, 2009 Chevy ambulance, 2 Phillips MRX cardiac monitors, and portable 800 and VHF radios.

Fire Protection

Alcona County has ten fire stations that are not full-time (Table 5-1). The county has an all-encompassing mutual aid agreement that provides for assistance outside the realm of normal emergency services. Through contractual agreements, some fire departments provide coverage to townships without fire departments. Barton City, Curran, Curtis, Harrisville, Hubbard Lake, Mikado and Lincoln Fire Departments have jaws of life units.

The U.S. Forest Service (USFS) is responsible for fire protection in the Huron National Forest and the Michigan DNR is responsible for fire protection on State forested land. When the danger of woodland and urban fires is elevated, both the USFS and DNR assist local fire fighters. There is a Forest Resources DNR field office in Lincoln.

Early Warning Systems

Alcona County has seven warning sirens (Figure 5-3). The county uses NOAA weather radios and the Emergency Alert System to warn the public about events. The NOAA transmitters are located in Alpena, Waters, and West Branch. However, there are areas in the county that do not receive NOAA signals or have very poor coverage (e.g., the southern portion of the county, in low-lying areas, in areas near Lake Huron's shoreline, etc.). To increase the NOAA signal coverage, external antennas were installed at Harrisville State Park and at the marina. Additionally, the county is working with the other counties in Region 3 to set up RAVE.

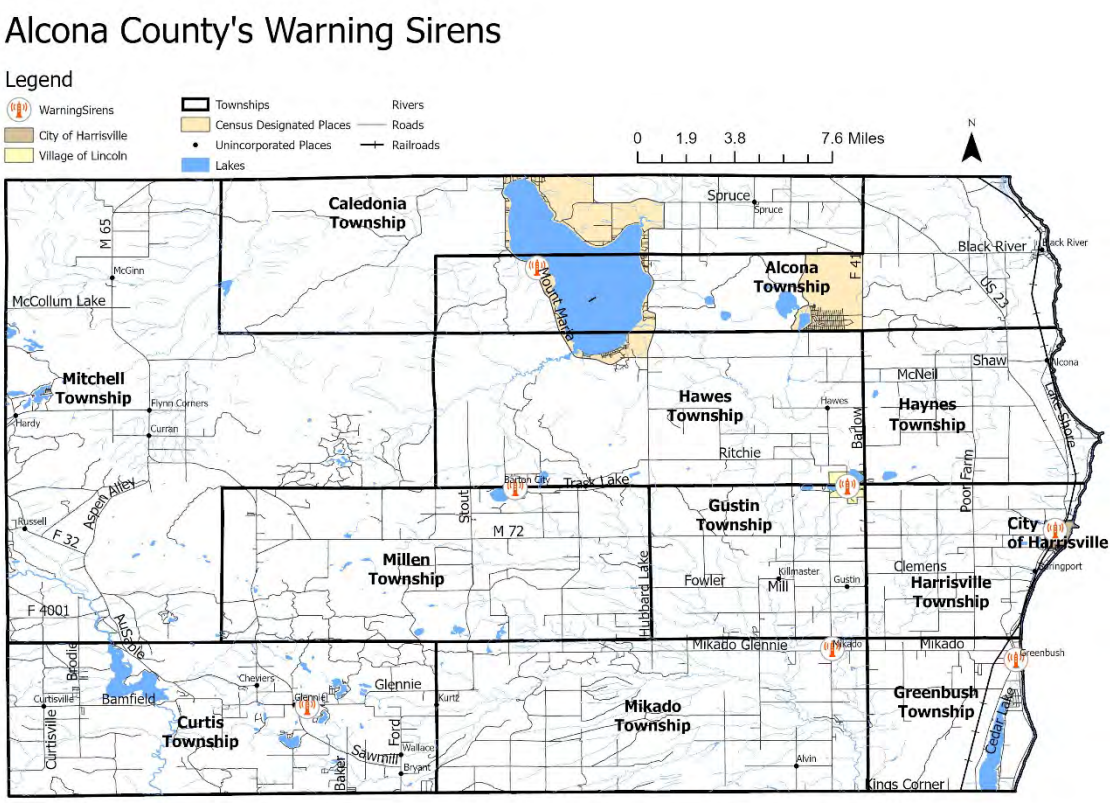

Figure 5-3 Alcona County's Warning Sirens

Table 5-1 Alcona County Fire Departments	
Alcona Township Fire Department 5576 S US Highway 23, Black River • Staff: 25 part paid • Service Area: 56 sq. mi • Population Served: 1,000	**Barton City Volunteer Fire Department** 1868 Trask Lake Rd, Barton City • Staff: 10 volunteers • Service Area: 93 sq. mi • Population Served: 900
Curran Fire Department 2240 N M-65, Curran • Staff: 20 part paid • Service Area: 196 sq. mi. • Population Served: 525	**Curtis Township Fire Department** 5019 Bamfield Rd, Glennie • Staff: 15 part paid • Service Area: 72 sq. mi • Population Served: 2,100
Greenbush Township Fire Department 2932 S Poor Farm Rd, Greenbush • Staff: 13 part paid • Service Area: 28 sq. mi • Population Served: 1,400	**Harrisville City Township Fire Department** 200 5th St., Harrisville • Staff: 18 part paid • Service Area: 66 sq. mi • Population Served: 1,740

Table 5-1 Alcona County Fire Departments	
Hubbard Lake Fire Department 1545 Hubert Rd , Hubbard Lake • Staff: 15 volunteers • Service Area: 144 sq. mi • Population Served: 2,244	**Lincoln Fire and Rescue** 117 W Fiske St, Lincoln • Staff: 14 part paid • Service Area: 75 sq. mi. • Population Served: 1,000
Mikado Township Volunteer Fire Department 2226 S F-41 Hwy, Mikado • Staff: 25 part paid • Service Area: 97 sq. mi • Population Served: 1,500	**South Shore Hubbard Lake Fire Department** 373 W Old Mt Maria Rd, Lincoln • Staff: 14 Volunteers • Service Area: 14 sq. mi. • Population Served: 1,000

Utilities

Both public and private industries supply the utilities in Alcona County; however, the large areas of public and private lands lack many utility services (Table 5-2). Private suppliers provide electric, natural gas, and telecommunications. The City of Harrisville and the Village of Lincoln own and operate water and wastewater systems, while District Health Department #2 regulates and maintains a permitting system for private on-site wells and septic systems.

Viking Energy of Lincoln, LLC operates a wood-fired biomass power plant in the Village of Lincoln. In 2019, Viking Energy negotiated an eight-year contract to produce power for Consumers Energy. Three-phase power for industrial purposes is available for the Village of Lincoln, the City of Harrisville and limited sites within the townships.

Table 5-2 Utility Systems		
Utility	**Company**	**Service Area**
Natural Gas	DTE	Lincoln, Harrisville, Mikado, Greenbush, Hubbard Lake, and Lost Lake Woods
Electricity	Consumers Energy; Viking Energy of Lincoln, LLC	Majority of county
	Presque Isle Electric Cooperative	Parts of Caledonia and Mitchell Townships
Telecommunications	Frontier, Spectrum, satellite tv, antennas	Countywide with pockets of unserved areas
	AT&T	Southern part of Greenbush Township
	Allband Communications	Parts of Mitchell Township; areas with unassigned phone and internet service
Water and Sewer	Septic disposal system (individual on-site septic tanks and a central, large drain field)	Village of Lincoln businesses and some residences

Table 5-2 Utility Systems		
	City of Harrisville Department of Public Works	City of Harrisville
	On-site private wells and septic systems	Areas of the county not within the City of Harrisville or the Village of Lincoln's septic disposal system area
Source: Michigan Department of Licensing & Regulatory Affairs (Michigan Public Service Commission)		

Media

Central Michigan Public Radio Station, WSFP (Smile FM) and WXTF (The Alcona Music Project) provide service in Alcona County. Television stations from Cadillac, Traverse City, Flint and Bay City provide local news and weather coverage. Newspaper coverage is provided by the Alcona County Review, the Oscoda Press, the Alpena News, and the Bay City Times.

Campgrounds

Between May and September, the county's campgrounds have large concentrations of people who stay in structures that are highly vulnerable to severe storm events. Harrisville State Park is located adjacent to the City of Harrisville in Harrisville Township and has 229 campsites. If the average family size is 2.24 people, the population estimate for the campground would be over 500 people, which is comparable to the population in the City of Harrisville. In Curtis Township, Alcona Park is located on the Au Sable River floodwaters above the Alcona Dam and has 470 campsites. A population estimate for the campground would be approximately 1,053 people.

Other campgrounds in the county include:

- Paul Bunyan Family Campground in Spruce (80 campsites)
- Alcona Canoe Rental and Campground in Glennie
- Pine River National Forest Campground in Glennie (11 primitive campsites)
- Jewell Lake Campground in Barton City (32 primitive campsites)
- McCollum Lake State Forest Campground in Curran (20 primitive campsites)
- Lost Lake Campground Associated with Lost Lake Woods (84 campsites)
- Horseshoe Lake Campground and Boat Launch in Curran (9 primitive campsites)
- National Forest campsites along the Au Sable River (113 campsites ranging from drive in, boat in, and walk-in sites)
- CampDoYaWanna Campground

Special Populations

Nursing Homes

There are two nursing homes in Alcona County: Jamieson Nursing Home and Lincoln Haven Nursing & Rehab Community. Jamieson Nursing Home is located in Harrisville and has 39 beds. Lincoln Haven Nursing & Rehab Community is located in Lincoln and has 39 beds.

Adult Foster Care and Homes for the Aged Facilities

There are three adult foster care and homes for the aged facilities in Alcona County (Table 5-3). Since the 2014 update of this plan, Bake Adult Foster Care has closed, and Chabot Adult Family Home, Dewar Road Home, and Justus Adult Foster Care do not have licenses.

Table 5-3 Adult Foster Care and Homes for the Aged Facilities

Name	Address	Facility Type	Capacity	Services
Harrisville Home	329 W Main, Harrisville	Small Group	1-6	Developmentally Disabled
Maple Grove AFC	1195 Stuve Ranch Road, Barton City	Family	1-6	Aged
Mill Creek Home	350 Mill Creek Road, Harrisville	Small Group	1-6	Physically Handicapped Developmentally Disabled

Source: Michigan Department of Licensing and Regulatory Affairs

Transportation System

Roads

The transportation network consists of state highways and county, city, private, and Forest Service roads (Figure 5-4). The highways include M-65 (runs north-south through the western portions of the county), U.S. 23 (runs along the coastline and connects the county to Alpena and Oscoda), and M-72 (connects the county to I-75, Traverse City and U.S. 23 in Harrisville). In less populated areas, there are seasonally maintained and unimproved public roads.

M-72 runs east and west through Millen Township and has a 2017 annual average daily traffic volume between 990 and 1,080 vehicles. M-65 runs north and south through Millen Township and has a 2017 annual average daily traffic volume between 1,032 and 1,174 vehicles. U.S. 23 runs north and south through the eastern section of Haynes Township with a 2017 annual average daily traffic volume of 2,243 vehicles. U.S. 23 runs north and south along the eastern edge of Greenbush Township and has a 2017 annual average daily traffic volume of 3,178 vehicles. M-72 runs east and west through the northern half of Gustin Township with a 2017 annual average daily traffic volume between 1,701 and 2,790 vehicles. M-72 runs east and west through the township and has a 2017 annual average daily traffic volume of 1,701 vehicles. Highway M-65 runs north and south through Curtis Township and had a 2017 annual average daily traffic volume of 1,032 vehicles. Highway F-41 becomes Grand Traverse Road on the Village of Lincoln's southwestern boundary and travels east to Barlow Road, where F-41 continues north. The 2017 annual average daily traffic volume for M-72 that intersects Highway F-41 south of the village was between 1,701 and 2,790 vehicles. U.S. 23 runs north and south through Alcona Township and has an annual average daily traffic volume of 2,243 vehicles. Hubbard Lake Trail cuts diagonally across Caledonia Township from southwest to northeast. U.S. 23 runs through the northeastern corner of Caledonia Township and has a 2017 annual average daily traffic volume of 5,627 vehicles. The western portion of Caledonia Township has few access roads. The 2017 annual average daily traffic volume on the segment of M-72 through the City of Harrisville was 1,701 vehicles and on U.S. 23, there were 3,101 vehicles north of M-72 and 3,959 vehicles south of M-72. M-65 runs north and south through Mitchell Township and has a 2017 annual average daily traffic volume of 1,450 vehicles. M-72 runs east and west through Mitchell Township and has a 2017 annual average daily traffic volume of 1,290 vehicles.

Airports

The only airport open to the public is the Harrisville Airport in the City of Harrisville. The airport has one grass/sod runway that is 2,140 ft. x 60 ft. and can accommodate small aircraft. Commercial passenger air service and freight service is available at Alpena County Regional Airport in Alpena, M.S.B. Airport near Midland and Cherry Capital Airport in Traverse City. Throughout the county, there are small private grass runways, such as Flying M Ranch Airport and Vlachos Acres Airport.

Railroads

Lake State Railroad provides daily freight handling services along the eastern edge of Alcona County (parallel to U.S. 23), and crosses through the City of Harrisville. According to the *Alpena Area Wide Transportation Plan*, no hazardous materials are transported on the rail at this time.

Harbor

The Harrisville Harbor is a full-service port of refuge on Lake Huron. The harbor is located in the City of Harrisville and is part of Michigan's Harbor of Refuge network. The harbor provides 97 boat slips, a courtesy shuttle service and bikes, a clubhouse with Wi-Fi and tv, fuel and pump out facilities, public restrooms/shower facilities, grills, picnic tables, and a dog walk.

Thunder Bay Transportation Authority

The Thunder Bay Transportation Authority (TBTA) provides scheduled public transportation services to the residents of Alpena, Alcona (northern portion of county), and Montmorency Counties. The authority operates a fleet of 40 vehicles and 4 hybrid trolley buses. In 2017, the TBTA completed construction on its new facility that includes a garage and maintenance facility. The TBTA operates an on-demand transportation service known as Alpena Dial-A-Ride Transportation (DART). DART has seven wheelchairs lift equipped buses.

Indian Trails, Incorporated

Indian Trails provides statewide daily public transportation services through Alcona County. The bus route follows U.S. 23 and has a southbound run in the morning and a northbound run in the afternoon. The buses are wheelchair lift equipped. The Michigan Department of Transportation (MDOT) subsidizes this transportation service for areas in Northern Michigan.

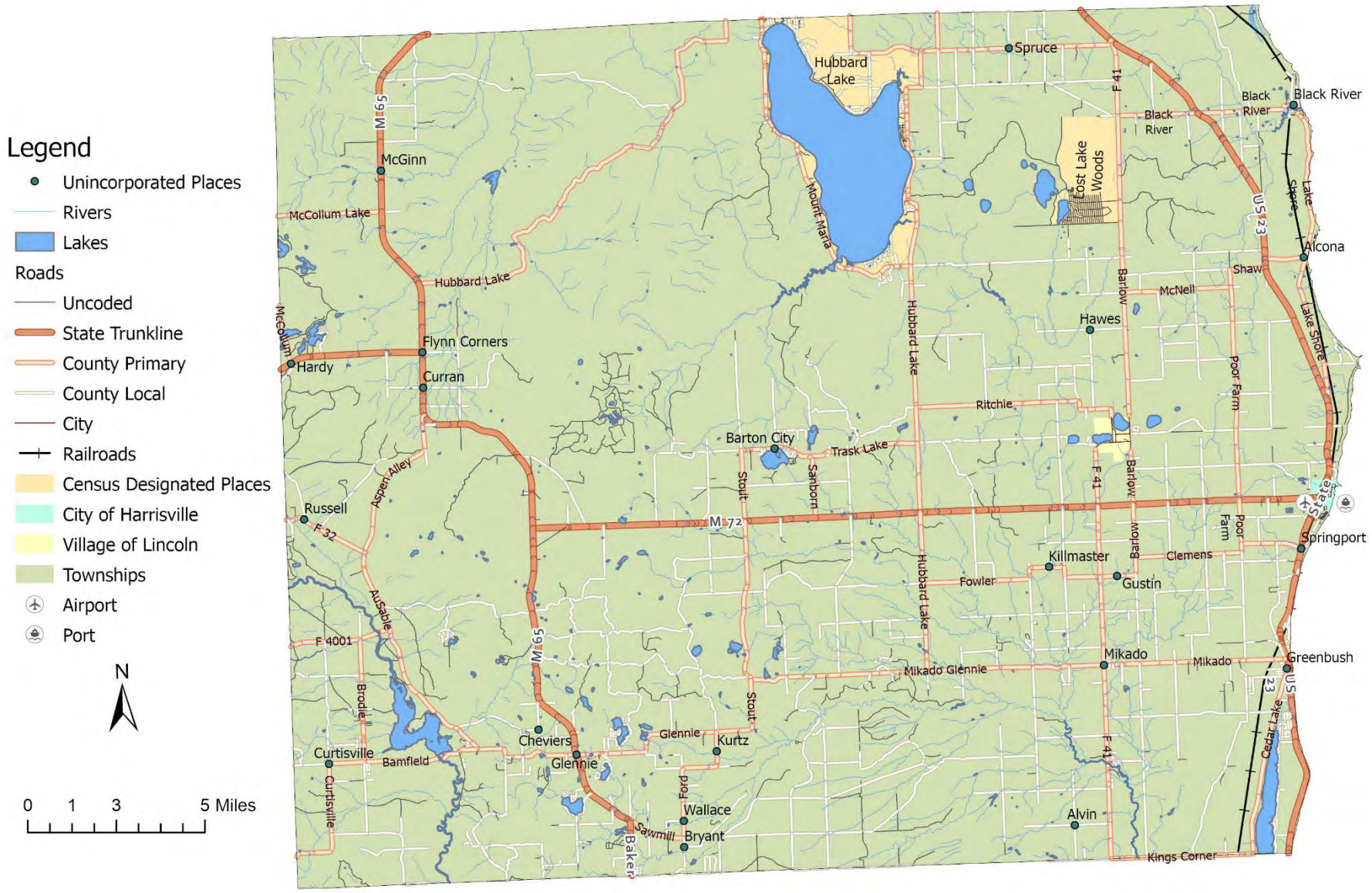

Figure 5-4 Alcona County Transportation Map

Community Capability

Overview

Currently, the communities in Alcona County have a limited number of staff and financial resources. None of the communities have planners, foresters, floodplain managers, public works engineers, transportation engineers, or civil engineers on staff. The Alcona County Road Commission has an engineer on staff. The communities have limited capabilities in implementing the hazard mitigation action and implementation strategies. However, all agencies, communities, and organizations use a combination of staff, elected officials, appointed officials (e.g., planning commission) and contractual services to provide some level of prevention and educational activities. To fully implement the hazard mitigation plan, the communities in Alcona County would need additional staff and funding.

Planning and Zoning

The City of Harrisville, Village of Lincoln and all townships (Alcona, Caledonia, Curtis, Greenbush, Gustin, Harrisville, Hawes, Haynes, Mikado, Millen and Mitchell) have exercised their authority under state statutes to administer their own planning and zoning. These communities utilize planning commission members, regional planning agencies (e.g., NEMCOG), and consultants for planning purposes. Alcona County updated its Master Plan in 1978 and updated its Recreation Plan in 2004. The county does not enforce zoning at the county level. The Township Boards, City Council and County Board are the governing bodies responsible for managing finances and making policy decisions.

Public Safety

Alcona County has an active Emergency Management Office. The county operates a countywide 911 system and the Sheriff's Office operates under the County Board of Commissioners.

Local agencies and units of government have fire suppression crews. All townships provide fire and rescue services either on their own or under a cooperative agreement. The City of Harrisville and the Village of Lincoln have fire departments. The U.S. Forest Service and Michigan DNR have foresters who conduct forest and fuels management on public lands. Forest consultants and the Alcona Conservation District provide forest management assistance on private lands.

Infrastructure

Alcona County's drain commissioner works with communities and landowners regarding drainage and flooding issues. The County Road Commission works in conjunction with the townships to manage the local road network, while MDOT is responsible for State and Federal highways. The City of Harrisville and the Village of Lincoln have Public Works Departments.

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Chapter 6 Hazard Identification and Assessments

Overview

Alcona County is vulnerable to a wide range of natural, technological, and human-related hazards. Emergency management officials are challenged with managing these threats to protect life and property. In order to be effective at mitigating, preparing for, responding to, and recovering from all hazards, the types of hazards facing a county should be identified and understood. Hazard identification provides communities with a realistic base to plan for mitigation, preparedness, response, and recovery activities.

Alcona County's risk and vulnerability assessments were determined based on the hazard maps, community profile, community input, and the weighted hazard ranking process recommended in *Publication #207*. However, it should be noted the assessments are not reliable predictors for the occurrence of any hazard. The assessments were used to determine if a hazard poses a risk to the county, inform the mitigation goals and objectives, and guide emergency management official(s) in setting annual priorities and goals for resource allocation, mitigation strategies, and preparedness techniques.

According to the National Oceanic and Atmospheric Administration's National Centers for Environmental Information data center (NOAA), Alcona County has had 191 storm events with approximately $5.9 million in estimated damages between June 1953 and January 2019.

Natural Hazards

Wildfires

Description

A wildfire is an unplanned, uncontrolled fire in grassland, brushland, or forested areas. Wildfires can occur in any forest type under dry conditions; however, some forest types are more susceptible to fires. For example, jack and red pine forest stands have a high risk for wildfires, while oak and white pine forest stands have a moderate risk. The primary cause of wildfires is from human activities, specifically burning outdoor debris. Wildfires cause destruction to property and timber resources, injure or cause loss of life to wildlife and persons living or recreating in wildfire prone areas. Long-term effects include scorched and barren land, soil erosion, landslides/mudflows, water sedimentation, and loss of recreational opportunities.

Historically, Michigan's landscape has been shaped by wildfire; however, over the last several decades, the landscape has transformed from wildlands to residential developments. With the increase in residential development in and around rural areas prone to wildfires, there is an increase in the potential for loss of life and property damage. Unfortunately, rural areas do not have enough fire suppression forces available to protect every structure from wildfires.

In Michigan, approximately 600 wildfires are reported each year with the majority occurring in April, May and June (Figure 6-1). In 2018, the Michigan DNR reported there were 301 fires throughout the State and as of June 2019, there were 168 fires.

In Northeast Michigan, the large amount of permanent and seasonal homes and the increase in tourists during the driest (most vulnerable) times of year greatly increase the wildfire risks.

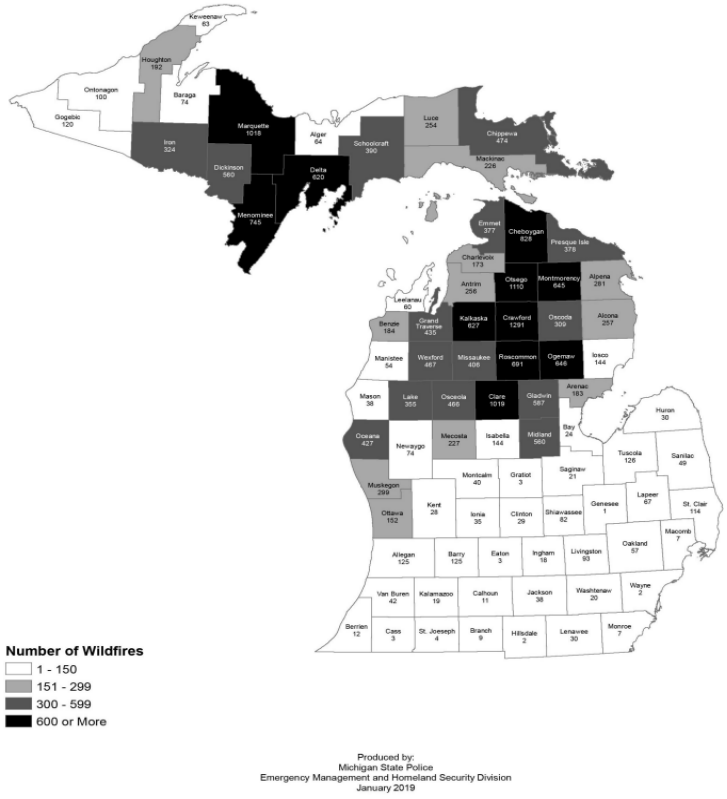

Figure 6-1 Number of Wildfires throughout Michigan

Location

In 2001, multiple federal agencies developed a list of Wildfire-Urban Interface communities in the vicinity of federal lands that have a high wildfire risk. In Alcona County, Glennie, Mikado, Alcona, Curtis, and Millen Townships were on the list (*Federal Register*, August 17, 2001). In addition, the State of Michigan developed a comprehensive list of communities that have a high wildfire risk. Additionally, wildfires cross geographic and political boundaries, which means fires can spread into Alpena, Oscoda, Montmorency, Iosco, and Ogemaw Counties. Figure 6-12 shows the large swaths of Alcona County that are susceptible to wildfire, and the communities within those areas. This wildfire risk area was mapped through a GIS analysis overlaying private-public lands, land use/land cover, aerial imagery, and community facilities data (Figure 4-1 Public-Private Lands, Figure 4-2 Land Use/Land Cover, Figure 5-1 Community Facilities).

Previous Occurrences and Probability of Future Occurrences

Between 2001 and 2012, the Michigan DNR reported 135 wildfires in Alcona County that burned 376 acres (not including wildfires suppressed by the U.S. Forest Service or local fire departments). Between 2013 and 2018, Alcona County had 99 wildfires that burned 597 acres according to the Michigan DNR's Wildland Fire Interactive Map. Table 6-1 provides information about the most significant fire incidents near Alcona County, Michigan. Fires from Oscoda County were included since Oscoda County is adjacent to Alcona County and the fires can cross political boundary lines. Since Alcona County has had 234 reported wildfires in the last 18 years, the data shows approximately 1 event will occur every 0.07 years. The Michigan DNR and local wildland fire managers use MesoWest Great Lakes Fire and Fuels to analyze the climate conditions that may impact the chance of a wildfire. Within Alcona County, climate data is received from Barton City (Station: BCYM4).

Extent

Extent can be measured by the number of acres burned. In Alcona County, wildfires have burned 973 acres since 2001. The Forest Service and The Nature Conservancy use prescribed fire to obtain the benefits from fire while ensuring the county's safety.

Vulnerability Assessment

Alcona County has a history of wildfires, and as can be seen in Figure 6-12, the county's communities and residential developments have been located within these wildfire prone areas. Wildfire vulnerability for any community, residence, or other structure is more clearly defined when considering the type of urban wildland interface community. Three categories of urban wildland interface communities were detailed in the *Federal Register* of January 4, 2001. These categories are defined as:

Category 1. Interface Community

The Interface Community exists where structures directly about wildland fuels. There is a clear line of demarcation between residential, business, and public structures and wildland fuels. Wildland fuels do not generally continue into the developed area. The development density for an interface community is usually 3 or more structures per acre, with shared municipal services. Fire protection is generally provided by a local government fire department with the responsibility to protect the structure from both an interior fire and an advancing wildland fire. An alternative definition of the interface community emphasizes a population density of 250 or more people per square mile.

Category 2. Intermix Community

The Intermix Community exists where structures are scattered throughout a wildland area. There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. The development density in the intermix ranges from structures very close together to one structure per 40 acres. Fire protection districts funded by various taxing authorities normally provide life and property fire protection and may also have wildland fire protection responsibilities. An alternative definition of intermix community emphasizes a population density of between 28-250 people per square mile.

Category 3. Occluded Community

The Occluded Community generally exists in a situation, often within a city, where structures abut an island of wildland fuels (*e.g., park or open space*). There is a clear line of demarcation between structures and wildland fuels. The development density for an occluded community is usually similar to those found in the interface community, but the occluded area is usually less than 1,000 acres in size. Fire protection is normally provided by local government fire departments.

A review of these definitions, combined with the GIS analysis noted earlier, it was determined that the vast majority of the wildfire prone areas would fall into the Intermix Community definition. The at-risk areas are vast areas of private, state, and federal forested lands with a low density of single-family residences dispersed throughout. Additionally, neighboring counties are also at-risk since wildfires can spread across political boundaries. About 36% of the county is composed of jack pine (pyrophytic plants), red pine, white pine, pine barrens, and pine/oak barrens. Wildfires burn property and structures, which results in high damage costs. Additionally, wildfires can cause death or injuries for people who become trapped in the fire or who are fighting the fire. Wildfires can cause a loss in timber production and agricultural revenue from the fire damaging timber supplies and agricultural products and killing livestock. Communication and power infrastructure can be damaged by wildfires, which would result in power outages, reduced/a loss of warning notifications to the public, and the inability to call for emergency services. Also, residents and businesses may have to evacuate and find shelter. Wildfires also have the ability to cause secondary hazards (e.g., fixed site hazardous material accident, oil and gas accident, etc.).

Table 6-1 Significant Fire Incidents near Alcona County, Michigan		
Location/Name of Fire	**Date**	**Event**
Mack Lake Fire	May 1980	A wildfire destroyed 44 homes and buildings in Oscoda County. 1,500 people were evacuated, one firefighter died, and it caused $2 million in total property and timber loss and burned 24,000 acres.
Northern Lower Peninsula	May 1999	The Michigan DNR fought ~40 wildfires that were fueled by dry conditions. In Oscoda County, an 850-acre fire burned in the Huron-Manistee National Forest.
Mio (Oscoda County)	April 30-first week of May 2000	Extremely dry conditions caused a wildfire that consumed approximately 5,200 acres in the Huron-Manistee National Forest before being contained. Nearly 300 firefighters and two aerial water tankers were deployed. Approximately 30 persons were evacuated. There were no injuries or structure damage.
Oscoda County	April 30- May 1, 2006	A brush fire ignited a wildfire in Hughes Lake and winds spread the fire northwest. Almost 300 personnel fought the fire (including crews from New Mexico and Montana). Approximately 5,950 acres of timber and brushland were burned south of M-72, east of M-18, and west of M-33. 16 structures and 7 vehicles were destroyed with property damage estimated at $600,000 (not including firefighting costs that were greater than $800,000). Evacuations were ordered for southeast Crawford County.

Riverine, Flash, and Urban Flooding

Description

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

Flash floods differ from riverine floods in extent and duration. Flash floods are brief, high velocity flows in small streams or normally dry creeks. These floods are generally the result of intense thunderstorms and often carry large amounts of debris.

Urban flooding occurs when water flows into low-lying areas because development has occurred in the floodplains and the natural landscape is no longer able to properly disperse the water. This flooding occurs from a combination of excessive rainfall, snowmelt, saturated ground, and inadequate drainage, and is becoming more common in Michigan. Urban flooding also has the potential to overflow onto docks or other structures that have electricity running to them, which increases the risk for an electric shock drowning. Additionally, storm and sanitary sewers are unable to handle the water flows associated with storm events.

According to the *2012 Michigan Hazard Analysis*, Michigan tends to have a major flood event every two years with minor local flood events occurring annually. The 2012 plan also reports the annual flood-related damages are estimated to be between $60 and $100 million. From 1975-2010, Michigan experienced eleven flood disasters that resulted in both a Presidential Major Disaster Declaration and a Governor's Disaster Declaration, and nine that resulted only in a Governor's Disaster Declaration.

Location

FEMA mapped the principal flood hazard areas in Alcona County and completed a Countywide Flood Insurance Study and County Digital Flood Insurance Rate Maps. The principal flooding hazard potential is generally restricted to the Alcona Dam Pond in Curtis Township, along the rivers, and Hubbard Lake in Caledonia, Alcona, Hawes, and Mitchell Townships, and along Lake Huron's shoreline in the City of Harrisville, and Alcona, Haynes, Harrisville, and Greenbush Townships. Figure 6-2 shows areas with a 100-year flood potential in orange.

Previous Occurrences and Probability of Future Occurrences

Riverine and urban flooding occurs in Alcona County during spring snowmelt, when the waters in Lake Huron are high, and during prolonged, intense thunderstorms. This flooding has caused damage to bridge and roadways. In 1985, Alcona County was granted a Governor's Disaster Declaration and Presidential Declaration of Disaster for flood related events. In 1998, The high-water levels washed out several roads and conduits. Since 2008, there have been five flood events (two floods and three flash floods) in Alcona County in the City of Harrisville, Mikado (Mikado Township), Backus Beach (Caledonia Township), Spruce (Caledonia Township), and the Village of Lincoln. These events did not have any deaths, injuries, or crop damages. Property damages ranged between $10,000 to $100,000. On June 22, 2008, a flash flood caused $100,000 in damages due to heavy rain. The flash flood occurred on Grey and Roy Creeks. It washed out several driveways and side roads, and closed parts of Alvin, Goddard, and London Roads. On July 17, 2008, a flash flood caused $10,000 in damages due to heavy rain. Mount Maria Road was flooded near the south end of Hubbard Lake and Hubbard Lake Road was also underwater between Lake Street and Pine Grove Shores as well as near Swede Road. On July 10, 2017, a flash flood caused $40,000 in property damages due to heavy rain. In the Lincoln area, basements were flooded, and numerous roads flooded and closed for part of the evening, including Gehres and Barlow Roads. Based on this data, one event would occur every 2.4 years. However, it should be noted that the floods and two of the flash floods occurred on the same day in the same year (the flood was caused by the flash flood on June 22, 2008 and July 17, 2008). Therefore, the future probability does not accurately estimate the probability of occurrence since it does not take into account the events occurred at the beginning of the range or that the

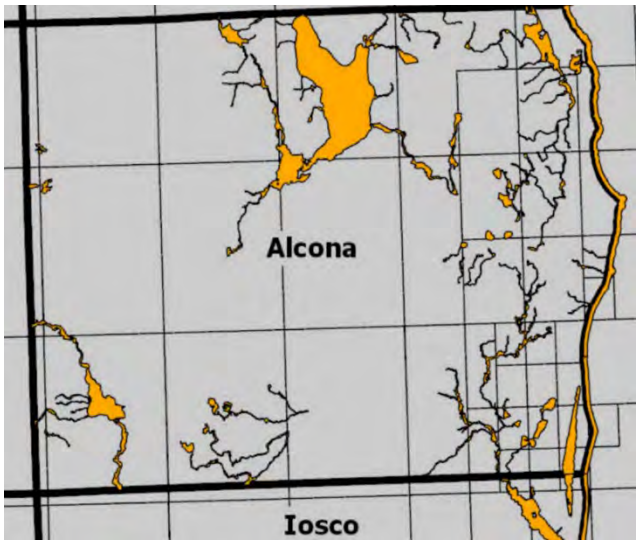

Figure 6-2 Alcona County 100-year Flood Potential

natural fluctuations in the water system. It should also be noted there may be a lack of reporting for flood events, which means the number of flood events may be higher. Furthermore, the number of events may increase due to the changing climate conditions.

Extent

Flood extent can be measured by the amount of property damage. Heavy rains caused $10,000 in property damages on July 17, 2008, $40,000 in property damages on July 10, 2017, and $100,000 in property damages on June 22, 2008. The county may see an increase in the number of flood events and the severity of flooding due to an increase in rain and snowfall due to climate change, the backwater effect from the current high-water levels of the Great Lakes, and the soil moisture content. The county's wetlands assist in preventing floods through the collection and storage of stormwater and floodwaters.

Vulnerability Assessment

The riverine and urban flooding events analyzed in this section relate to the natural and built environments. Flooding due to a dam failure is analyzed in the dam failure section of this chapter. Existing buildings may experience flooding if they are located in the county's floodplains.

Within Alcona County, the following number of structures are located within specified areas:

Flood Zone A (areas subject to inundation by the 1% annual chance flood event determined using approximate methodologies) is found throughout the county along river corridors including the AuSable River and around small lakes. Flood Zone A is also found around two larger lakes – Hubbard Lake and Cedar Lake. Approximately 900 structures (residential and a few recreational properties) are located in Flood Zone A. Approximately half of all structures in this zone are found around Hubbard Lake.

Flood Zone AE (areas subject to inundation by the 1% annual chance flood event determined by detailed methods) is found along the Lake Huron shoreline. There are approximately 196 structures (primarily residential with several public facilities including Harrisville State Park, Sturgeon Point Lighthouse, and the Harrisville Harbor) in this flood zone.

Flood Zone AO (designated in areas with high flood velocities such as alluvial fans and washes) is found along the Lake Huron shoreline just west of Flood Zone AE. There are 58 residential structures located within this zone.
The remainder of the county is designated as "Area of Minimal Flood Hazard."

The number of structures within the specified flood zones was obtained by downloading the GIS shapefiles from the FEMA Flood Map Service Center and using ArcGIS to overlay the flood zones onto aerial imagery. The structures falling within the zones were counted using a visual survey. However, it should be noted that only structures which are visible were counted. Structures which are not visible due to leaf-on aerial imagery are not included in this estimate. It should be assumed that the number of actual structures within these flood zones could be between 20-30% higher than the estimate.

Structures that have flooded have the potential to be damaged, destroyed, and compromised. After the flood event(s), they may develop mold, have foundation damage, and may rot. The presence of mold will increase the health risk for people with breathing conditions. Businesses may have to close to fix damages and potentially lay off employees. Floodwaters can conceal dangerous

conditions, such as damaged electrical wires, debris, and diseases. Electrical wiring on docks may become damaged from a flood, which increases the risk for electric shock. The contaminants and pollutants in floodwaters can degrade watersheds, and cause diseases, infections, and injuries to people traversing or playing in the waters. Flooding can damage roads and bridges, overflow sewers, and cause vehicles to crash. Roads may be closed for extended periods of time, which would impact traffic flow and emergency response times. Floodwaters can also cause erosion along inland lakes and streams, which can degrade habitats. Depending on the severity of flooding, residents may be evacuated.

Great Lakes Shoreline Flooding and Erosion

Description

Flooding and erosion issues are natural processes that occur on the Great Lakes due to wind, waves, precipitation levels, water levels, seiches, and human activities. They have the potential to threaten life, health, and property. For example, the removal of soil from erosion activities may expose the foundations of structures or underground utility pipes, as well as cause roadways to become unstable and crack. Additionally, seiches can cause lake waters to travel inland over large areas. Unfortunately, humans have built structures in flood prone areas along the shorelines that have altered the natural landscape and increased the number of people and structures in these hazardous areas.

Michigan has over 3,200 miles of coastline with approximately 4.7 million people living along the shoreline. EGLE has developed a coastal management program to protect shoreline resources, identify development areas and hazardous areas, and improve public access to the coastline. EGLE estimates approximately 10% of the Great Lakes' shoreline is prone to flooding and has identified 125 municipalities that have high-risk shoreline erosion areas. In these areas, new permanent structures must comply with building setbacks to minimize the extent and magnitude of flooding and erosion issues.

In nearly every decade, high water levels on the Great Lakes have caused significant damage to Michigan coastal communities (Figure 6-3). In the early 1950s and late 1960s, high water levels resulted in flooding that caused millions of dollars in damages to shoreline communities. Between 1972 and 1973, high water levels caused flooding in over 30 counties and resulted in an excess of $50 million in public and private damages since thousands of people were forced to evacuate their homes. Between 1985 and 1986, high lake levels culminated in a Governor's disaster declaration for 17 shoreline counties. The Army Corps of Engineers (USACE) implemented its Advance Measures Program, and the State implemented three shoreline flooding and erosion mitigation programs aimed at reducing future flood impacts. In 1997, the USACE implemented its Advance Measures Program to assist Michigan shoreline communities with their flood and erosion mitigation efforts. In 2019, record high water levels were recorded on the Great Lakes. The Army Corps of Engineers forecasts the water levels on Lake Michigan-Huron will begin reaching record highs between April 2020 and August 2020.

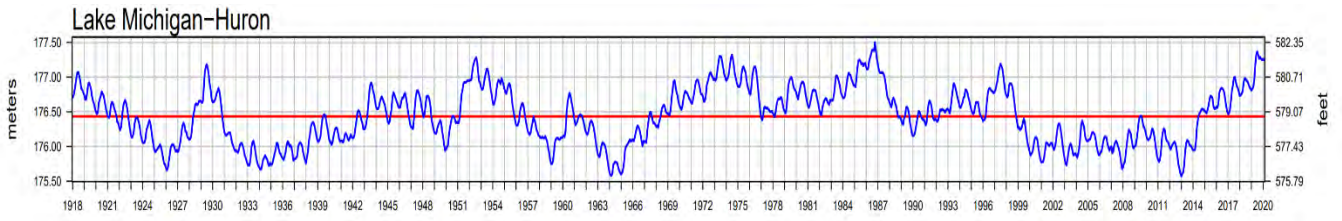

Figure 6-3 Lake Michigan-Huron Water Levels 1918-2020
Source: U.S. Army Corps of Engineers, Retrieved March 2020
Blue: Monthly Mean Level; Red: Long Term Annual Average

Location
Alcona County has approximately 36 miles of shoreline along Lake Huron. The City of Harrisville, Alcona, Haynes, Harrisville, and Greenbush Townships are at the greatest risk for Great Lakes flooding and erosion. In addition, there are lakes, ponds, and rivers throughout the county.

Previous Occurrences and Probability of Future Occurrences
According to Michigan Sea Grant's Great Lakes Current Incident database, Alcona County has not had any incidents since 2002. It should be noted the database was started in 2002, and it was more difficult to gather incident-related information, and rip currents were not recognized as occurring on the Great Lakes before the early 2000's. Therefore, incidents may not have been recorded in the database or were reported as different hazards. In the early 2000's, low water levels existed in Lake Huron (dropped about 5 feet). The water levels remained below the long-term annual average until 2014 when they began to rise above the long-term average.

On February 20, 2020, Harrisville and Rogers City officials met to tour the damage to Harrisville's harbor (e.g., waves ripped floating docks away from the fixed docks after crashing over the breakwall) and other areas with infrastructure damage. Unfortunately, the breakwall is owned by the USACE, who has not maintained it since the water levels began rising. Since Rogers City and Harrisville have similar issues with Great Lakes shoreline flooding and erosion, the communities plan to meet on a quarterly basis.

Since the Great Lakes' water levels go through cyclical high and low water periods, the future occurrence of this hazard is not easy to predict. Additionally, seasonal water fluctuations due to water runoff can impact the future occurrence of this hazard. In Lake Huron, the average amount of seasonal runoff is about one foot.

Extent
Extent can be measured by the amount of damage caused to buildings and infrastructure. In Alcona County, the high waters from Lake Huron have contributed to major erosion issues, and infrastructure and shoreline damage. Rogers City is working with the City of Harrisville in Alcona County to address Great Lakes shoreline flooding issues. Extent can also be measured by the number of injuries or fatalities. According to the *2019 Hazard Analysis*, Alcona County has had between 0-1 incidents from 2002-2019. Additionally, the *2019 Hazard Analysis* classified Alcona County as a low-risk erosion hazard area and a low shoreline recession risk.

Vulnerability Assessment
The buildings and infrastructure in the City of Harrisville, Alcona, Haynes, Harrisville, and Greenbush Townships are most at-risk for Great Lakes shoreline flooding and erosion. The waves

and winds from Lake Huron can cause damage to docks, and remove sand or soil from buildings, which causes a loss in property, and exposes foundations and underground utilities. Structures and facilities (parks) can also become closer to the waters or become perched on bluffs, which could cause the structures to end up in Lake Huron. The foundations and utilities may experience water damage, water contamination, extreme temperatures, and become unstable. High water levels can also wash out roads and trails, and cause them to crack, become unstable, and slough. This damage has the potential to cause vehicles, bicyclists, hikers, or equipment to go into Lake Huron. Road closures have the potential to cause longer emergency response times. High water levels have also pushed shipwrecks inland and unearthed new shipwrecks. Low water levels on Lake Huron can impact shipping companies since they may be forced to lighten loads on their freighters to avoid running aground in channels and ports and reducing drafts. Low water levels also have the potential to shut down ferry services and call for more dredging projects that are expensive and cause an issue of where to appropriately dispose of contaminated sediments.

National Flood Insurance Program

In 1968, Congress created the National Flood Insurance Program (NFIP) to reduce the impact of flooding on private and public structures by providing affordable insurance. The program is administered by FEMA and requires participating communities to adopt and enforce floodplain management ordinances that meet or exceed the NFIP minimum requirements. In addition, if communities participate in the Community Rating System (CRS), residents and business owners can receive reduced flood insurance premiums.

When NFIP was created, it included discounted policies that paid at rates that do not reflect the true flood risk of the properties. The Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12) required FEMA to eliminate certain subsidies and it set limits on the amount that rates may increase. However, the Homeowner Flood Insurance Affordability Act of 2014 repealed some of the provisions in BW-12 and included gradual rate increases to properties receiving subsidized rates until the premium reaches its full-risk rate, adding a surcharge to all policies, and having a Flood Insurance Advocate to advocate for fair treatment of NFIP policyholders.

In 2012, FEMA completed a countywide Flood Insurance Study and Digital Flood Insurance Rate Maps for Alcona County. According to the *FEMA Community Status Book Report for Michigan*, the City of Harrisville, and Alcona, Caledonia, Curtis, Greenbush, Gustin, Harrisville, Hawes, Haynes, Mikado, and Millen Townships are participating in the National Flood Insurance Program since the areas have a history of flooding. The Village of Lincoln and Mitchell Township are not participating in the program at this time after researching the program and considering the areas' flooding history. According to information in the official FEMA/NFIP database as of October 2019, Alcona County has one single property classified within the repetitive-loss category and should be prioritized for flood mitigation project considerations. This property is located in Greenbush Township and has suffered two losses within recent years, averaging less than $15,000 in total damages to the structure itself. Due to confidentiality requirements, no specific details can be included within this plan.

Severe Winds (Derecho)

Description

A derecho is a long-lived windstorm that is associated with fast-moving severe thunderstorms that occur during the spring or summer; however, they can occur any time of the year. According to The National Severe Storms Laboratory, winds in excess of 58 mph are considered to be a derecho. Severe windstorms can cause damage to homes and businesses, power lines, trees and agricultural crops, and may require temporary sheltering of individuals without power for extended periods of time.

According to the *2019 Michigan Hazard Mitigation Plan*, the statewide average annual number of severe wind events is 395 with 2 average annual deaths, 13 average annual injuries, and an expected annual loss of $51.3 million. Windstorms occur in all areas of Michigan, although more often along the lakeshore and in central and southern Lower Michigan. On average, severe wind events can be expected 2-3 times per year in the Upper Peninsula, 3-4 times per year in the Northern Lower Peninsula, and 5-7 times per year in the Southern Lower Peninsula. Along the Great Lakes shoreline, strong winds regularly occur and occasionally have gusts over 74 mph hour when in conjunction with a storm front.

In the Northern Lower Peninsula, *the 2019 Michigan Hazard Mitigation Plan* states on average there are 2 average annual events, 0.2 average annual deaths, 2.6 average annual injuries, and approximately $4.7 million in property and crop damage per year. For example, during September 26-27, 1998, Northern Lower Michigan experienced severe thunderstorms that produced strong winds that damaged or destroyed homes, businesses and public facilities, and downed trees and power lines. In the City of Gaylord in Otsego County, the storm had rain, wind speeds between 80 and 100 mph, and golf ball sized hail. In Otsego County, approximately 818 homes were damaged or destroyed, 11 persons were injured, 12,000 people lost power, and thousands of trees were snapped. A Governor's Disaster Declaration was granted to the county for state assistance during the debris cleanup effort.

On April 30, 1984, another windstorm struck the entire Lower Peninsula and resulted in winds up to 91 mph in some areas. The storm caused severe shore erosion, and damaged 6,500 buildings, 300 mobile homes, and 5,000 vehicles. The storm also resulted in one death, several injuries, and over 500,000 customers without power.

Another storm event that moved across Michigan occurred on November 10-11, 1998. This storm was the strongest storm ever recorded in the Great Lakes with wind gusts between 50-80 mph and a peak gust of 95 mph reported on Mackinac Island. Its damaged buildings, downed trees and power lines, killed one person, and left over 500,000 people without power. By the morning of November 11, the winds had pushed so much water into Lake Huron that the water level on Saginaw Bay bottomed out 50" below chart datum, which exposed and dried-up half of the bay bed. As the wind died down, the water level in the Saginaw Bay rose to its normal level.

Measuring Severe Winds

The Beaufort Wind Scale is used to describe wind strength through observation. Table 6-2 shows the Beaufort Wind Scale.

Table 6-2 Beaufort Wind Scale			
Force	**Wind Speed (knots)**	**Description**	**Specifications for use on Land**
0	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind varies
2	4-6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Dust, leaves, and loose paper lifted; small tree branches move
5	17-21	Fresh Breeze	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Twigs breaking off trees, generally impedes progress
9	41-47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56-63	Violent Storm	-
12	64+	Hurricane	-

Location

Severe winds are a regional event that is not confined to geographic boundaries and can affect several areas at one time. Also, the severity of the winds may range across the affected areas. All of Alcona County is at risk to the occurrence and impacts from severe winds.

Previous Occurrences and Probability of Future Occurrences

According to the USDA's *Soil Survey of Alcona County, Michigan,* thunderstorms occur about 32 days each year. Since 1962, there have been 65 high wind and thunderstorm wind events reported in the county. The events did not have any deaths or crop damages. Property damages ranged between $1,000 and $24,000. There was one injury on July 22, 2001. A thunderstorm wind event caused one injury and $2,000 in damages when winds up to 55 mph caused flying debris to damage the windshield of a truck and injure a passenger. The most severe windstorm in the county occurred on May 19, 1998 with wind speeds up to 80 mph. The event did not have any deaths, injuries, or property and crop damages. The costliest wind event occurred on July 18, 2013. The event had 54 mph winds that caused $24,000 in property damages, and did not have any deaths, injuries, or crop damage. The event downed trees onto homes and caused widespread power outages. On May 30, 2007, a thunderstorm event with 52 mph winds caused $10,000 in property damages when a tree fell on a camper trailer in a campground and power was lost in the campground. On July 8, 2016, a thunderstorm wind event with 56 mph winds caused $15,000 in property damages. The event caused a camper to be blown open and an outbuilding to have its roof torn off. Since there have been 65 high wind and thunderstorm wind events reported in the last 58 years, the data shows approximately one event would occur every 0.9 years.

Extent

Winds are measured by wind speed and the amount of damage. The most severe windstorm in Alcona County occurred on May 19, 1998 with wind speeds up to 80 mph. The event did not have any deaths, injuries, or property and crop damages. However, the county had events with property

damages ranging from $1,000 to $24,000. However, it should be noted that stronger winds and higher damage estimates are possible.

Vulnerability Assessment
All existing and future buildings and populations are at-risk to severe winds. Mobile homes and older homes may sustain the greatest amount of damage. Severe winds have the potential to blow shingles, siding, awnings, and other features off buildings. Falling trees and tree limbs can damage structures as well as cause timber damage that would result in a loss of timber production. Severe winds can pick up objects and hurl them through the air, which may result in damage to structures or harm to people. Sometimes, structures can be blown off their foundations. Severe winds can also blow down communication infrastructure, utility poles, and aboveground power lines. Businesses may have to close due to power outages.

Ice and Sleet Storms

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

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

Location
Ice and sleet storms are a regional event that is not confined to geographic boundaries and can affect several areas at one time. Also, the severity of the ice and sleet storms may range across the affected areas. All of Alcona County is at risk to the occurrence and impacts from ice and sleet storms.

Previous Occurrences and Probability of Future Occurrences
Alcona County has had three ice storms according to NOAA (one in 2001, one in 2005, and one in 2013). The events did not have any deaths, injuries, or property and crop damages. Since three events have occurred in the past 7 years, approximately one event would occur every 2.3 years. However, not all ice and sleet storms may have been reported based on the lack of injuries, deaths, and extensive damages. Also, ice and sleet storms may have been reported as other hazards. Therefore, the number of ice and sleet storm events and damages may be higher.

Extent
Ice and sleet storms can be measured based on the cost of damages and the number of injuries and deaths. None of the events in Alcona County had any injuries, deaths, or property and crop damages.

Vulnerability Assessment
Walking can cause injuries from falls that may result in fractures or broken bones. Ice accumulation can cause damage to tree limbs, and communication and power infrastructure, which can result in power outages. Icy roads can cause traffic accidents, which may result in injuries and loss of life. Heating shelters and evacuations may be required if power outages last a long time. Power outages and ice-covered roads can limit access to food and basic supplies since businesses would have to close and the roads would not be travelable.

Snowstorms

Description
Snowstorms are periods of rapid snow accumulation with high winds, cold temperatures, and low visibility that have the potential to shut down towns and cities. Blizzards are the most perilous snowstorms and are characterized by low temperatures, strong winds, and enormous amounts of fine, powdery snow. Snowstorms have the potential to reduce visibility, cause property damage, and loss of life.

According to the *2019 Michigan Hazard Analysis,* Michigan has 360 snowstorms with 0.1 average annual deaths, 0.1 average annual injuries, and $1.9 million in average annual property and crop damage. Michigan experiences large differences in snowfall over short distances due to the Great Lakes. The average annual snowfall accumulation ranges from 30 to 200 inches with the highest accumulations in the northern and western parts of the Upper Peninsula according to the Michigan Climatology Atlas. In Lower Michigan, the highest snowfall accumulations occur near Lake Michigan and in the higher elevations of northern Lower Michigan. For example, the average snowfall ranges from 141 inches in the Gaylord area to 53 inches in the Harrisville area.

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

Previous Occurrences and Probability of Future Occurrences
Since 1997, there have been 48 winter storm events, including heavy snowstorms, blizzards and winter storms reported in Alcona County. These events did not have any deaths, injuries, or crop damages. On April 24, 2005, heavy snow caused $3,000 in property damages when the wet snow combined with wind gusts of 25-30 mph downed trees and tree limbs in Harrisville. In January 1999, Alcona County received a Presidential Emergency Declaration for a snowstorm and blizzard. This data shows approximately one event will occur every 0.5 years though it should be noted that winter weather hazards fluctuate between years.

Extent
Extent can be measured by the cost of property damages. One event on April 24, 2005 had property damages at $3,000. Extent can also be measured based on snowfall accumulations. The average annual snowfall in Alcona County is 53 inches.

Vulnerability Assessment
All existing and future buildings and populations are at-risk for snowstorms. Downed trees and branches can cause damage to buildings and other structures. The weight of snow on roofs can

cause the roofs to collapse and ice dams can cause water damage to buildings. Additionally, cold temperatures can freeze pipes in buildings that can rupture and leak. Salting can cause damage to the roads and sidewalks. The weight of snow accumulations on communication and power infrastructure can cause power outages. Shoveling snow can cause heart attacks. During and immediately after a snowstorm, the driving conditions are dangerous since blowing snow, ice, and slush can create slippery roads. Blizzards can create whiteout conditions that result in low to no visibility. Stranded motorists may get hypothermia or frostbite. Heating shelters and evacuations may be required if power outages last a long time. Power outages and snow-covered roads can limit access to food and basic supplies since businesses would have to close and the roads would not be travelable.

Extreme Temperatures (Extreme Heat and Extreme Cold)

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

Nationwide, there have been approximately 175 deaths per year that are attributable to extreme heat according to the *2019 Michigan Hazard An*alysis. The threats from extreme heat are heatstroke, sunstroke, muscle cramps, fatigue, and heat exhaustion. It is hazardous to livestock and agricultural crops, causes water shortages, exacerbates fire hazards, exacerbates respiratory problems, prompts excessive energy demands, and causes infrastructure failures. Urban areas experience the most serious extreme heat with the combined high temperatures and high humidity that produce a heat-island effect. According to the *2019 Michigan Hazard Mitigation Plan*, Michigan has 11 average annual extreme heat events with 0.4 average annual deaths and 41 average annual injuries.

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

Measuring Extreme Temperatures (Extreme Heat and Extreme Cold)
Extreme heat is measured with the National Weather Service's Heat Index Chart (Figure 6-4). The chart uses relative humidity and air temperature to determine the likelihood of heat disorders with prolonged exposure or strenuous activity. Individuals are unable to shed excess heat from their bodies when they experience prolonged exposure to hot temperatures, which results in heat disorders.

Extreme cold is measured with the windchill index, which is a measure of the rate of heat loss from exposed skin caused by the combined effects of wind and cold. As the wind increases, heat is carried away from the body and reduces the external and internal body temperatures. Figure 6-5 shows the NOAA Wind Chill Chart as it corresponds to various temperatures and wind speeds.

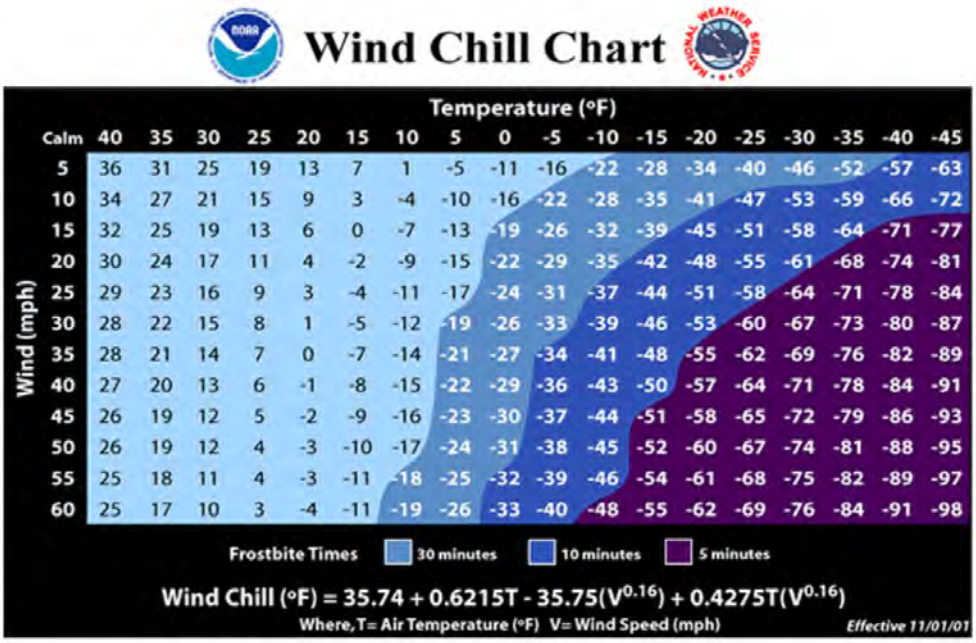

Figure 6-4 National Weather Service Heat Index

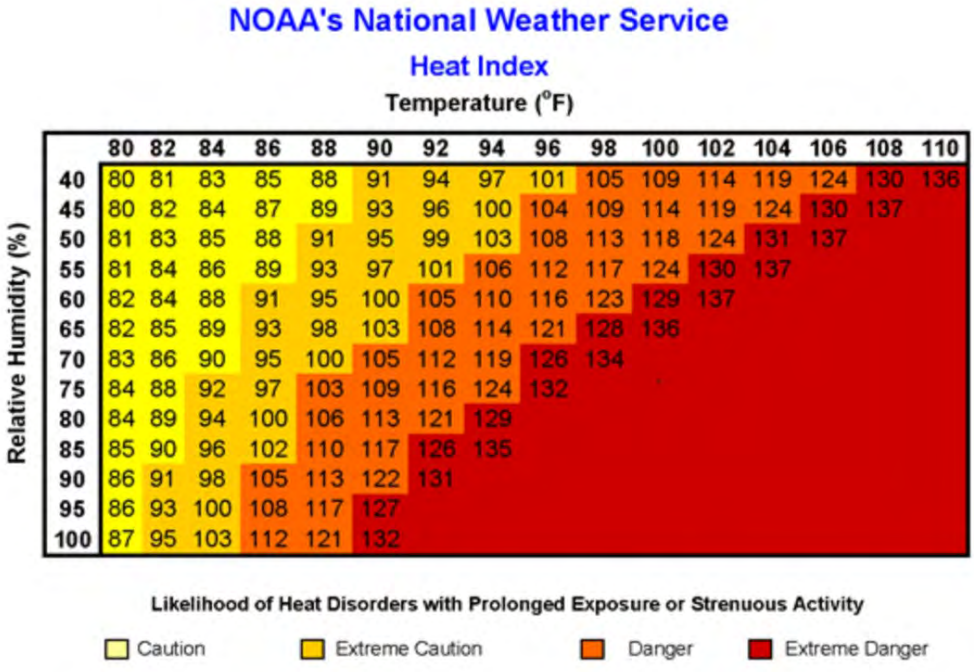

Figure 6-5 Wind Chill Chart

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

Previous Occurrences and Probability of Future Occurrences
A comparison between average maximum/minimum temperatures and extreme maximum/minimum temperatures assists in understanding the risk for extreme temperatures in the county. Figure 6-6 shows the average maximum temperatures and extreme maximum temperatures in Alcona County between 1913 and 2020 from the Western Regional Climate Center, Hale Loud Dam, MI Station (203529). Figure 6-7 shows the average minimum temperatures and extreme minimum temperatures in Alcona County between 1913 and 2020 from the Western Regional Climate Center, Hale Loud Dam, MI Station (203529).

Alcona County has had two heat or excessive heat events in 2001 and 2018. The events did not have any deaths, injuries, or property/crop damages. The events consisted of hot and humid conditions that caused outdoor events to be modified, livestock to be sent home from county fairs (some livestock losses occurred at the fairs), and attendance at outdoor events to be lower than normal. Since there have been two extreme heat events in Alcona County in the last 19 years, approximately one extreme heat event would occur every 9.5 years.

There have been three extreme cold/windchill events reported in Alcona County (one in 2007, one in 2014, and one in 2015). The events did not have any deaths, injuries, or property and crop damages. The low temperatures caused schools to close. However, since cold temperatures typically occur during winter months and are coupled with blustery winds and snowstorms, many events may have gone unrecorded or reported as other hazards. Since there have been three extreme cold events in Alcona County in the last 13 years, approximately one extreme cold event would occur every 4.3 years.

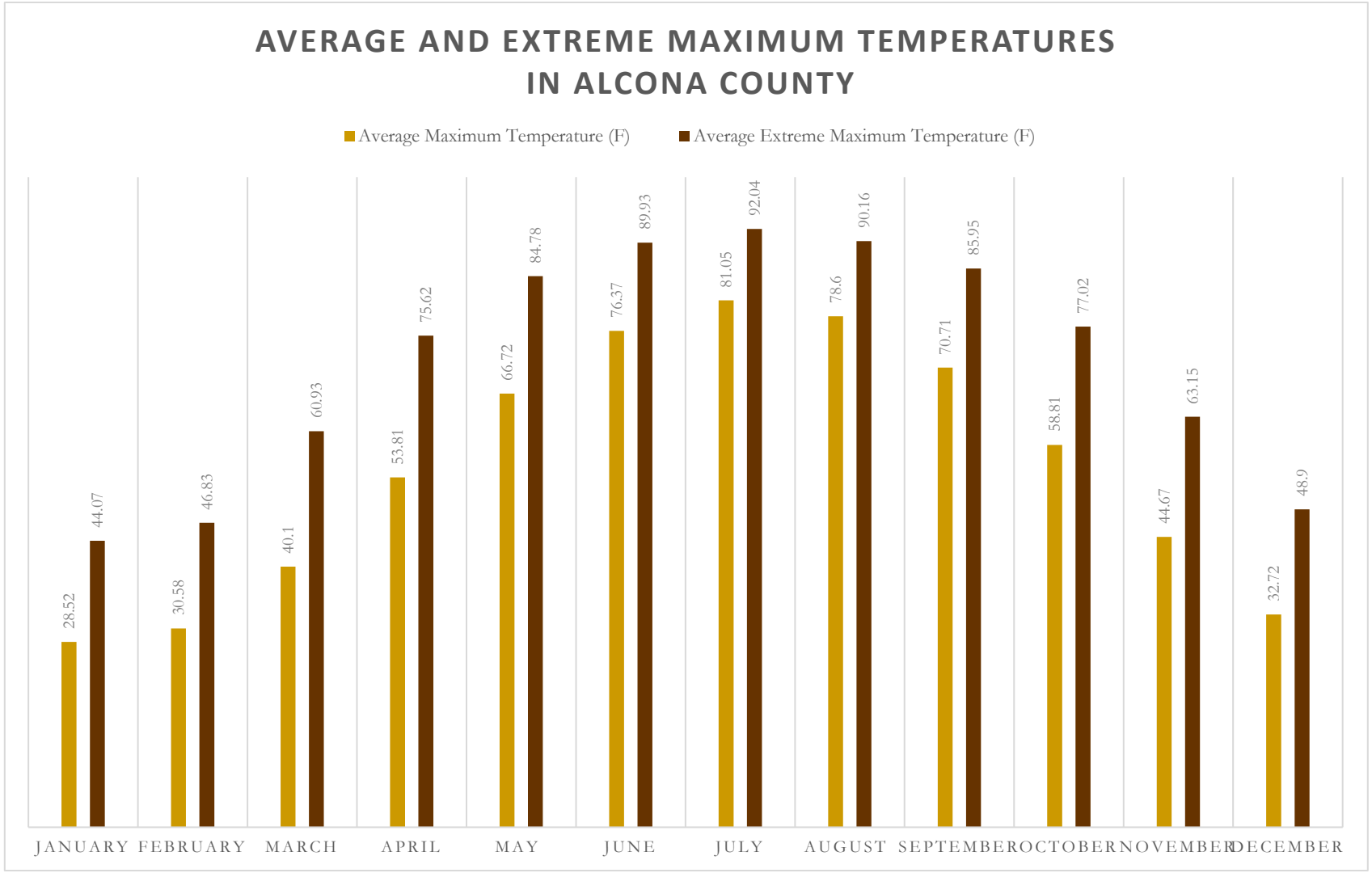

Figure 6-6 Average and Extreme Maximum Temperatures in Alcona County

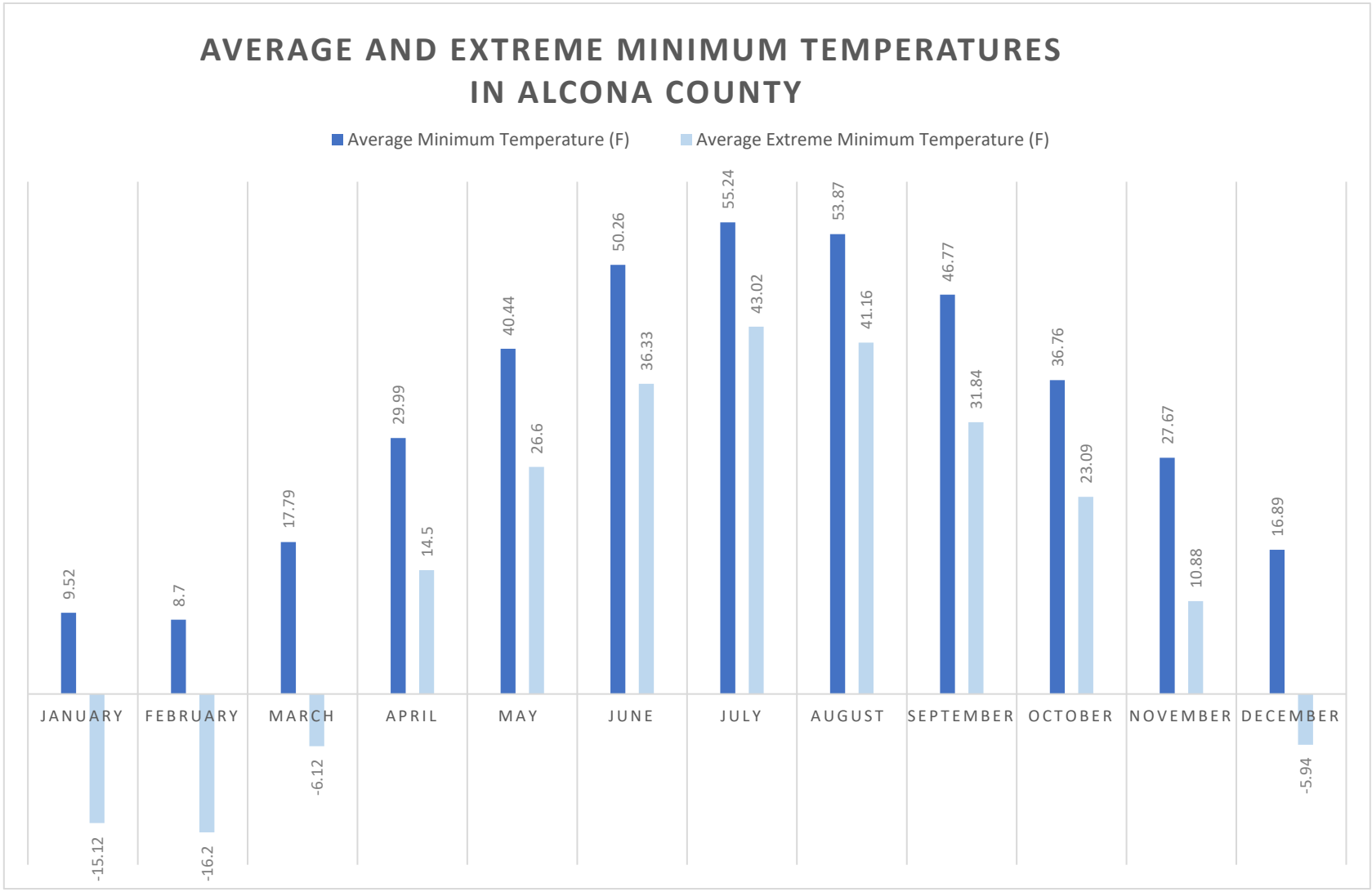

Figure 6-7 Average and Extreme Minimum Temperatures in Alcona County

Extent
Since adequate climate records are not available for Alcona County, climate information from East Tawas (Iosco County) have been used to determine extent. Extreme heat temperatures can be defined by record highs and the National Weather Service Heat Index. On July 9, 1936, the highest recorded temperature in East Tawas was recorded at 106 degrees Fahrenheit. This temperature correlates to danger and extreme danger of having a heat disorder form prolonged exposure or strenuous activity (Figure 6-4). However, it should be noted that hotter events are possible. In Alcona County, the City of Harrisville has the potential to produce a heat island effect since it is an urbanized area with buildings and roads that absorb and re-emit the sun's heat more than the more rural areas in the county.

Extreme cold temperatures can be defined by record lows and the National Weather Service Wind Chill Index. On February 1, 1918, the lowest recorded temperature for East Tawas was -29 degrees Fahrenheit. This temperature correlates to frostbite exposure of 5-30 minutes (Figure 6-5). However, it should be noted that colder events are possible.

Vulnerability Assessment
All of Alcona County's existing and future buildings, population, and infrastructure are at-risk and vulnerable to extreme temperatures (extreme heat and extreme cold).

Extreme heat has little effect on buildings and infrastructure. However, in rare cases, buildings can collapse or buckle. Utility infrastructure can fail and cause power outages or put stress on utility service due to an increase in the usage of air-conditioning units. Heat can also cause pavement to expand. Elderly adults, and young children are more susceptible to heat disorders since older adults are more likely to be on medications or have chronic illnesses that affect their body's ability to regulate heat, and young children rely on others to keep them cool and hydrated. Athletes and outdoor workers are also susceptible since they are more likely to become dehydrated. Low income populations are susceptible since they may not have or be able to afford an air conditioning system for their home. Extreme heat negatively impacts air quality by increasing the amount of pollutants in the air, which can aggravate existing respiratory illnesses, and can decrease lung function after long-term exposure to high temperatures. Water quality is impacted by heating up waterbodies or heating up the runoff that drains into them. This hotter water may degrade the water resources as well as kill fish, macroinvertebrates, and vegetation.

Extreme cold temperature events can cause pipes to freeze and burst in buildings, broken water mains, and stress to concrete and asphalt, which is costly to repair. After exposure to extreme cold temperatures, individuals may get frostbite or hypothermia, or they could die. Elderly, children, and individuals without access to an adequate heat source are considered to be at a higher risk to the impacts from extreme cold events. Additionally, extreme cold events could cause power outages and potentially result in carbon monoxide-related deaths due to the indoor usage of gas-powered furnaces and alternative heating sources. Risks for structural fires also increase with the use of alternative heating and power sources. Business and school operations would be disrupted since people are advised to remain indoors to reduce their exposure.

Tornadoes

Description

A tornado is a violently rotating column of air that extends from a thunderstorm to the ground and can occur any time during the day and year. It can only be seen if water droplets, dust, and debris form a funnel. The funnel cloud can have winds that reach up to 300 miles per hour with an interior air pressure that is 10-20% below the surrounding atmosphere's pressure. The length of a tornado path is approximately 16 miles, but there have been tracks reported up to 200 miles. Tornado path widths are generally less than one-quarter mile wide. These storms are the most violent of the atmospheric storms since they have the potential to destroy buildings, uproot trees, hurl objects, and cause loss of life. According to NOAA/the National Weather Service's Storm Prediction Center, tornadoes cause approximately 60 deaths and hundreds of millions of dollars in property damage each year.

According to the *2019 Michigan Hazard Mitigation Plan*, Michigan is located on the northern fringe of the nation's tornado belt and has a statewide expected annual loss of about $19.6 million due to tornadoes. Michigan also has an average of 18 tornadoes, approximately 4 deaths, and approximately 50 injuries per year. Between 1999 and 2019, Michigan has had 314 reported tornado events with 52.9% as EF0 (weak) or EF1 (moderate), 38.9% reported as F0 or F1 (weak), 6.7% as EF2 (significant) or EF3 (severe), and 1.6% as F2 (strong). In Northern Michigan, tornadoes are most likely to occur during the summer months, although some have occurred in the spring and fall.

Measuring Tornadoes

Prior to 2007, the United States used the Fujita Scale to measure the intensity of tornadoes (Table 6-3). The Fujita Scale used mathematical interpolation to assign wind estimate guesses to a damage scale. In 2007, the United States began using the Enhanced Fujita Scale to measure the intensity of tornadoes since the wind estimates are more associated with the degree of tornado storm damage than the Fujita Scale (Table 6-3).

Table 6-3 Fujita Scale and Enhanced Fujita Scale

Fujita Scale	Fujita Scale Wind Estimate (MPH)	Enhanced Fujita Scale	Enhanced Fujita Scale Wind Estimate (MPH)
F0	< 73	EF0	65-85
F1	73-112	EF1	86-110
F2	113-157	EF2	111-135
F3	158-206	EF3	136-165
F4	207-260	EF4	166-200
F5	261-318	EF5	Over 200

Source: National Oceanic and Atmospheric Administration/National Weather Service Storm Prediction Center, May 2019

Location

Tornadoes are a regional event that are not confined to geographic boundaries and can affect several areas at one time. Also, the magnitude of tornadoes may range across the affected areas. All of Alcona County is at risk to the occurrence and impacts from tornadoes. It should be noted that it is impossible to predict where and with what magnitude a tornado will touchdown.

Previous Occurrences and Probability of Future Occurrences

Between 1953 and 2008, Alcona County has had eleven reported tornadoes, causing over $5.6 million in property damage (Table 6-4). No deaths, injuries, or crop damage occurred as a result of these tornadoes. Property damages ranged between $30 and $5 million. The most destructive tornadoes touched down on March 27, 1991 in Curtis and Millen Townships and caused $5 million worth of damage. The July 3, 1999 tornado was a continuation of an Oscoda County tornado that downed trees and damaged 16 homes. On October 18, 2007, a tornado originated near McCollum Lake in Oscoda County and moved into Alcona County. The event primarily damaged trees in Alcona County. On June 22, 2008, a tornado downed trees west of Mount Maria Road, east of Consolidated Road, and north of the West Branch River. Since eleven events have occurred in the past 67 years, approximately one event will occur every 6.1 years. However, it should be noted that the majority of the events occurred between 1953 and 1999. Caledonia, Curtis, and Mitchell Townships are at greater risk for a tornado based on the NOAA data.

Table 6-4 Alcona County Tornado Events

Date	Time	Location	F-Scale	Deaths	Injuries	Property Damage	Crop Damage
6/8/1953	1908 CST	Caledonia Township	F3	0	0	$250,000	$0
7/5/1953	1600 CST	Curtis Township	F0	0	0	$250	$0
8/9/1954	1445 CST	Greenbush Township	F1	0	0	$25,000	$0
7/1/1956	1350 CST	Caledonia Township	F1	0	0	$2,500	$0
3/30/1976	1420 CST	Curtis Township	F2	0	0	$30	$0
3/27/1991	1835 EST	Curtis Township	F3	0	0	$2,500,000	$0
3/27/1991	1840 EST	Millen Township	F3	0	0	$2,500,000	$0
6/17/1992	1640 EST	Gustin Township	F1	0	0	$25,000	$0
7/3/1999	1848 EST	Mitchell Township	F1	0	0	$250,000	$0
10/18/2007	1942 EST-5	Mitchell Township	EF1	0	0	$15,000	$0
6/22/2008	1315 EST-5	Alcona Township	EF1	0	0	$50,000	$0

Source: National Oceanic and Atmospheric Administration, National Centers for Environmental Information, May 2019

Extent

Based on the Fujita Scale, Alcona County's most intense tornadoes occurred in Caledonia, Curtis, and Millen Townships with winds ranging from 158-206 mph. The tornadoes did not have any deaths, injuries, or crop damage. The tornado in Caledonia caused $250,000 in property damages, and the ones in Curtis and Millen Townships caused $5 million. Based on the Enhanced Fujita Scale, Alcona County's most intense tornadoes occurred in Mitchell and Alcona Townships with winds ranging from 86-110 mph. The tornadoes did not cause any deaths, injuries, or crop damage. The tornado in Mitchell Township caused $15,000 in property damages and the one in Alcona Township caused $50,000 in property damages.

Vulnerability Assessment

All of Alcona County's existing and future buildings, population, and infrastructure are at-risk to tornadoes. Buildings and above ground infrastructure in a tornado's path will be damaged and/or destroyed. Older buildings and light construction structures (houses) have a greater risk of damage. Buildings adjacent to a tornado's path may have no to little damage dependent on the amount and type of debris hurled from a tornado at the adjacent buildings. Through a FEMA study in 1999, it was found that mobile homes, homes with crawlspaces, and building with large spans (schools,

gyms, factories, theaters, etc.) are more susceptible to damage from tornadoes. Schools are vulnerable to tornadoes due to the number of students and employees in the buildings. Tornadoes can close roads due to debris on the road or road damage/destruction from the tornado. Tornadoes can cause injuries or death when people are in or near the tornado's path (picked up by the tornado or struck by debris). Individuals in buildings may have injuries or die if they are trapped in a building struck by a tornado or are struck by debris or falling objects. Tornadoes can contaminate water supplies, cause fires, and cause hazardous material spills (pipeline or septic tanks) or gas leaks. If a tornado damages businesses or infrastructure, it will cause economic losses in the county since businesses will have to close and the cost of repairs will impact the business. Tornadoes can also cause power outages. Governments will have to spend money for search and rescue teams, shelters, and clean-up efforts. Also, structural and vegetative debris storage areas may become filled to capacity.

Drought

Description

Drought is a consequence of a natural reduction in the amount of expected precipitation over an extended period of time, usually a season or more in length. Drought differs from normal arid conditions found in low rainfall areas since the aridity is a permanent characteristic in the arid areas. The severity of a drought depends on its location, duration, geographical extent, and the water supply demands from human activities and vegetation. Due to the multi-faceted nature of drought, it is difficult to define it and assess when and where it will occur.

Some of the severe impacts droughts have on communities and regions include:

- Water shortages for human consumption, power generation, recreation and navigation, and industrial, business and agricultural uses
- Reduction in quality and quantity of crops
- Reduction of water quality in lakes, streams, and other natural water bodies
- Malnourished wildlife and livestock
- Increase in wildfires and wildfire-related losses
- Decline in tourism in areas dependent on water-related activities
- Decline in land values due to the impact of drought conditions on the economic or functional use of the property
- Reduction in tax revenue due to income losses from the agriculture, retail, tourism, and other industry sectors
- Increase in insect infestations, plant disease and wind erosion
- Potential loss of life due to food shortages, extreme heat, fire, increased pollutant concentrations in surface water, and diminished sewage flows

According to the *2012 Michigan Hazard Analysis*, drought is a natural part of Michigan's climate and can be exacerbated by the heat during the warmer months. The *2019 Michigan Hazard Mitigation Plan* states Michigan has 3 average annual drought events with no deaths or injuries and has greater than $7 million in annual property and crop damage. The most common type of drought is agricultural drought, where severe soil-moisture deficits lead to serious consequences for crop production.

In the late 1980's, the central and eastern portions of the United States, including Michigan, experienced a drought that caused an estimated $40 billion in damages from agricultural losses, river transportation disruption, water supply shortages, wildfires, and other related economic impacts.

Communities instituted temporary water use restrictions and a state task force was formed to study the drought and formulate mitigation strategies. In June 1988, the Governor issued a statewide outdoor burning ban to prevent potential wildfires. Between 1989 and 1990, the Northeastern Lower Peninsula experienced drought conditions for eight months in a row.

Between 1998 and 2003, Michigan experienced another drought that caused an estimated $6-9 billion in damage from Texas to the Carolinas, over $1 billion in damage in the Eastern U.S. in 1999, and over $4 billion in damages and costs in the South-Central and Southeastern U.S. in 2000. The northeastern and southwestern areas of the Lower Peninsula experienced 9 to 10 months of drought conditions between 1999 and 2000. In 2001, the drought/heat wave damaged or destroyed one-third of Michigan's fruit, vegetable, and field crops, which resulted in a U.S. Department of Agriculture Disaster Declaration for 82 of the state's counties. In addition, Southeast Michigan experienced water shortages, which resulted in local officials issuing periodic water usage restrictions. In September 2002, Michigan communities were under water use restrictions and the agricultural yields were estimated to be less than 50%, while counties in eastern Michigan were declared agricultural disaster areas.

Measuring Droughts

Two main methods to measure drought are the Palmer Drought Severity Index (PDSI) and the U.S. Drought Monitor. The PDSI was the first comprehensive drought index and the U.S. Drought Monitor is a newer index that combines quantitative measures with input from experts in the field.

The Palmer Drought Severity Index (PDSI) responds to weather conditions that have been abnormally dry or abnormally wet and is calculated with precipitation and temperature data, and the local available water content of the soil. The index's scale ranges from -6.0 (dry) to +6.0 (wet), where zero is normal. The nearest station to Alcona County that maintains PDSI information is Hale Loud Dam. The station shows Alcona County's coastal and inland areas are currently experiencing a moderate wet period (Figure 6-8).

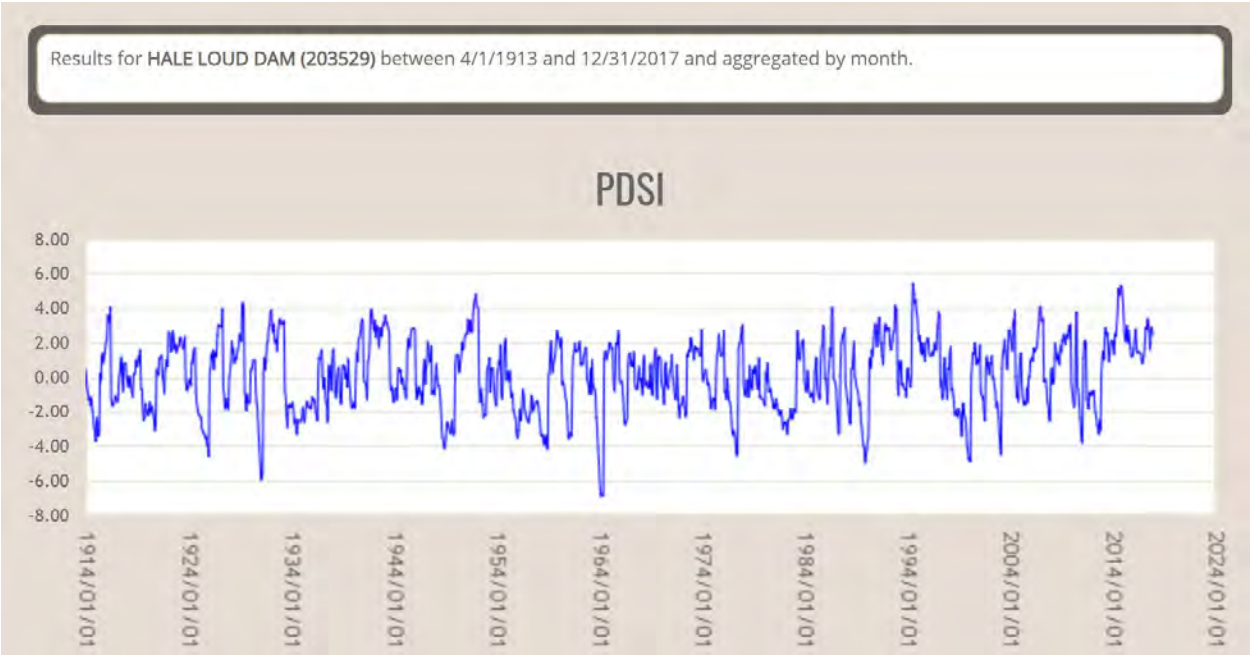

Figure 6-8 Palmer Drought Severity Index for Hale Loud Dam
Source: The National Drought Mitigation Center's Drought Risk Atlas

The U.S. Drought Monitor classifies droughts into four categories from least intense (D1) to most intense (D4) and has an additional category for drought watch (D0). Drought watch (D0) results in short-term dryness with slowed planting, slowed crop and pasture growth, and some lingering water deficits. Moderate Drought (D1) results in some crop and pasture damage, low streams, reservoirs, or wells, some water shortages, and voluntary water-use restrictions. Severe Drought (D2) results in crop or pasture losses, common water shortages, and water restrictions. Extreme Drought (D3) results in crop and pasture losses, widespread water shortages and water restrictions. Exceptional Drought (D4) results in water emergencies with widespread crop and pasture losses, and a shortage of water in reservoirs, streams, and wells.

Location

A drought is a regional event that is not confined to geographic and political boundaries and can affect several areas at one time. Also, the severity of the drought may range across the affected areas. All of Alcona County is at risk to drought occurrence and impacts. Agricultural lands are found in the Village of Lincoln, and Caledonia, Haynes, Hawes, Harrisville, Gustin, Mikado, Greenbush, Curtis, Alcona, and Mitchell Townships.

Previous Occurrences and Probability of Future Occurrences

The amount of precipitation received each year has the potential to inform the impact drought may have on the county. Alcona County's average annual precipitation is 30.67 inches, and its average annual snowfall is 53 inches.

In Michigan, droughts are monitored and analyzed through its ten climate divisions. According to the *2019 Michigan Hazard Analysis,* Alcona County is part of Climate Division 4, along with Alpena, Cheboygan, Crawford, Iosco, Montmorency, Ogemaw, Oscoda, Otsego, Presque Isle, and Roscommon Counties. The U.S. Drought Monitor for Climate Division 4 shows the division's area tends to be abnormally dry with some moderate and severe droughts throughout the years (Figure 6-9). Between 1895 and 2018, 51% of the years did not have any drought months in Climate Division 4 according to the *2019 Michigan Hazard Analysis*. The most extreme drought in this climate division occurred in February 1931 with a Palmer Index of -6.13. The division also had droughts in the following time periods: 1895-1896 (15 months), 1908-1911 (37 months), 1913-1915 (21 months), 1925-1926 (10 months), 1930-1931 (12 months), 1948-1949 (17 months), 1955-1956 (12 months), 1963-1964 (8 months), 1976- 1977 (11 months), 1989-1990 (8 months), 1998-1999 (11 months), and 1999-2001 (21 months).

On March 2, 1977, Alcona County received a Presidential Drought Emergency Declaration during the 1976-77 drought in the Great Plains, Upper Midwest, and West. The drought conditions contributed to wildfires, crop damage, and low Great Lakes levels in Michigan.

Due to the limited amount of data available for droughts, an exact probability is difficult to calculate. However, based on the U.S. Drought Monitor Index, Alcona County experienced drought in 16 out of the 18 years on record, which equates to an 88% chance that a drought will occur each year. It is difficult to predict future occurrences of drought in the county since multiple factors, such as climate change, precipitation, humidity, and temperature can influence drought conditions. However, droughts are more likely to occur in the summer months when the higher temperatures increase evaporation rates. Based on the data from the U.S. Drought Monitor Index, abnormally dry conditions are predicted for future drought occurrences in the county, which would result in slowed planting, slowed crop and pasture growth, and some water deficits.

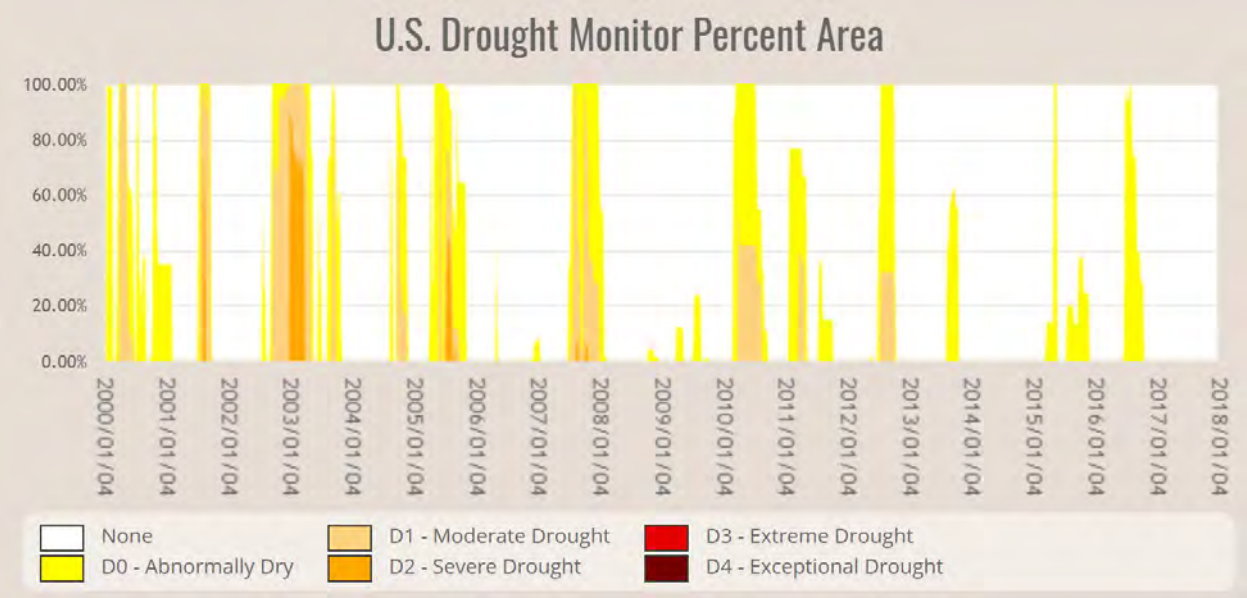

Figure 6-9 U.S. Drought Monitor Percent Area for Climate Division 4
Source: The National Drought Mitigation Center's Drought Risk Atlas

Extent

Generally, the county experiences abnormally dry conditions that fall into the drought watch category of the U.S. Drought Monitor. Severe droughts occurred in 2001, 2003, 2005, and 2007. Despite not experiencing exceptional droughts, the county has the potential to experience them in the future.

Vulnerability Assessment

It is difficult to quantify drought conditions since droughts do not have specific boundaries and are dependent on the weather-related factors. In Alcona County, impacts from extended drought are an increased potential for wildfires, a reduction in farm products, a reduction in timber production, and loss of tourism. Drought conditions may increase the risk for wildfires, which would require residents to be warned and/or evacuated. Droughts can also impact the county's public health through the reduction of the quality and quantity of available water for drinking, business operations, and recreational, agricultural, and forestry management activities. While droughts have not been severe enough to fully deprive the county of water, it is possible. Additionally, droughts may impact food prices and may result in food product shortages since farming activities (hay production, pastureland, and row crops) occur on about 9.4% of the county's land. Farms may see an increase in production expenses.

Lightning

Description

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

In the United States, approximately 100,000 thunderstorms occur annually according to the *2019 Michigan Hazard Analysis*. According to the National Weather Service Storm Data, in the last 10 years (2009-2018), the U.S. has averaged 27 lightning fatalities and 243 injuries. The *2019 Michigan Hazard Analysis* reports that lightning on average damages more structures and kills and injures more people in the U.S. per year than tornadoes or hurricanes despite being perceived as a minor hazard. The *2019 Michigan Hazard Analysis* compiled the following statistics from NOAA and the National Lightning Safety Institute (NLSI) for the period of 1959-1994:

- The majority of lightning strikes had one victim (91%)
- The majority of lightning strikes occurred during the summer months: June (21%), July (30%), and August (22%)
- Most lightning strikes occur between 2 p.m. and 6 p.m.

The NLSI estimates that 85% of lightning victims are children and young men (aged 10-35 years) engaged in recreation or work-related activities. Approximately 10% of lightning strike victims die, and 25% of survivors suffer serious long-term after-effects, such as memory and attention deficits, sleep disturbance, fatigue, dizziness, and numbness. Additionally, the NLSI estimated that annual lightning damage to property exceeds $4-5 billion in the United States.

Michigan's lightning deaths and injuries are fairly consistent with the national trends in terms of location of deadly or injury-causing strikes (Table 6-5, Table 6-6). According to the National Weather Service records through the mid-2000s, Michigan has incurred 101 lightning deaths, 711 lightning injuries, and 810 lightning casualties (deaths and injuries combined). During 1959-1995, Michigan was ranked 2nd nationally (behind Florida) in lightning injuries, and 12th nationally in lightning deaths. During 1998-2008, Michigan was ranked 13th in the number of lightning deaths.

Table 6-5 Lightning-Related Deaths in Michigan, 1959-July 2005

Number of Deaths	Location	Percent of Total
29	Open fields, ball fields	29%
26	Under trees (not golf)	26%
11	Boats / water-related	11%
10	Golf course	10%
4	Near tractors / heavy equipment	4%
2	At telephone	2%
19	Other location / unknown	19%

Source: Storm Data, National Climatic Data Center; 2019 Michigan Hazard Analysis

Table 6-6 Lightning-Related Injuries in Michigan 1959-July 2005

Number of Injuries	Location	Percent of Total
243	Open fields, ball fields	34%
104	Under trees (not golf)	15%
35	Golf course	5%
26	Boats / water-related	4%
20	Near tractors / heavy equipment	3%
19	At telephone	3%
264	Other location / unknown	37%

Source: Storm Data, National Climatic Data Center; 2019 Michigan Hazard Analysis

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

Previous Occurrences and Probability of Future Occurrences
Between 1959 and 2019, Alcona County has not had any reported lightning events according to NOAA. Based on this data, Alcona County would not have a lightning event in the future. However, not all lightning events may have been reported since events with injuries, deaths, and extensive damages tend to be the only ones reported. Therefore, the number of lightning events and damages may be higher.

Extent
One method to measure lightning extent is by flash density even though not all flashes result in a lightning strike. In Alcona County, there are 1.5 to 6 flashes per square mile per year on average according to Vaisala, Inc. Another way to measure lightning extent is by the amount of property damage and the number of deaths and injuries. However, no events have occurred in Alcona County.

Vulnerability Assessment
All existing and future buildings, exposed infrastructure, tall trees, and populations are at risk from lightning events since it may cause structural and wildland fires, loss of electrical and telecommunications equipment, and damage to buildings or vehicles from falling trees struck by lightning. People that work outside or participate in outdoor recreation activities are at a higher risk to be struck by lightning.

Hailstorms

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

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

According to the *2012 Michigan Hazard Analysis,* the National Weather Service (NWS) began recording Michigan's hail activity in 1967. The NWS issues forecasts for severe thunderstorms with sufficient warning time to allow residents to take appropriate action to reduce the effects of hail damage to vehicles and some property. However, little can be done to prevent damage to crops. For example, during September 26-27, 1998, a line of severe thunderstorms moved across northern

Lower Michigan producing hail up to 2" in diameter, destroying an estimated 30,000-35,000 bushels of apples at area farms, and damaging several homes and vehicles.

Measuring Hailstorms
Hailstorms are categorized using the TORRO Hailstorm Intensity Scale, which ranges from H0 (Hard Hail) to H10 (Super Hailstorms).

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

Previous Occurrences and Probability of Future Events
According to NOAA, Alcona County has had 53 hailstorms with the largest reported hail size recorded at two inches between 1967 and January 2019. None of the events had any deaths, injuries, or property damages. On August 21, 2011 and October 17, 2016, hailstorms occurred with two-inch hail. The storms did not have any deaths, injuries, or property and crop damages. On July 16, 2018, a hailstorm with one-inch hail caused $500 in crop damages to area gardens (no deaths, injuries, or property damages occurred). Since there have been 53 events in the past 53 years, approximately one event will occur every year.

Extent
The greatest extent of hail reported in Alcona County was 2 inches, which correlates to H6 (Destructive) and H7 (Destructive) on the TORRO Hailstorm Intensity Scale. According to the scale, hailstones of this size are equivalent to a hen's egg and can cause brick walls to be pitted, bodywork of grounded aircraft to be dented, severe roof damage, and risk of serious injuries.

Vulnerability Assessment
All existing and future buildings, exposed infrastructure, and populations are at risk from hailstorms since hail causes damage to roofs, brick walls, glass, landscaping, crops, and cars. Hail can also damage roads, sidewalks, bridges, and above ground utilities. Hail has the potential to cause injury and death, and populations are advised to take shelter when an event occurs.

Technological Hazards

Transportation Hazardous Material Accident

Description
A transportation hazardous material incident is an uncontrolled release of hazardous materials during transport that pose risks to health, safety, property, and the environment. All modes of transportation (e.g., highway, railroad, seaway, airway, and pipelines) carry thousands of hazardous material shipments on a daily basis through local communities. A transportation accident involving any of the hazardous material shipments could cause a local emergency that would affect the immediate vicinity of the accident site or a small portion of the surrounding community. The Pipeline and Hazardous Materials Safety Administration of the U.S. Department of Transportation regulates over 1 million daily shipments of hazardous materials in the United States.

All areas in Michigan are vulnerable to a hazardous material transportation incident with Southern Michigan being more vulnerable due to its highly concentrated populations. The State has experienced numerous small-scale incidents that are responded to by local fire departments and hazardous material teams. Fortunately, Michigan has not experienced large scale incidents.

Location
The City of Harrisville, Springport, Greenbush, and Caledonia, Haynes, Harrisville, and Greenbush Townships are vulnerable to transportation hazardous material accidents along U.S. 23. The City of Harrisville, Hardy, Flynn Corners, and Mitchell, Millen, Gustin, and Harrisville Townships are vulnerable to an accident along M-72. Glennie, Cheviers, Curran, Flynn Corners, McGinn, and Curtis, Millen, and Mitchell Townships are vulnerable to accidents along M-65. Additionally, the county is vulnerable to transportation hazardous material accidents on Lake Huron from routine marine shipments.

Previous Occurrences and Probability of Future Occurrences
Alcona County has not had any significant accidents reported but has had minor petroleum and hazardous material spills on the highways and railroad. At this time, no hazardous materials are transported on the railroad. A potential accident would occur on M-72, M-65, and U.S. 23.

Extent
The extent of a transportation hazardous material accident can be measured by the amount and cost of property damages. However, data is unavailable to quantify the cost of past accidents. Another way extent can be measured is based on location of an accident. U.S. 23, M-65, and M-72 are the most vulnerable to a transportation hazardous material accident since these are the major thoroughfares through the county.

Vulnerability Assessment
Existing and future buildings, infrastructure, and populations located near U.S. 23, M-65, and M-72 are at-risk for a transportation hazardous material accident. An accident has the potential to leak material into the county's surface water and groundwater systems, which would impact wells. Additionally, an accident could cause damage to buildings near the road, and damage communication and utility infrastructure that could cause power outages and a loss of communication lines. Dependent on the severity of the incident, individuals may experience chemical burns, nausea, vomiting, poisoning, and disorders of the body's organ systems. Businesses may close and a spill could cause the soil around businesses and residences to become contaminated. The routine shipments of hazardous materials along the county's Lake Huron shoreline increases the risk for the Great Lakes to become contaminated, which could potentially degrade the aquatic habitat, kill vegetation and aquatic wildlife, make terrestrial wildlife sick from ingestion of the contaminated water, negatively impact real estate along Lake Huron near the accident site, negatively impact the recreational opportunities and community events, and negatively impact the commercial fisheries.

Infrastructure Failures

Description

Infrastructure provides essential services, such as power, heating, air conditioning, water, sewage disposal and treatment, storm drainage, communications, and transportation. Infrastructure failures occur when public or private utility infrastructure becomes temporarily disabled. These failures can occur at any time and last from a few seconds to weeks. Infrastructure failures also cause widespread economic losses to businesses and industries, limit security, and alter lifestyles. Generally, the elderly, children, impoverished individuals, and people in poor health are most impacted by infrastructure failures. For example, people unable to afford generators or have access to fireplaces will have more difficulty getting through a failure.

Since infrastructure is becoming more complex and interdependent, these failures can be large in scope and magnitude. For example, a power outage during extreme heat and cold events has the potential to cause a person to die in their home, which creates a public safety emergency, and it may cause water or wastewater treatment systems to become inoperable, which may result in a public health emergency. Northern Michigan has fewer infrastructure networks than urban areas; however, a failure affects a larger geographic area since residences and businesses are spread out.

Michigan's infrastructure is aging, which is affecting maintenance funding and user demand. Additionally, Michigan's codes and standards for the design, construction, and operation of public and private utility infrastructure require a minimum level of structure integrity and operational performance, which is not adequate to protect infrastructure during a disaster. In 2018, the State established the Michigan Infrastructure Council to develop a 30 year statewide strategic framework to address the need for infrastructure improvements in Michigan. For more information, see the following website: https://www.michigan.gov/mic.

Location

The entire county is susceptible to infrastructure failures since the population and businesses are spread out. Even though the county has a large number of forested areas, infrastructure does traverse these areas. Additionally, 57.1% of the population is located in Greenbush Township (13.0%), Harrisville Township (12.5%), Curtis Township (11.2%), Alcona Township (10.7%), and Caledonia Township (9.7%). However, it should be noted that all of the jurisdictions except for Alcona Township have a declining population. The dense populations in the Village of Lincoln and the City of Harrisville account for 7.2% (3.4% and 3.8%, respectively).

Previous Occurrences and Probability of Future Occurrences

Alcona County has not had a major infrastructure failure reported. However, the possibility for an event to occur exists depending on the age of the county's infrastructure and the availability of maintenance funding.

Extent

Since Alcona County is classified as rural, its infrastructure is spread over a large geographic area. If there is an infrastructure failure, a large area would be impacted. Additionally, if a failure occurred in Greenbush, Harrisville, Curtis, Alcona, or Caledonia Townships, large population concentrations would be affected.

Vulnerability Assessment
In Alcona County, the electrical system consists of above ground power transmission lines that traverse forested areas. Damage to these lines would cause a power outage over a large area since the county is rural in nature. A power outage would impact the population based on the time of year (winter would require heating stations to be set up and summer would require cooling stations to be set up), and if the population has any medical issues that require machines or refrigerated medicine. A water and sewer infrastructure failure would impact the businesses and residents in the City of Harrisville, while a sewer infrastructure failure in the Village of Lincoln would impact the businesses and some residences. The Village of Lincoln does not have a water system. A failure may cause health issues (e.g., gastrointestinal illnesses and cancer) if contaminated water is ingested. Also, some areas in the county are not covered by cell phone service due to topography and lack of infrastructure. Businesses, residents, and visitors would not be able to reach out to family and friends or call for emergency services if the existing communication infrastructure fails. Damage to the roads would cause them to be closed until fixed. These road closures would increase drive times and emergency response times.

Transportation Accident (air/land/water)

Description
Transportation crashes or accidents involve air, land, or water-based commercial passenger carriers. These accidents can result in mass casualties and tremendous injuries due to large numbers of passengers, unpredictable weather, mechanical failures, and human error. These accidents have the potential to strain local response and medical services. Airplane accidents tend to occur either during take-off or landing according to the NTSB and airline industry. When responding to these accidents, it may be difficult to suppress the fires, rescue and provide first aid to survivors, establish a mortuary facility, detect the presence of explosive, radioactive, or other hazardous materials, and provide crash site security and crowd control. Water transportation accidents may require underwater rescue and recovery efforts. Vulnerable populations to these hazards include communities near airports, communities with railroad tracks through them, communities with commercial intercity passenger bus or local transit bus service, communities with school bus service, and communities with commercial marine passenger service or along water bodies.

Michigan has approximately 19 commercial passenger airports, more than 130 certified intercity carriers that provide passenger, charter, commuter, and special bus service to 220 Michigan communities with six offering regular route service, an intercity rail passenger system that consists of 568 route miles along three corridors that serves 22 Michigan communities, 72 local bus transit systems serving 85 million passengers and 20 commercial marine passenger ferries.

Location
The entire county is susceptible to air, land, and water transportation accidents with the water accidents strictly occurring on all waterways (rivers, streams, lakes, etc.). The air transportation accidents have a greater chance of occurring at the Harrisville Airport (City of Harrisville) and the small private runways, such as Flying M Ranch Airport (Lincoln) and Vlachos Acres Airport (Hubbard).

Previous Occurrences and Probability of Future Occurrences
Alcona County does not have any major air and land transportation accidents reported. However, smaller accidents have likely occurred. Air accidents would primarily occur around the airports. Land transportation accidents would primarily occur along the roadways, railroad, and trail systems. Water transportation accidents would primarily occur on Lake Huron, the AuSable River, and the county's major lakes (Hubbard Lake, Alcona Dam Pond, Cedar Lake, Jewell Lake, Vaughn Lake, Crooked Lake, Brownlee Lake, Badger Lake, North Lake, McCollum Lake, and Lincoln Lake). There have been many shipwrecks on the Great Lakes due to sudden and severe storms, and reefs. The greatest concentration of shipwrecks lies near Thunder Bay (Alpena County) on Lake Huron and the most significant accident was the sinking of the Edmund Fitzgerald in 1975.

Extent
All of Alcona County is at-risk for an air, land, or water transportation accident. The extent can be measured by the amount of property damages, deaths, and injuries. According to the University of Michigan Transportation Research Institute's *Societal Costs of Traffic Crashes and Crime in Michigan: 2017 Update*, Alcona County has had one fatal traffic crash, 11 with serious injuries, and 549 out of 610 traffic crashes with property damage only. The average cost of a traffic crash casualty was $34,315 with the total traffic crash cost for all 610 accidents equaling $20,932,384. Unfortunately, data is unavailable to quantify the extent of air and water transportation accidents.

Vulnerability Assessment
Alcona County does not have passenger rail service, commercial marine passenger service, intercity bus service or commercial airport. However, it does have school bus and specialized public transit services that could result in loss of life and injuries if an accident occurred. An air transportation accident has the potential to cause deaths, injuries, and large amount of property damage if a plane hits the county's buildings, infrastructure, or population. Land transportation accidents have the potential to cause damage to other vehicles, injuries, death, and a transportation hazardous material accident. Dependent on the severity of the accident, it can cause road closures that would impact the county's traffic flow patterns and emergency service response times. Additionally, there is a significant amount of private and commercial marine activity along Alcona County's Lake Huron shoreline. Since conditions on Lake Huron change rapidly, the communication system between the boaters and mainland should be maintained and upgraded. Since the 1800s, shipwrecks have decreased dramatically due to better weather prediction and communication abilities, radar technologies, lighthouses, ship lighting, shipping regulations, floating navigation aids, LORAN stations, improved ship designs and construction quality, and U.S. and Canadian Coast Guard stations around the lakes. Additionally, the U.S. Army Corps of Engineers and other agencies dredge the harbors and seaways.

Dam Failure

Description
A dam is either man-made or constructed by wildlife, and controls the flow of water for agriculture, flood-control, artificial lakes, municipal water supplies, and energy generation. A dam failure occurs when an impoundment either collapses or fails, which results in flash flooding downstream or water pouring over the top of the dam during a flood event. This failure may be due to poor operation, lack of maintenance, or vandalism of the dam. Dam failures can result in loss of life and extensive damage to property and natural resources since they occur unexpectedly.

According to EGLE, there are 2,500 dams in Michigan with 813 regulated by Part 307, Inland Lake Levels, and 235 regulated by Part 315, Dam Safety of The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The dams regulated by Part 307 have a court issued order that establishes the level at which the lake is to be maintained; while the dams regulated by Part 315 are over 6 feet in height and over 5 acres are impounded during the design flood. Additionally, the Federal Energy Regulatory Commission (FERC) regulates 99 hydroelectric dams under the Federal Power Act. Since 1888, EGLE has documented approximately 302 dam failures in Michigan with an estimated average annual property and crop damage of $0.3 million.

Part 315 requires EGLE staff to determine the hazard potential classification for each dam according to the potential downstream impact the dam would have if it failed and to establish an inspection schedule. Dam inspections are required every three to five years for state regulated dams based on their hazard potential rating. For dams classified with a high or significant hazard potential, dam owners are required to prepare and maintain emergency action plans. Additionally, owners are required to have the local emergency management coordinators review the plans for consistency with local emergency operations plans before the owners submit the emergency action plan to EGLE.

The FERC licenses and inspects private, municipal, and state hydropower projects. The FERC requires every applicant to develop and file an emergency action plan with the Regional Engineer unless granted a written exemption. The plan describes the actions that will be taken to moderate or alleviate a problem at the dam and the actions that will occur to respond to dam incidents or emergencies. It also includes inundation maps that identify critical infrastructure and at-risk populations. A yearly comprehensive review of the emergency action plan is conducted, which may include a functional exercise with local emergency management officials.

Location

Dams are located in Curtis, Mikado, Millen, Mitchell, Caledonia, and Alcona Townships (Figure 6-10). The Alcona Dam is located in Curtis Township and is the only high hazard dam in the county. Waszkiewicz Dam is located in Mikado Township and is the only significant dam in the county. All other dams have a low hazard potential.

Previous Occurrences and Probability of Future Occurrences

Alcona County has not had any previous reported dam failures. According to the National Inventory of Dams, Alcona County has eighteen dams with an average age of 42 years (Table 6-7). Based on the aging infrastructure, there is a potential for a dam failure. Proper dam maintenance may predict and prevent the possibility of a future event. Further analysis will only focus on the Alcona Dam, Waszkiewicz Dam, and Hubbard Lake Dam. The Alcona Dam is 96 years old, has a high hazard potential, and is required to have an emergency action plan. The Waszkiewicz Dam is 53 years old, has a significant hazard potential, and does not have an emergency action plan. The Hubbard Lake Dam is 130 years old, has a low hazard potential, and is required to have an emergency action plan. The other dams in the county have a low hazard potential and are not required to have an emergency action plan. Therefore, the low hazard potential dams will not be further analyzed at this time.

Extent
Extent can be measured by the amount of damage that occurs and the number of deaths and injuries. Since Alcona County has not had any reported dam failures, data is unavailable to quantify the extent. However, since the Alcona, Waszkiewicz, and Hubbard Lake Dams are over 50 years old, there is a potential for a dam failure.

Vulnerability Assessment
Alcona Dam has a high hazard potential, which means there is some development downstream in the dam's hydraulic shadow and it is expected there will be environmental impacts from the release of contaminated sediments behind the dam. Consumers Energy owns the Alcona Dam and has compiled inundation maps for the Au Sable River that show failure of the dam would not impact homes but would impact several bridges. The Waszkiewicz Dam has a significant hazard potential, which means a failure would not cause deaths, but can cause environmental damage. The Hubbard Lake Dam has a low hazard potential but has an emergency action plan since there are homes around Hubbard Lake and there will be an environmental impact from a dam failure. The inundation maps for the Alcona Waszkiewicz Dams can be found in the Emergency Action Plan since they are protected copies that cannot be placed in other plans or re-distributed.

A flood event due to a dam failure would prevent access to buildings, carry people and vehicles away, cause businesses to lose their businesses and inventories, and residents to lose their houses and belongings. Buildings would be damaged, destroyed, and compromised, and would develop mold, rot, and foundation damage from floodwaters. The presence of mold would increase the health risk for populations with breathing conditions. Floodwaters may damage roads, bridges, electrical systems, communication systems, overflow sewers, and impact natural gas tanks where they are at-risk for fire or explosions. Roads may be close for long periods of time, which would impact traffic flow and emergency response times. Floodwaters also can conceal damaged electrical wires and debris. Contaminants and pollutants in the floodwaters can degrade watersheds, and increase the population's risk for diseases, infections, and injuries. Flooding from a dam failure would be costly. Possible evacuation procedures should be put in place, and residents and visitors should be aware of evacuation routes.

Table 6-7 Alcona County Dams									
	Name	**Height (ft.)**	**Storage (acre-feet)**	**Location**	**Regulatory Agency**	**Dam Type**	**Year Completed**	**Dam Purpose**	**Hazard Potential**
1	Kelsey Dam	13.5	220	Butternut Creek	State	Private	-	Other	Low
2	Thompson Dam/ Hubbard Lake Walleye Pond	12	70	Tributary to Devils River	State	Private	1979	Other	Low
3	Lost Lake Woods East Dam	5.8	146	Tributary to Pettis Creek	-	Private	1999	Recreation	Low
4	Birch Creek Club Dam	18	57	Robbs Creek	State	Private	1998	Recreation	Low
5	Little Wolf Creek Dam	14	540	Little Wolf Creek	State	Private	1948	Recreation	Low
6	Bucks Pond Dam/Kewanee Lake Dam	11	470	Comstock Creek	State	Private	1930	Recreation	Low
7	Dahms Dam	10	70	-	Federal-USDA FS	Federal	1994	Fish and Wildlife Pond	Low
8	Foote Dam	10	133	-	Federal-USDA FS	Federal	1994	Fish and Wildlife Pond	Low
9	Big Gulch Pond/Curtisville Wildlife Pond 1	14	73	Tributary to Wilbur Creek	State	Federal	1996	Other	Low
10	Outlaw Pond/Curtisville Wildlife Pond 2	11.5	102	Tributary to Wilbur Creek	State	Federal	1996	Other	Low
11	Otter Pond/Curtisville Wildlife Pond 3	14	85	Tributary to Smith Creek	State	Federal	1996	Other	Low
12	Alcona Dam	60	25,000	Au Sable River	Federal	Public Utility	1924	Hydroelectric	High
13	McGillis Creek Dam	9.5	68	McGillis Creek	State	Federal	1992	Other	Low
14	Cattail Dam	8	57	Tributary to McGillis Creek	Federal-USDA FS	Federal	1996	Fish and Wildlife Pond	Low
15	Sprinkler Lake Dam	9	206	Sprinkler Lake Outflow	Federal-USDA FS	Federal	1988	Fish and Wildlife Pond	Low
16	Shagpoke Dam	10	88	Tributary to Wilbur Creek	Federal-USDA FS	Federal	2001	Fish and Wildlife Pond	Low
17	Waszkiewicz Dam	19	141	Grey Creek	-	Private	1967	Recreation	Significant
18	Hubbard Lake Dam	11	35,200	Thunder Bay River-South Branch	-	Private	1890	Hydroelectric	Low

Source: National Inventory of Dams, Retrieved July 2019

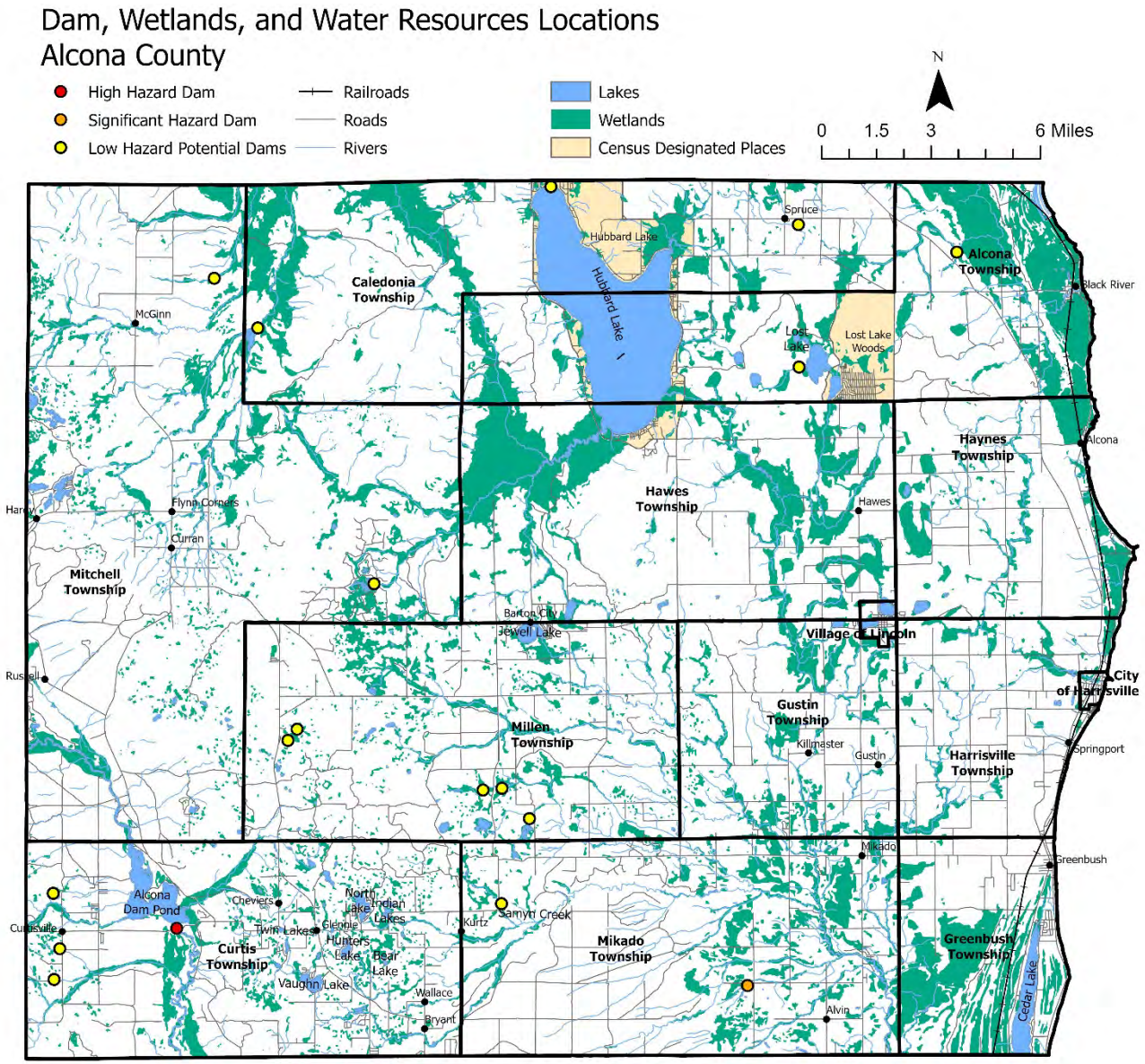

Figure 6-10 Dam, Wetlands, and Water Resources Locations

Structural Fire

Description
Structure fires occur when a fire ignites one or more structures of residential, commercial, industrial, institutional, or other type. These fires are considered to be the most common hazard with most incidents limited in scale and not having the ability to threaten or harm an entire community. However, fires in facilities, such as hotels, entertainment venues, schools, and hospitals, pose a great risk due to the large number of persons involved.

According to the National Fire Protection Association and the U.S. Fire Administration, the U.S. had 499,000 structure fires and 3,400 civilian fire deaths in 2017 with a national average of 2.3 deaths and 9.3 injuries per 1,000 fires. Michigan generally matches the national trend for structure fires.

From 1975 to 2009, the number of reported fires in Michigan has trended downwards, with annual numbers fluctuating. In 2003, the Fire Marshal Division of the Michigan Department of Licensing and Regulatory Affairs reported nearly 19,000 structure fires occurred in Michigan resulting in 161 deaths, 624 injuries, and $230 million in estimated damages. In 2006, Michigan's fire death rate was 15.4 persons per million, which ranked it in the middle of all states. According to the U.S. Fire Administration, Michigan reported 3.7 deaths and 15.6 injuries per 1,000 fires through the National Fire Incident Reporting System in 2017.

Location
All of the existing and future structures in Alcona County are at-risk for a structural fire.

Previous Occurrences and Probability of Future Occurrences
According to the Michigan State Police's Fire Marshal Division in 1998, there were 6.58 structural fires and other types of fires per 1000 persons in Alcona. In 2018, Alcona County received 64 fire calls with 32 structural fire calls, 6 vehicle fire calls, and 26 other fire calls according to the National Fire Incident Reporting System for Michigan. The fire service did not have any fire related injuries or deaths, and the total fire loss amount was $1,848,900. Dependent on age of housing stock, infrastructure, and distance between structures, all of the existing and future structures are at-risk for a structural fire. It is difficult to predict the future occurrence of a structural fire.

Extent
All existing and future structures in the county are at-risk for a structural fire with the total fire loss amounting to $1,848,900 in 2018.

Vulnerability Assessment
All of the existing and future buildings, populations, and infrastructure in Alcona County are at-risk to a structural fire. The county has aging housing stock and infrastructure that was built under building codes and rules for fire prevention that are no longer in effect today. Aged electrical lines increase a buildings risk for structural fires. Also, buildings without smoke and carbon monoxide detectors increase the risk for deaths. If not contained, the structural fires can turn into wildfires and cause secondary hazard events.

Alcona County relies on a network of township volunteer fire departments, which means there is a lack of full-time professional firefighters who are available to conduct fire inspections and take other preventive measures to lessen the threat of structural fires. Therefore, efforts in Alcona County are

directed at fire suppression and make it challenging to maintain sustainable fire prevention and inspection programs. Additionally, some communities may not have fire prevention codes and rely on the State Rules for Fire Prevention, while other communities have developed local ordinances. However, the costs of compliance for existing buildings may be prohibitive for business owners, yet it would be beneficial for new construction to comply with both State building code and State Rules for Fire Prevention.

Oil and Gas Accidents (well and pipeline)

Description
An oil and gas accident occurs when there is an uncontrolled release of oil, natural gas, or the poisonous by-product hydrogen sulfide from production wells or from a pipeline that causes property damage, environmental contamination, injuries, or loss of life. Michigan is a major consumer and producer of oil and natural gas products that are transported and stored throughout the state. The State has the greatest underground natural gas storage capacity in the nation and supplies natural gas to its residents and neighboring states. However, these underground pipelines have the potential to leak, rupture, and explode, which puts many communities at risk. In Michigan, oil and natural gas wells are located in 63 counties in the Lower Peninsula. Between 1927 and 2009, there have been 56,525 oil and natural gas wells drilled in Michigan with about half of them producing oil and gas. As of 2012, Michigan wells have produced approximately 1.4 billion barrels of crude oil and 6 trillion cubic feet of gas. Despite being highly regulated and having a fine safety record, the threat of oil and gas well accidental releases, fires, and explosions still exists. Additionally, unplugged abandoned wells impact the health and safety of surrounding communities since they have the potential to allow natural gas to flow underground and accumulate in nearby buildings, contaminate nearby water wells, and leak into soils and the water system.

In addition, well and pipeline accidents have the potential to release hydrogen sulfide, which is a poisonous gas that explodes when mixed with air temperatures of 500 degrees or above. Hydrogen sulfide gases can be found around oil and gas wells, pipeline terminals, storage facilities, and transportation facilities where the gas or oil have a high sulfur content. Hydrogen sulfide has a "rotten egg" odor in concentrations from .03 ppm to 150 ppm, while in larger concentrations it paralyzes the olfactory nerves, so the odor is no longer an indicator of the hazard. Over 1,300 wells in Michigan have been identified as having hydrogen sulfide levels exceeding 300 ppm. At concentrations of 700 ppm, one breath of hydrogen sulfide can kill. Hydrogen sulfide can cause the failure of high-strength steels and other metals, which requires all company and government responders to be familiar with the emergency procedures and the kind of materials safe for use when responding to sour gas wells.

Location
The majority of oil and gas wells and pipelines are located in Caledonia, Mitchell, Alcona, and Haynes Townships.

Previous Occurrences and Probability of Future Occurrences
Alcona County has not had any major accidents reported. Even though the county has not had any significant accidents, the possibility for an oil and gas well and pipeline accident does exist.

Extent
The majority of the oil and gas wells and pipelines are concentrated in the northern region of Alcona County. According to EGLE, Alcona County had 601 oil and gas wells with 16 active, 111 plugging approved, and 474 producing wells in 2017. There are gas processing facilities in the well fields that are connected to the wells with numerous small, low pressure gas lines. In Alcona County, there is one major high pressure gas line that runs through the county. Smaller lines deliver natural gas to homes and businesses, and from wells to processing/compressor facilities. These facilities remove the brine and moisture from the natural gas and transmit the gas to major processing and storage facilities.

Vulnerability Assessment
The existing and future buildings and populations near the oil and gas wells and pipelines are at-risk if there is an oil and gas well and/or pipeline accident. These accidents consist of accidental releases, fires, and explosions that would cause damage and/or destruction to the buildings, infrastructure, and natural areas around the event. Oil and gas well and pipeline accidents have the potential to contaminate water wells and spread into the surface water and groundwater systems. These accidents can also negatively impact air quality through the release of hydrogen sulfide that can accumulate in oil and gas wells, pipeline terminals, storage facilities, transportation facilities, and nearby buildings. Hydrogen sulfide can cause paralysis of the olfactory nerves, burns, death, and the failure of high strength metals. Additionally, oil and gas wells and pipelines located in high-risk wildfire areas are at greater risk for an accident.

Fixed Site Hazardous Material Accident

Description
Fixed site hazardous material incidents occur when there is an uncontrolled release of hazardous materials from a fixed site that poses risks to health, safety, property, and the environment. Due to technological advances, hazardous materials are present in quantities of concern in business and industry, agriculture, universities, hospitals, utilities, and other facilities. These materials include corrosives, explosives, flammable materials, radioactive materials, poisons, oxidizers, and dangerous gases. Federal and state agencies regulate hazardous materials and many communities have plans and procedures to immediately respond to an incident. However, releases can occur despite the precautions taken to ensure careful handling during the manufacture, transport, storage, and use and disposal.

Location
According to the Tier II Manager, Alcona County has one SARA Title III Site: Viking Energy of Lincoln at 509 State Street in Lincoln, Michigan.

Previous Occurrences and Probability of Future Occurrences
Alcona County does not have any recorded fixed site hazardous material accidents. However, there is the potential for an accident. The emergency plan is on file with the Alcona County Local Emergency Planning Committee and fire departments.

Extent
Extent can be measured by the amount of damage incurred from a fixed site hazardous material accident. However, the county has not had an accident in the past fifteen years and the emergency plan is annually reviewed and updated, if necessary.

Vulnerability Assessment
The Village of Lincoln's infrastructure, existing and future buildings, and population near the fixed site are at-risk for a fixed site hazardous material accident. An accident could impact air quality. Individuals affected by the hazardous material may experience chemical burns, nausea, vomiting, disorders of the lungs, kidneys, or liver, and poisoning. An accident could also cause the area to be evacuated and require a need for emergency shelters. It would cause businesses to close and owners may have to pay for repairs caused by the accident. The hazardous material also has the potential to leak into the county's drinking and natural water systems as well as causing communication and utility infrastructure to fail.

Scrap Tire Fire

Description
Scrap tires end up in either dumps or recycling facilities, some of which have more than several hundred thousand tires. The tires provide fuel for fires since the shape of a tire allows air to flow into the interior of a pile of tires, which renders standard firefighting practices nearly useless. Scrap tire fires impact the air, soil, and water quality since the burning tires release hazardous compounds into the air, and the tires' oily residue can seep into the ground and water system. The Rubber Manufacturers Association reports a fire can convert a standard passenger vehicle tire into about two gallons of oily residue. Sometimes, the burning oil can spread the fire to adjacent areas and burn for months. These fires can cause an area to become a Superfund site.

Although infrequent, scrap tire fires can become a major hazard affecting entire communities due to the difficulty in extinguishing them and the expensive cleanup. Scrap tire fires differ from conventional fires since small scrap tire fires can require significant resources to control and extinguish, the costs of fire management are beyond what local governments can absorb, and the environmental consequences are significant.

According to the EPA and the Rubber Manufacturers Association, approximately 290 million tires are discarded in the U.S. each year, with approximately 80% of the tires being reused or recycled. As of 2017, Michigan generates approximately 10 million scrap tires annually according to EGLE. At the time of the 2014 update, Michigan had more than 24 million scrap tires at disposal sites throughout the state.

Location
The collection of scrap tires can occur throughout Alcona County. The county does not have any known tire collection sites.

Previous Occurrences and Probability of Future Occurrences
There are no recorded occurrences of scrap tire fires in Alcona County. According to EGLE, Astro Automotive, Inc. had a collection site application that lapsed in 1993 and Smiths Auto Salvage had a collection site application that lapsed in 1992, but in 2007, the facility was inspected as a scrap tire collection site and found to be in compliance. Additionally, Recycle Alcona County, Inc. and Alcona County received grants to round up scrap tires in the county in 2018 and 2019. Since there have not been recorded occurrences of scrap tire fires in Alcona County, it is expected that future tire fires will not occur. However, there may be scrap tire collection sites through the county that few people know about, which makes a scrap tire fire a possibility in the county.

Extent
Extent can be measured by the number of acres burned and the cost of property damages. Since Alcona County has not had a reported scrap tire fire, data is unavailable to determine the number of acres burned, property damage costs, and the costs to fight the fire. However, there is a potential for an event to occur in an area of the county that few people know has a stockpile of tires.

Vulnerability Assessment
If a scrap tire fire were to occur in the county, all of the county's infrastructure, existing and future buildings and populations would be at-risk. Additionally, neighboring counties would also be at-risk since the fires are difficult to control and can spread across political and geographical boundaries. Depending on the location of a scrap tire fire, it has the potential to cause a wildfire, infrastructure failure, and an oil and gas accident (well and pipeline). Scrap tire fires burn property and structures and have the potential to cause death and injuries for people who become trapped in the fire or are fighting the fire. Scrap tire fires also have high costs due to property damage and firefighting needs. Scrap tire fires can cause a loss in timber production and agricultural revenue from the fire damaging timber supplies and agricultural products and killing livestock. Communication and power infrastructure can be damaged by the fires resulting in power outages, reduced/loss of warning notifications to the public, and the inability to call for emergency services. Also, residents and businesses may have to evacuate and find shelter.

Human-related Hazards

Public Health Emergency

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

Throughout the years, there have been many pandemics. For example, there was an outbreak of severe acute respiratory syndrome (SARS) in 2003. This virus was a new coronavirus that resulted in over 8,000 infections and a 10% mortality rate around the world. Additionally, a new strain of H1N1 was detected in 2009, which had approximately 300,000 deaths. Older people were less likely to get sick from this disease since they had derived immunity from a flu strain that had circulated in the mid-20th century. Since 2012, Middle East respiratory syndrome (MERS), a coronavirus, has been reported in 27 countries where there have been approximately 2,494 people infected and 858 deaths. In 2017, the World Health Organization (WHO) put SARS and MERS on its priority pathogen list to spur further research into coronaviruses.

On March 11, 2020, the WHO declared the SARS-CoV-2 (COVID-19) outbreak a pandemic. The new coronavirus had not been previously identified in humans and does not have a vaccine or treatment. It was first reported in China on December 31, 2019. In early 2020, COVID-19 began impacting numerous countries around the globe. In response, countries and some states in the U.S.

instituted bans and restrictions on travel, instituted nationwide lockdowns, closed schools and businesses, requested study abroad students return to their countries, transitioned from in-person to online classrooms, cancelled/postponed events (e.g. conferences, concerts, sporting events, commencement ceremonies, etc.), requested people call before arriving at hospitals, instituted bans on the number of people that can gather in one area, instituted social distancing of six feet between individuals, and some churches temporarily suspended services. Some citizens responded by purchasing supplies en masse, which caused some supply shortages. On March 13, 2020, the U.S. declared COVID-19 a national emergency and began developing a sweeping relief package, which was signed by President Trump on March 27, 2020. On March 23, 2020, Michigan announced an order for all Michigan businesses and operations to temporarily suspend in-person operations that are not necessary to sustain or protect life, and to stay home unless they are part of the critical infrastructure workforce, engaging in outdoor activities, or performing necessary tasks (e.g., going to the grocery store). On March 28, 2020, President Trump approved Governor Whitmer's request for a Major Disaster declaration in Michigan, which allows Michigan to participate in FEMA programming.

Location
Public health emergencies do not have geographic or political boundaries and affect all of Alcona County.

Previous Occurrences and Probability of Future Occurrences
As of December 23, 2020, there have been 469,928 confirmed COVID-19 cases and 11,775 deaths in Michigan, and 273 confirmed cases and 11 deaths in Alcona County. It is impossible to predict when a major event will occur or how severe it will be. However, a pandemic has a higher probability of occurring in areas where there are high population concentrations and during colder weather.

Extent
The extent of a public health emergency can be determined by the number of cases and deaths, and the amount of money spent to prepare for and respond to public health threats. In Alcona County, District Health Department #2 works with local, state, and federal agencies to prepare for and respond to public health threats. It has developed a comprehensive emergency preparedness program that is capable of responding to a variety of emergency situations with funds from the Centers for Disease Control and Prevention. Additionally, Region 3 Healthcare Coalition promotes an all-hazards emergency healthcare preparedness program. Between March 10, 2020 and December 22, 2020, Alcona County administered 4,156 tests for COVID-19 with 238 positive tests.

Vulnerability Assessment
Alcona County is highly vulnerable to public health emergencies since it is composed of an older population. A public health emergency will have a severe impact over a large geographic area or in densely populated areas. Additionally, the hazard will have a serious financial impact on residents and businesses. In extreme cases, travel may be prevented, and businesses and schools will be closed. If businesses close for extended periods of time, employees will lose wages and the ability to pay their bills, and the businesses will lose revenue, which may cause them to go out of business and employees to lose their jobs. At risk-populations include individuals who are at higher risk of severe complications from infectious diseases (older adults, pregnant women, children, people with pre-existing medical conditions), individuals with limitations that impact their ability to receive and respond to information, individuals who rely on personal care assistance, individuals with transportation needs, and individuals who have difficulty coping in new environments.

Sabotage/Terrorism/Nuclear Attack

Description

Sabotage and terrorism involve an intentional, unlawful use of force or violence against persons or property to intimidate or coerce a government or the civilian population to further political, social, or religious objectives. Since sabotage/terrorism objectives are widely varied, the potential targets are also varied. Any public facility, infrastructure, controversial business, assembly place, computer systems operated by government agencies, financial institutions, healthcare facilities and colleges/universities can be considered a potential target. Regardless, terrorists seek the greatest possible media exposure to frighten as many people as possible. Sabotage/terrorism techniques include bombings, assassinations, organized extortion, use of nuclear, chemical and/or biological weapons, information warfare, ethnic/religious/gender intimidation (hate crimes), state and local militia groups that advocate to overthrow the U.S. Government, eco-fanaticism (destruction or disruption of research or resource-related activities), and narcotics smuggling and distribution organizations.

A nuclear attack is any hostile action taken against the United States that involves nuclear weapons and results in property destruction and/or loss of life. Nuclear weapons are powerful explosive devices that can devastate an area. The entire United States is subject to the threat of a nuclear attack; however, the strategic importance of military bases, population centers and certain types of industries place these areas at a greater risk. With the end of the Cold War, the threat of a nuclear attack against the U.S. diminished slightly with the dismantling of nuclear warheads aimed at U.S. targets. However, the number of countries capable of developing nuclear weapons continues to grow despite the ratification of an international nuclear non-proliferation treaty. Additionally, nuclear weapons have the potential to be acquired and/or developed by terrorist organizations.

Even though a nuclear attack is unlikely in Michigan, the extent of destruction and casualties from a nuclear weapon still make this hazard a possibility. Unfortunately, there is no way to assess the probability of a nuclear attack and most mitigation strategies would originate from and be prompted by federal initiatives and defense priorities. However, some things should be considered, such as the ability to shelter or evacuate people, maintain government functions and social services, protect critical computer and communication systems, and create redundancies in infrastructure and critical services.

Location

The population centers in Alcona County are at risk for terrorism, sabotage, and nuclear attack. However, the population centers are small and will not create high profile media coverage.

Previous Occurrences and Probability of Future Occurrences

In the last 15 years, Alcona County has not had any recorded incidents of sabotage/terrorism/nuclear attack. Based on this information, Alcona County would not have a sabotage/terrorism/nuclear attack in the future. However, an event has the potential to occur depending on political, social, and religious interests. Unfortunately, it is impossible to predict when an event will occur and how severe it will be.

Extent

The extent of a sabotage/terrorism/nuclear attack can be measured by the amount of damage that occurs. Since an event has not occurred in the county, no injuries, deaths, or damages have been reported.

Vulnerability Assessment
Sabotage/Terrorism/Nuclear Attack will have minimal impacts and financial burdens on residents and businesses since the county does not have high profile targets, such as military installations, Federal and State government offices, large population centers, etc. Therefore, sabotage/terrorism/nuclear attack will not be further analyzed at this time.

Civil Disturbance

Description
Civil disturbances occur from collective behavior that results in lawbreaking, a perceived threat to public order, or the disruption of essential functions. Large portions of a community may be encompassed by civil disturbances and require the involvement of multiple community agencies to respond to the disturbance. Some facilities that may be adversely impacted by civil disturbances include government buildings, military bases, colleges/universities, businesses, hospitals, and police and fire facilities. There are four types of civil disturbance:

- Protests: Formal organization of demonstrations to achieve collective goals that are threatening, disruptive, and malicious (e.g., political protests, labor disputes, etc.). Sometimes these events result in property destruction, service interruptions, and interference with law-abiding citizens and emergency responders.
- Hooliganism: Unorganized, unlawful acts by either an individual or a collective that are inspired by crowds (e.g., disorder following sporting events and college parties, "block parties," etc.). These acts cause property destruction, assaults, disorderly conduct, and criminal victimization. Sometimes hooliganism can include elements of protest.
- Riots: A disorganized, violent gathering of people that involves assaults, intimidation, and property destruction. Sometimes, individuals attempt to exploit the disorder (e.g., looting, arson, etc.).
- Insurrection: A deliberate effort to disrupt or replace the established government or its representatives (e.g., prison uprisings, political conflicts, ethnic conflicts, etc.).

Large-scale civil disturbances rarely occur; however, they are usually an offshoot of labor disputes with a high degree of animosity between two dissenting parties, high profile/controversial judicial proceedings, the implementation of controversial laws or other governmental actions, resource shortages caused by a catastrophic event, disagreements between special interest groups over a particular issue or cause, or a perceived unjust death or injury to a person held in high esteem by a particular segment of society. Alcona County has not had any recorded incidents of civil disturbances.

Location
Greenbush, Harrisville, and Curtis Townships would be the most at-risk for civil disturbances since the majority of the population lives in these jurisdictions (13.0%, 12.5%, 11.2%, respectively). Civil disturbances may also occur in the City of Harrisville and the Village of Lincoln due to their population densities. However, it should be noted an event may occur at community events in any of the county's jurisdictions.

Previous Occurrences and Probability of Future Occurrences
Alcona County has not had any recorded incidents of civil disturbances. Based on this information, the county would not have any civil disturbances in the future. However, an event has the possibility of occurring depend on political, social, and religious interests. Unfortunately, it is impossible to predict when an event will occur and how severe it will be.

Extent
The extent of a civil disturbance can be measured by the amount of damage that occurs. Since an event has not occurred in the county, no injuries, deaths, or damages have been incurred.

Vulnerability Assessment
Civil disturbance events will have minimal impacts and financial burdens on residents and businesses since the county is not an area that provides high profile media coverage. However, during community events, large crowds may be attracted to county. Dependent on the severity of the civil disturbance event, businesses may be damaged or looted, and injuries and deaths may occur. However, this hazard has a low chance of occurring in the county and will not be further analyzed at this time.

Alcona County and Its Local Jurisdictions
The Alcona County hazard maps show infrastructure, oil and gas wells and pipelines, areas of high wildfire risk in red (pine forests), orange (central hardwoods), and yellow (aspen-birch forests), vulnerable communities, and areas that have a high potential for shoreline and riverine flooding (Figure 6-11 to Figure 6-12). The local jurisdictions have base and hazard maps. The base maps show the community's infrastructure, facilities, public lands, and oil and gas wells, while the hazard maps show infrastructure, oil and gas wells, areas of high wildfire risk in red (pine forests) and yellow (oak-pine forests and aspen-birch forests), and waterways that have a high potential for flooding in dark green (wetlands from the Natural Wetlands Inventory data) (Figure 6-13 to Figure 6-36).

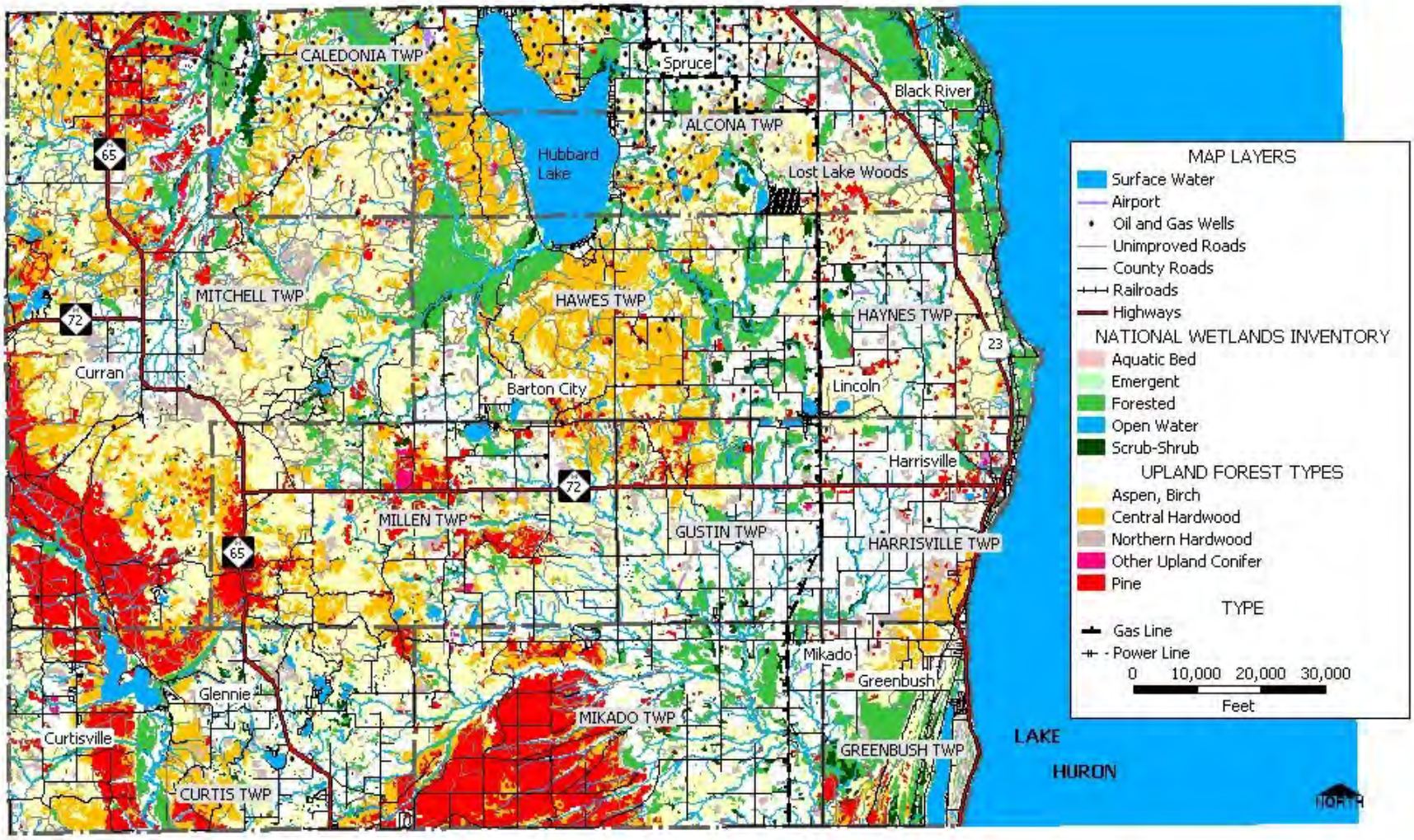

Figure 6-11 Alcona County Hazard Map

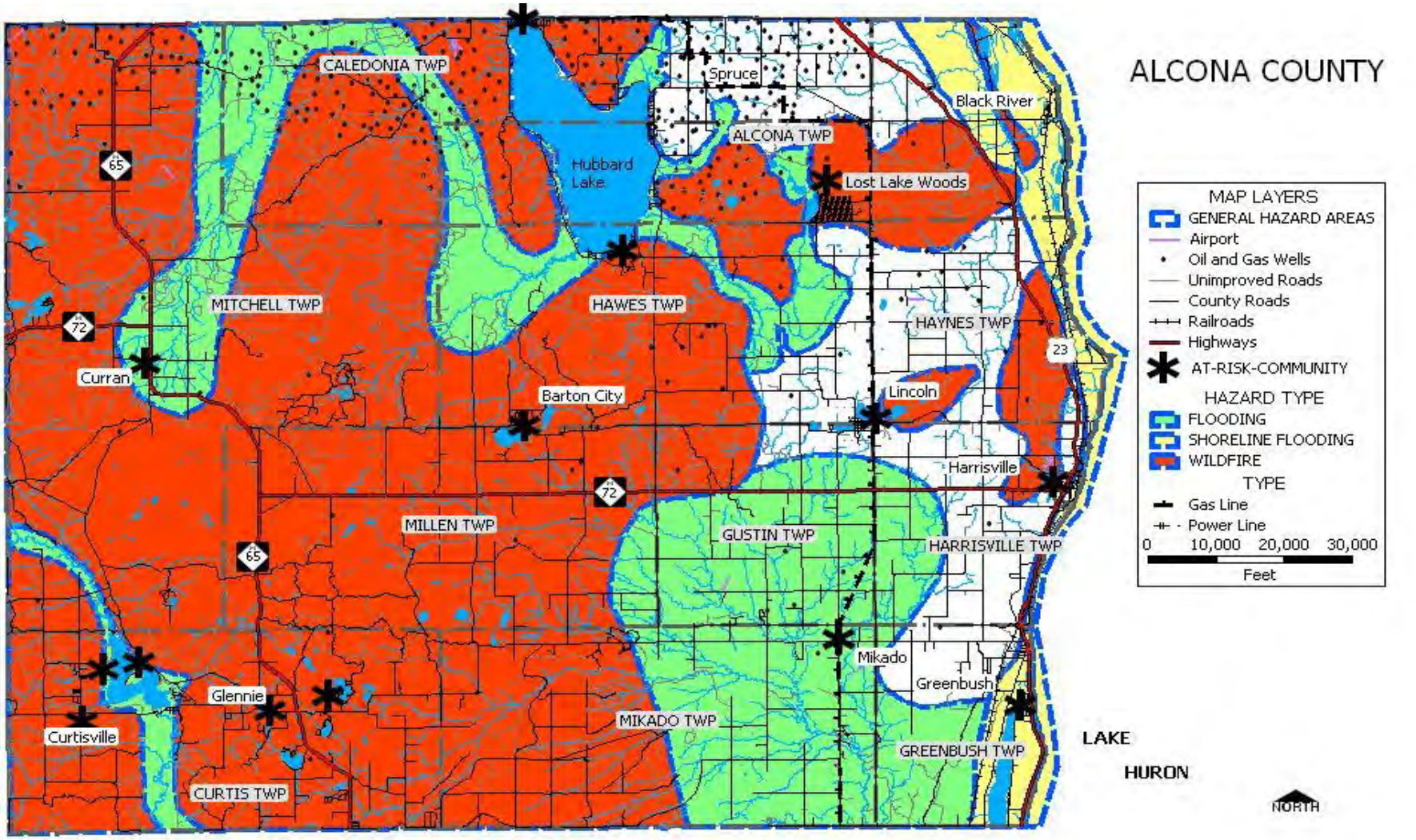

Figure 6-12 Alcona County's General Hazard Areas for Flooding, Shoreline Flooding, and Wildfires

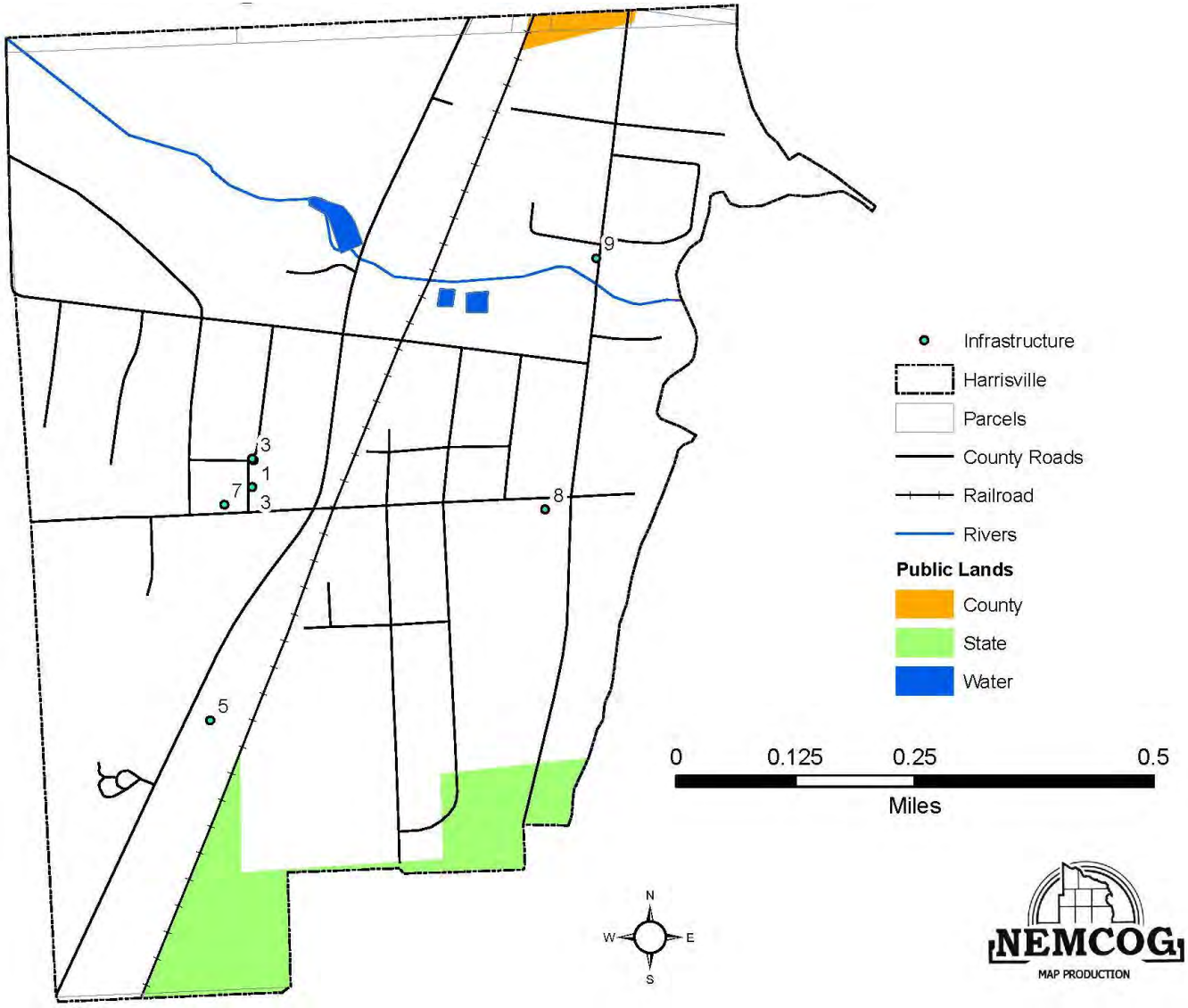

Figure 6-13 City of Harrisville Base Map

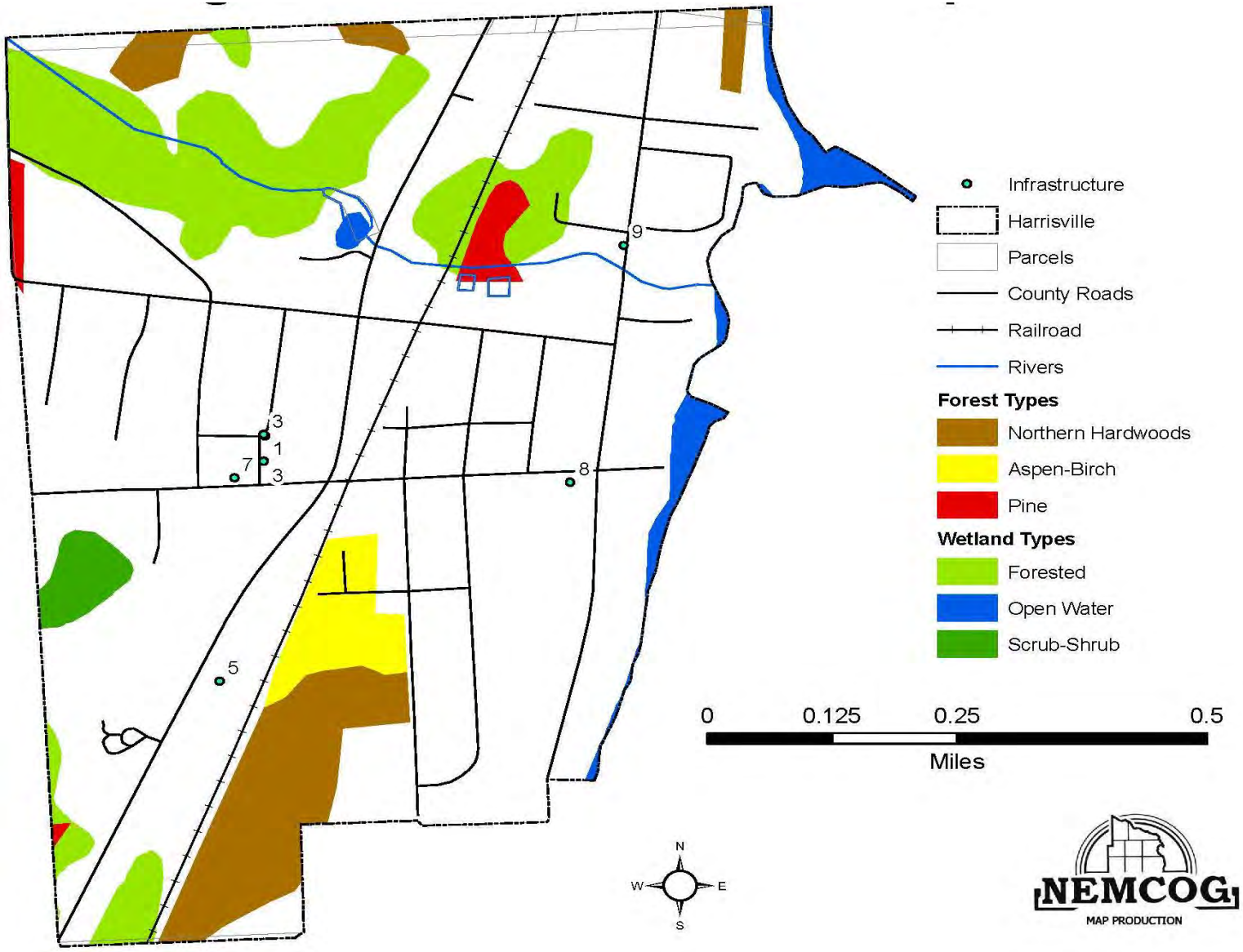

Figure 6-14 City of Harrisville Hazard Map

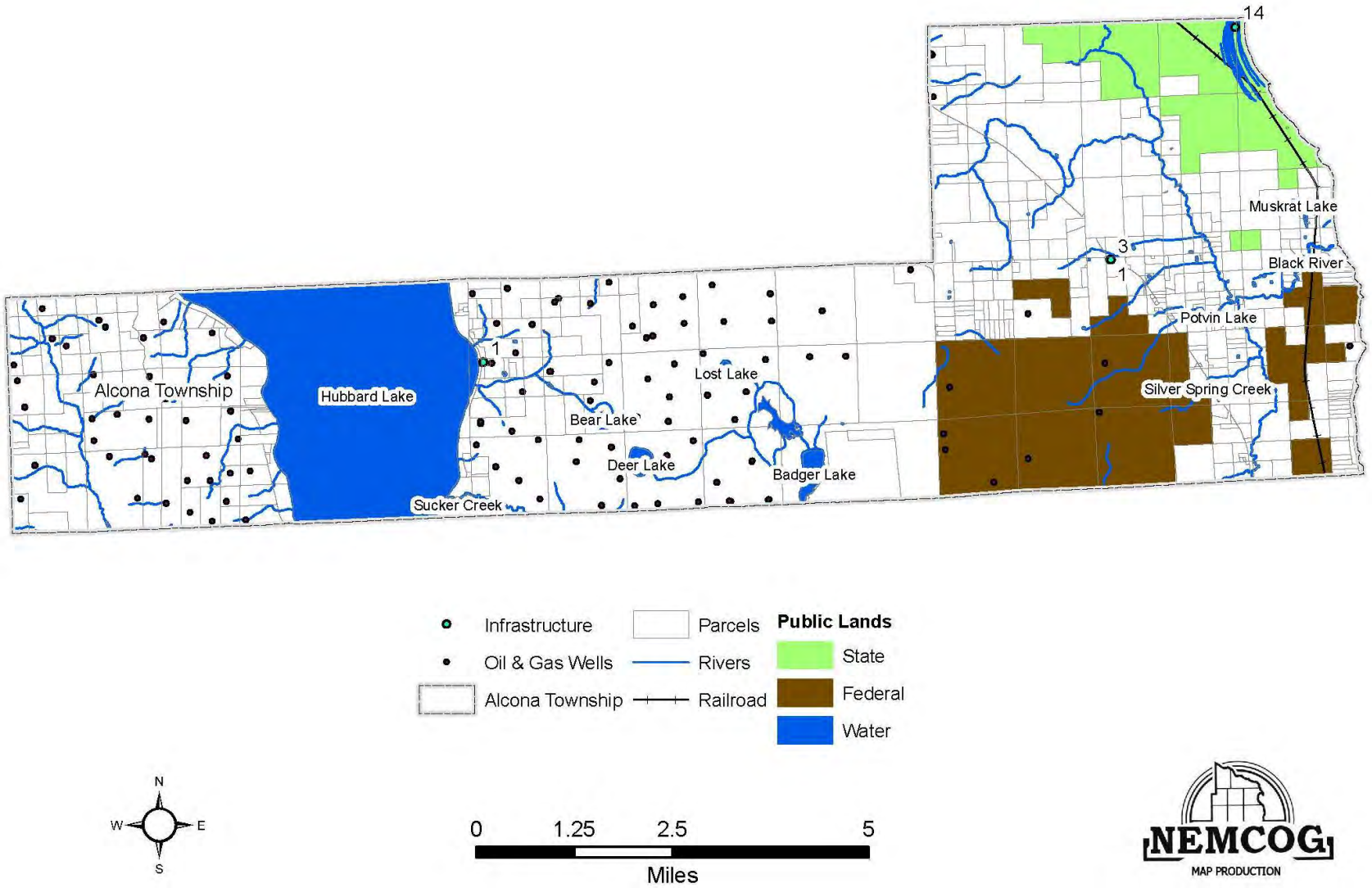

Figure 6-15 Alcona Township Base Map

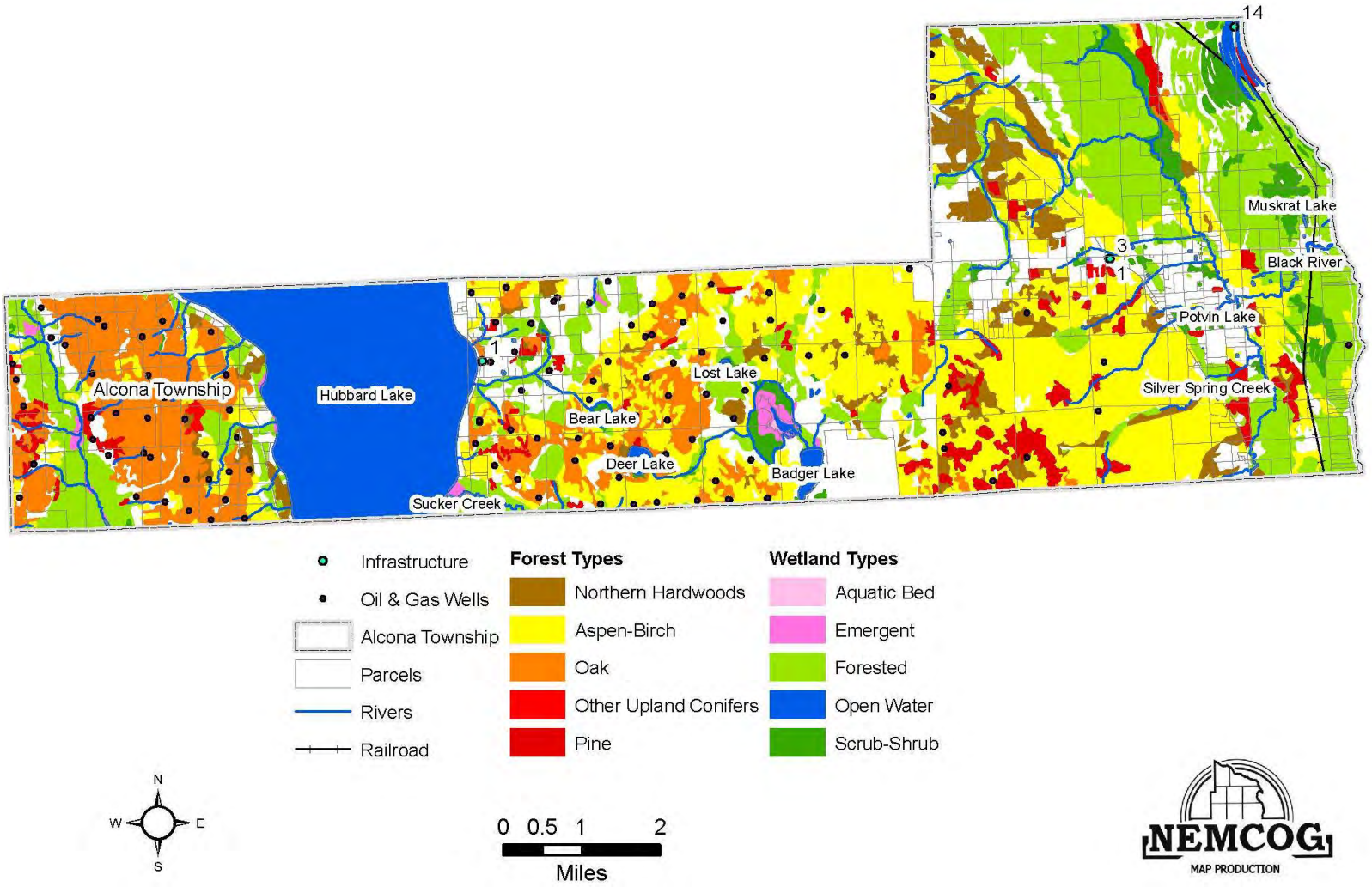

Figure 6-16 Alcona Township Hazard Map

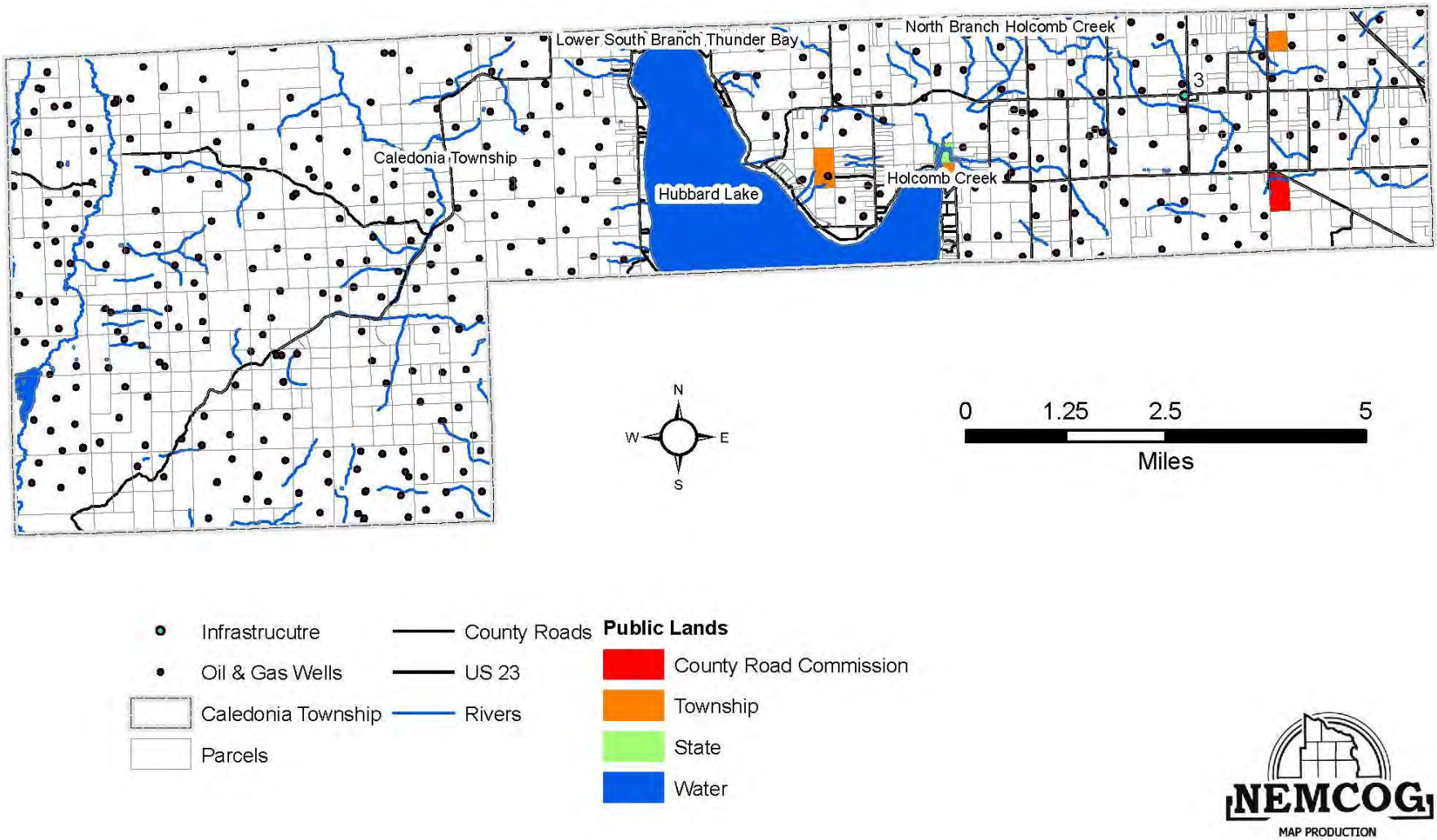

Figure 6-17 Caledonia Township Base Map

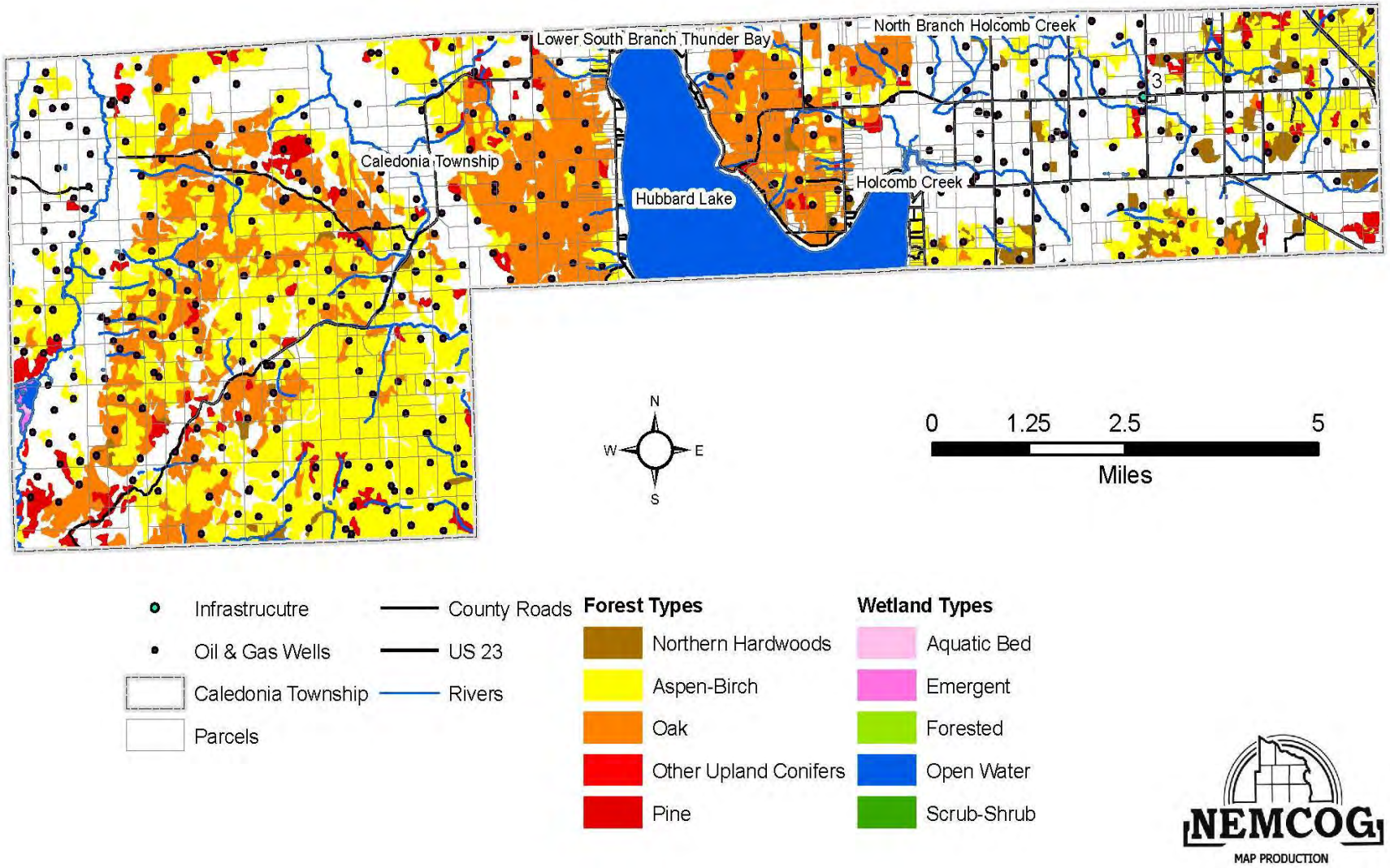

Figure 6-18 Caledonia Township Hazard Map

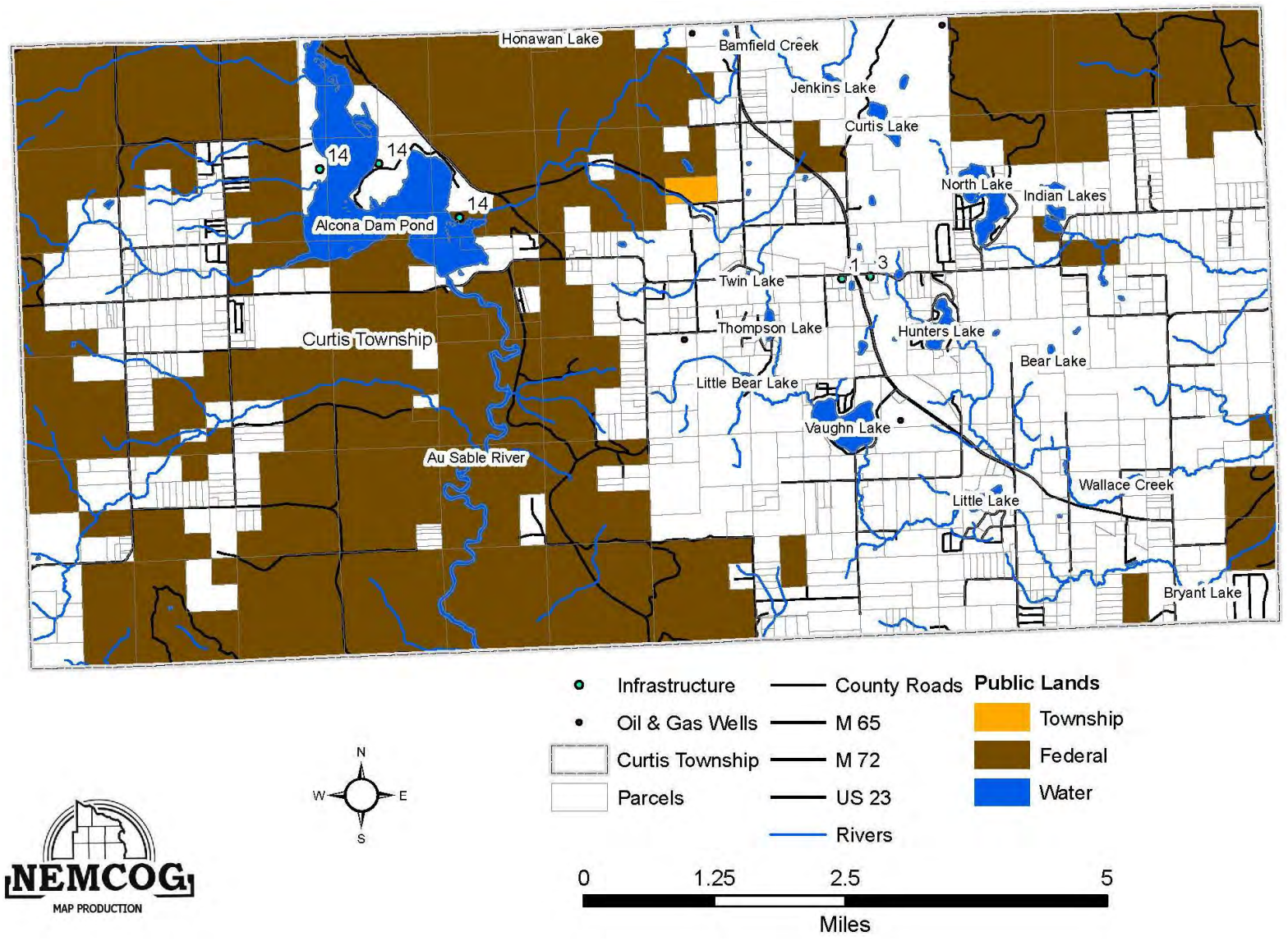

Figure 6-19 Curtis Township Base Map

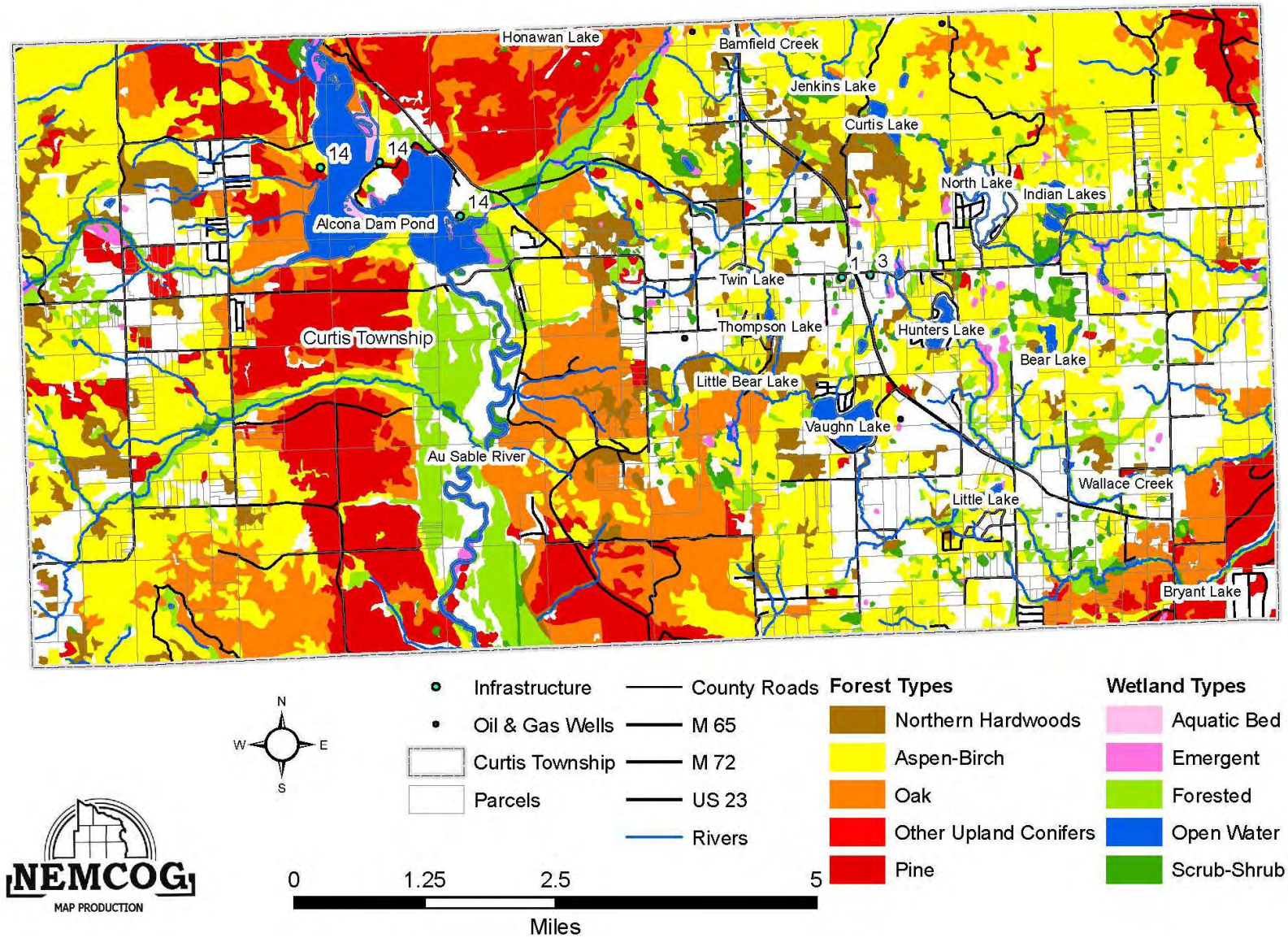

Figure 6-20 Curtis Township Hazard Map

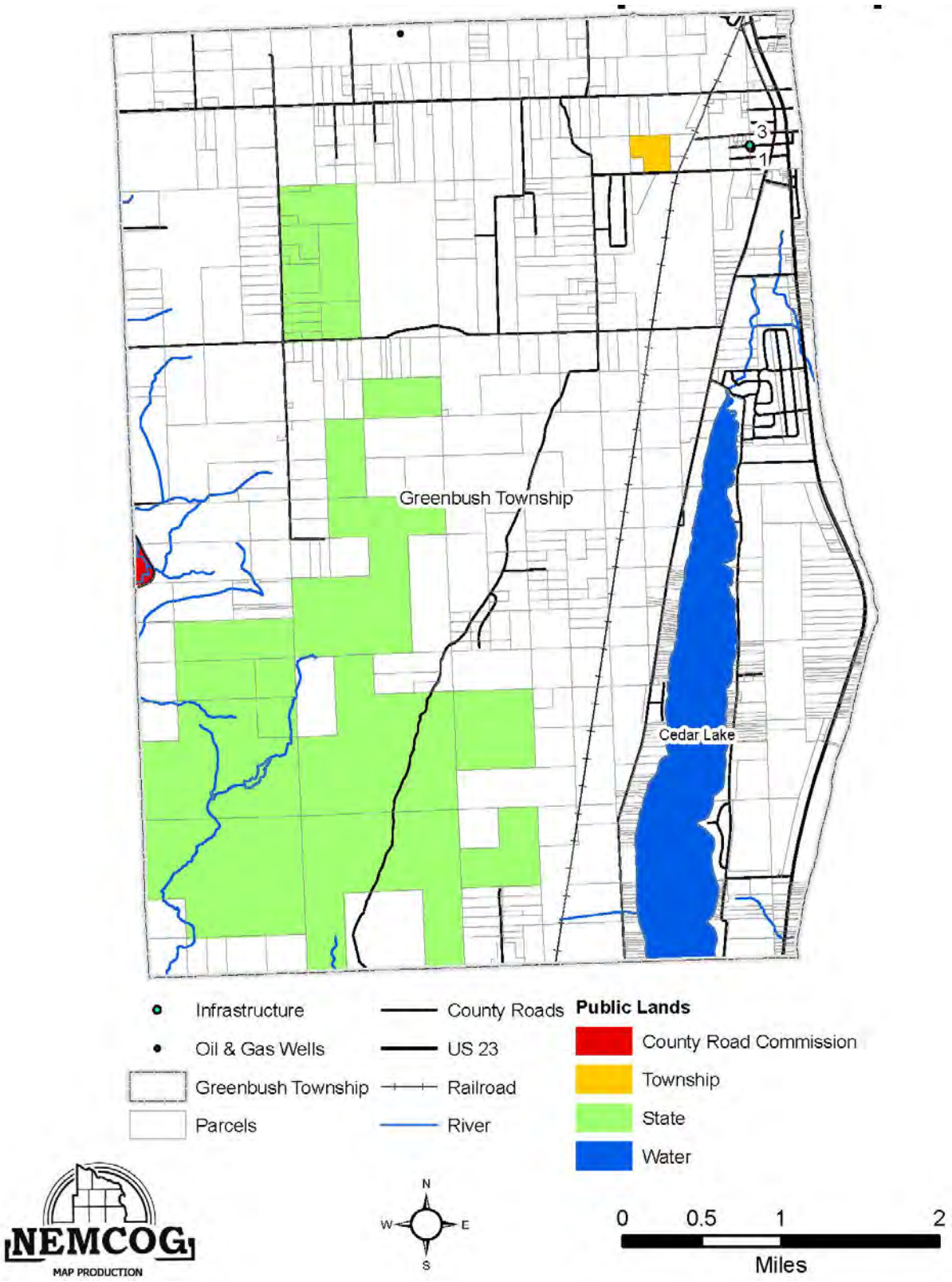

Figure 6-21 Greenbush Township Base Map

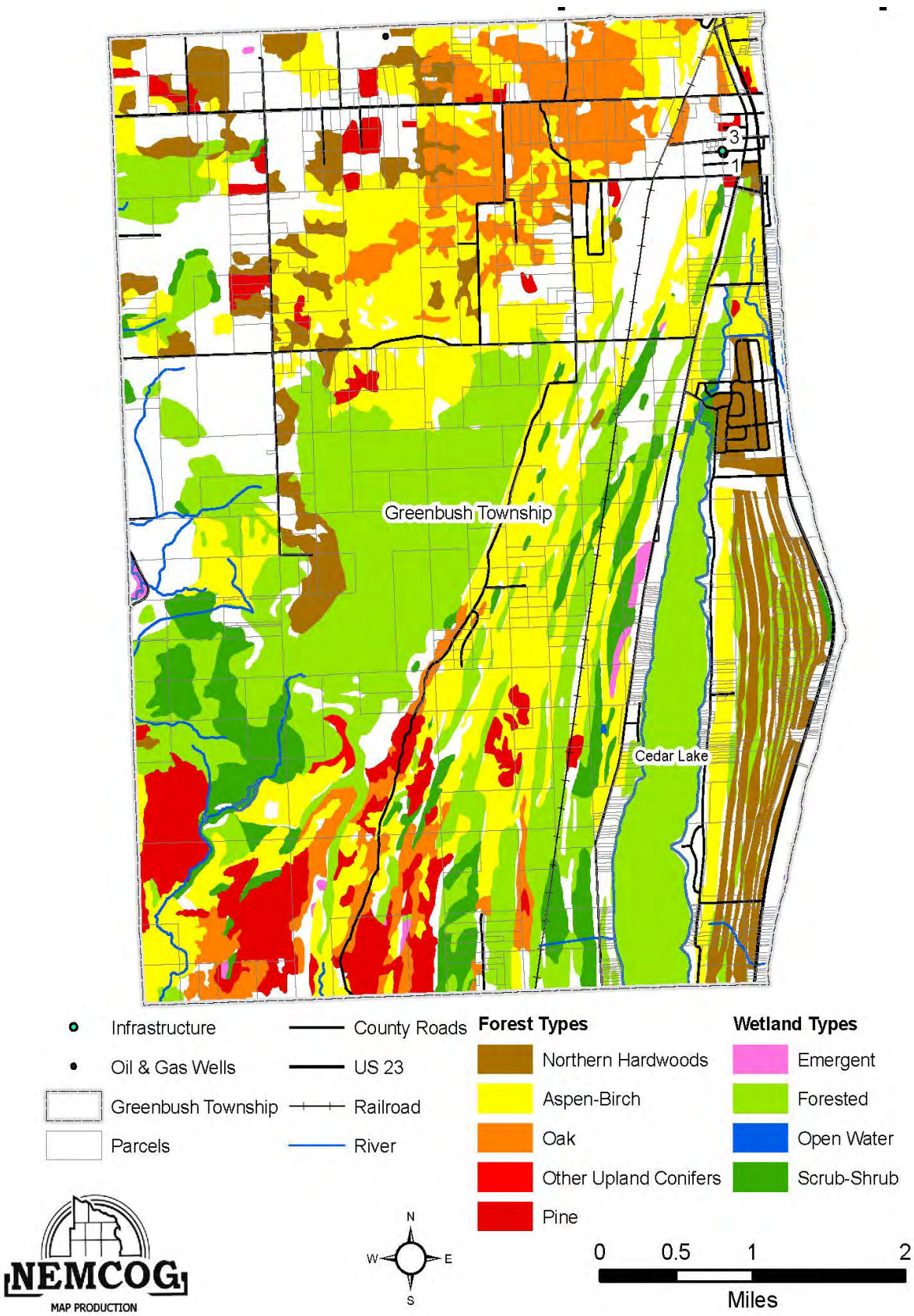

Figure 6-22 Greenbush Township Hazard Map

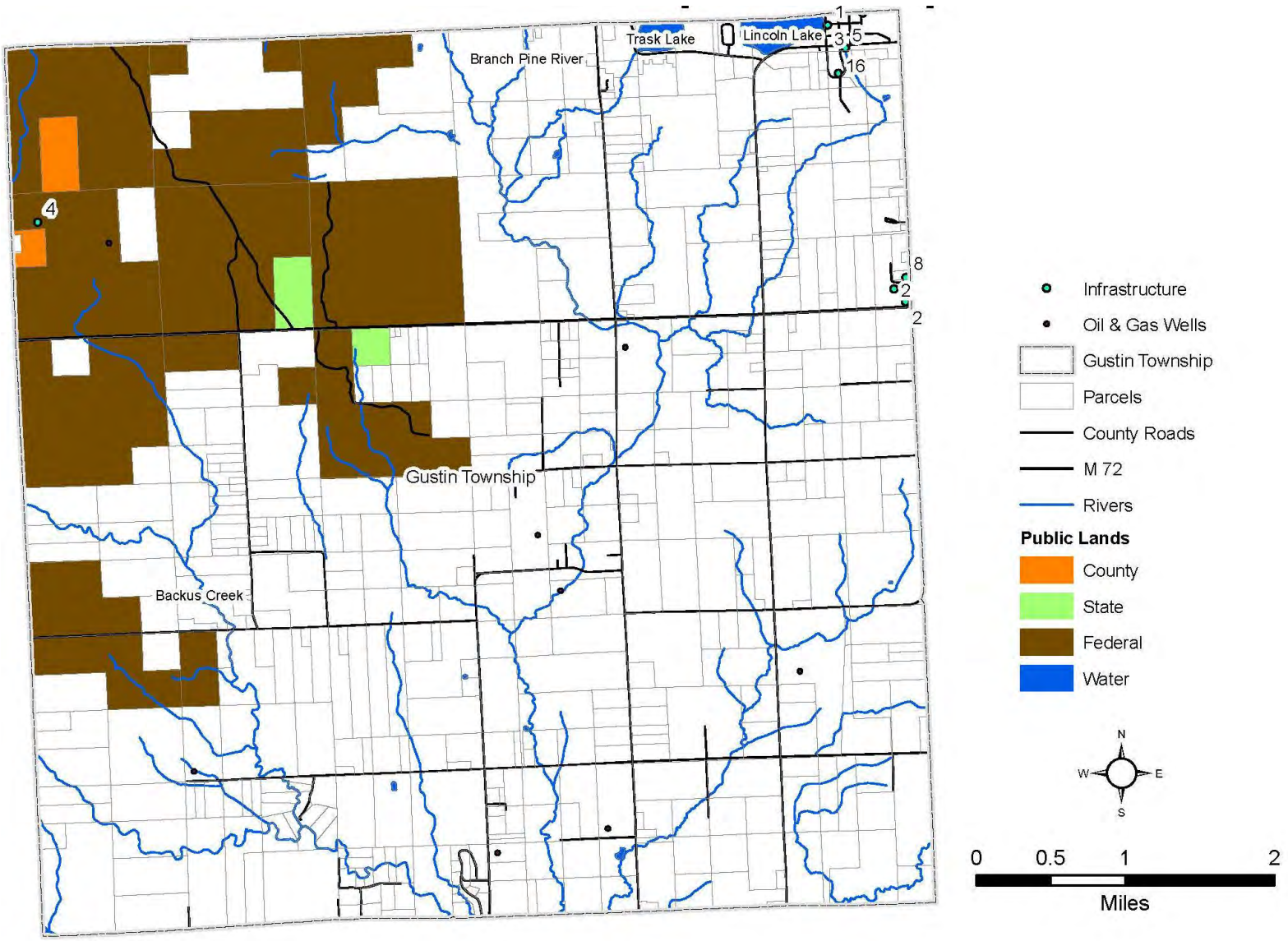

Figure 6-23 Gustin Township Base Map

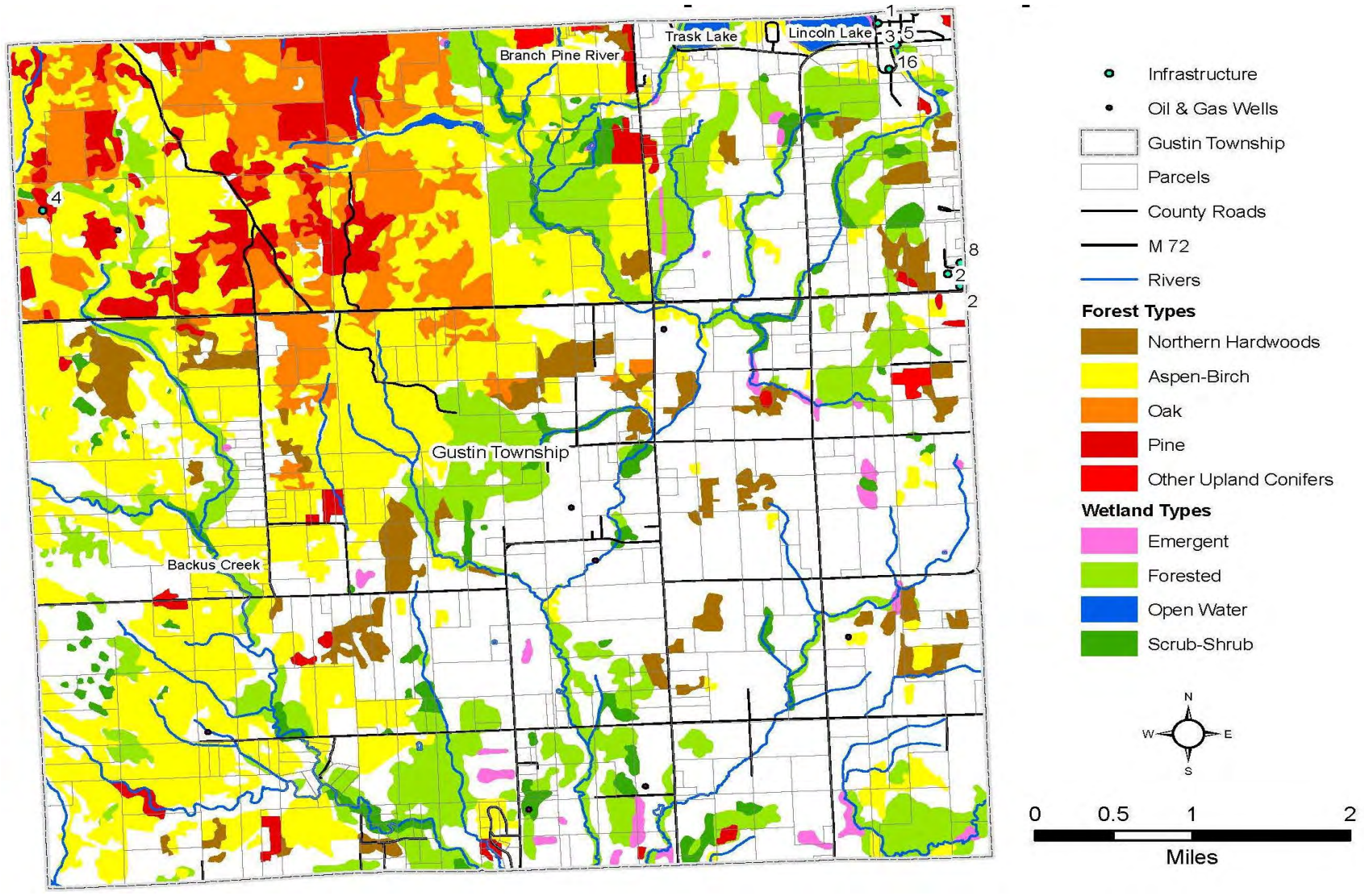

Figure 6-24 Gustin Township Hazard Map

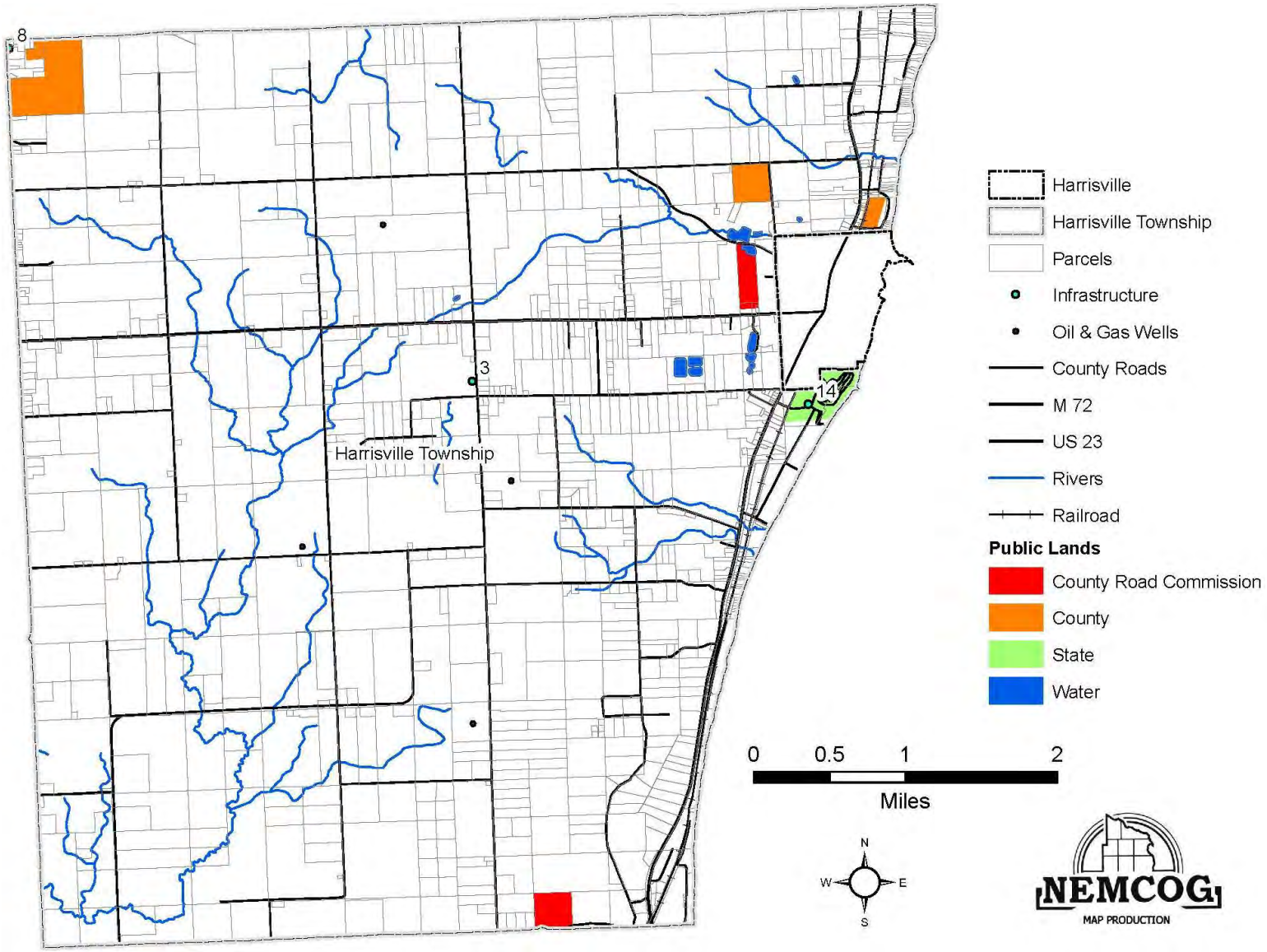

Figure 6-25 Harrisville Township Base Map

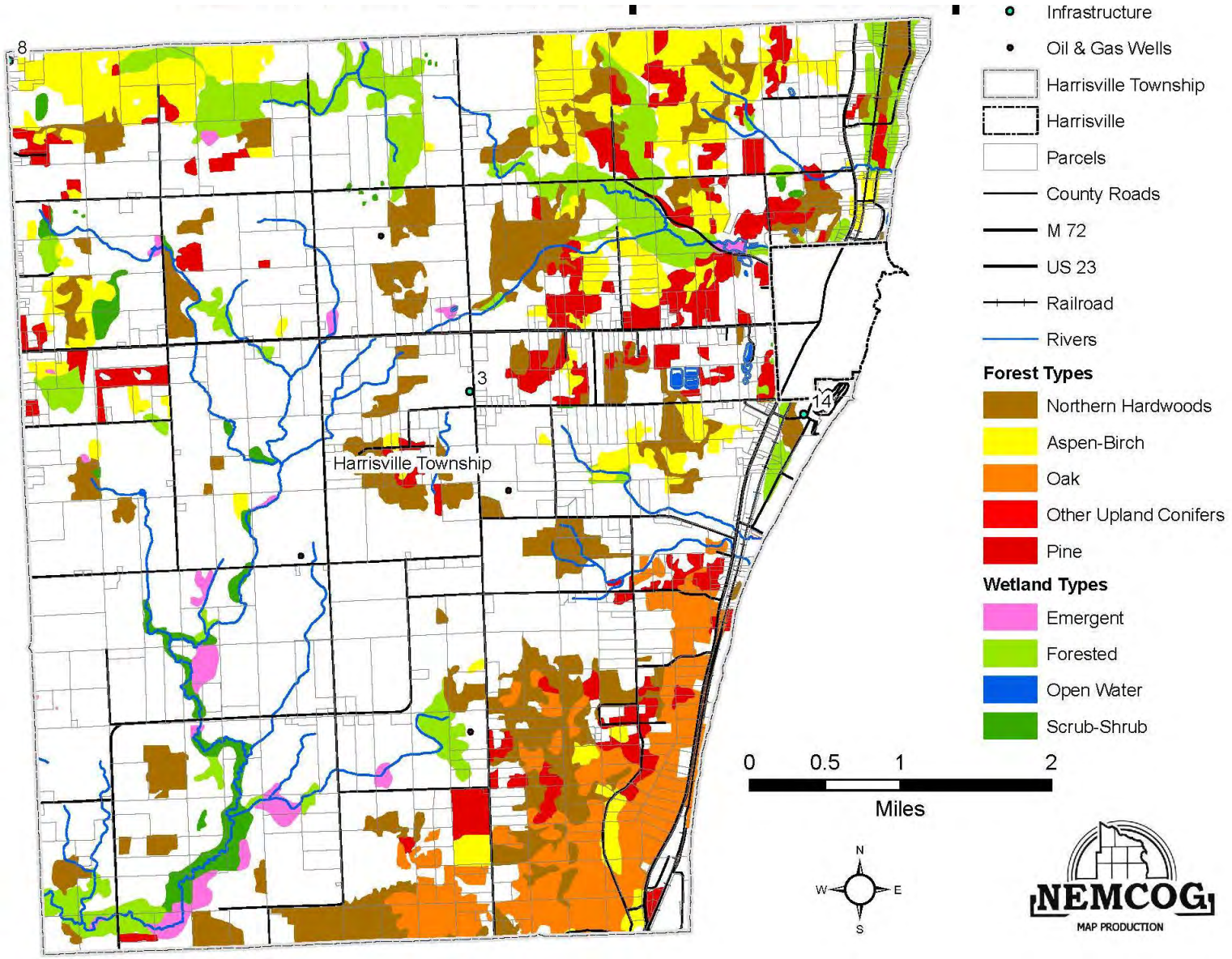

Figure 6-26 Harrisville Township Hazard Map

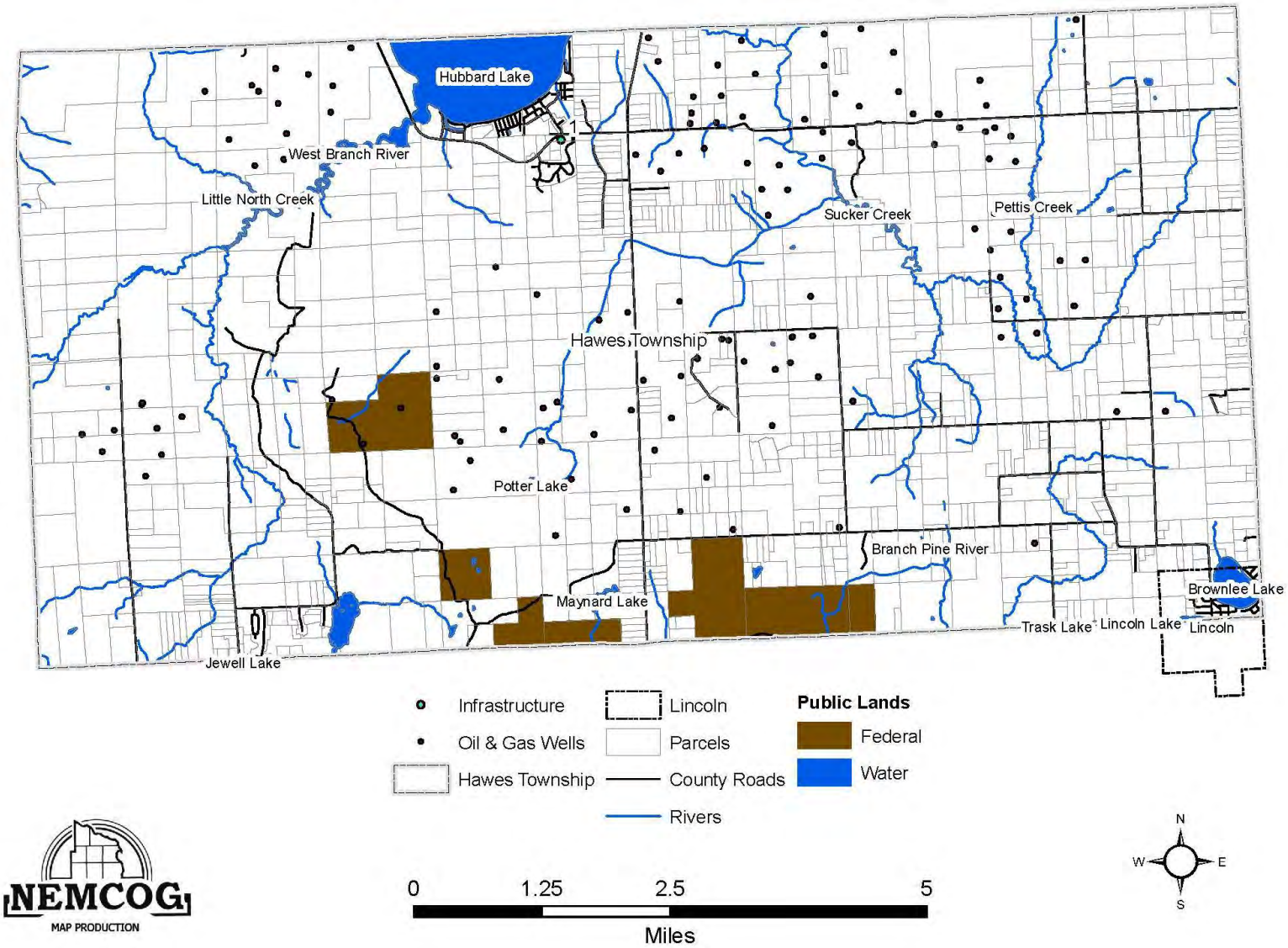

Figure 6-27 Hawes Township Base Map

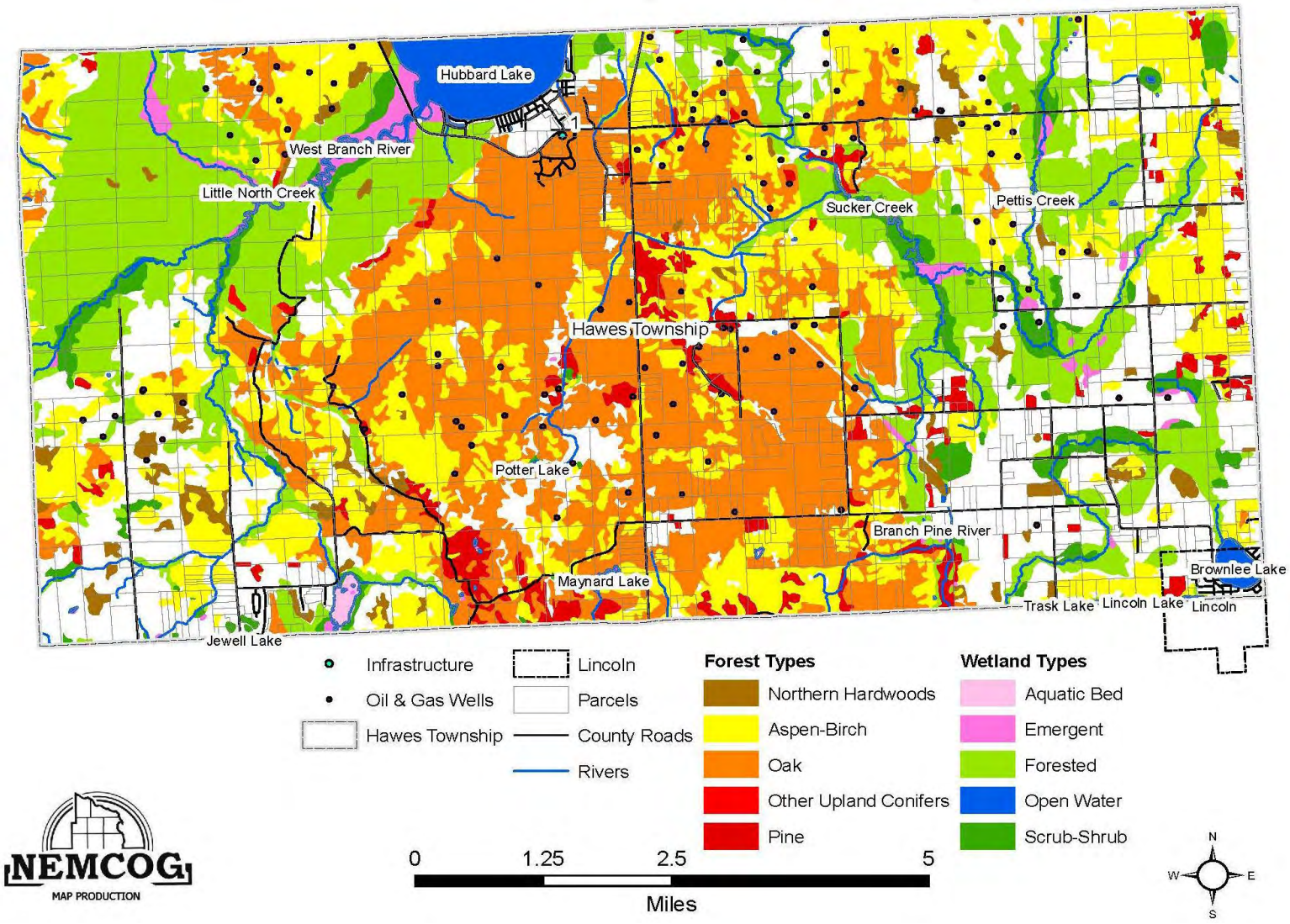

Figure 6-28 Hawes Township Hazard Map

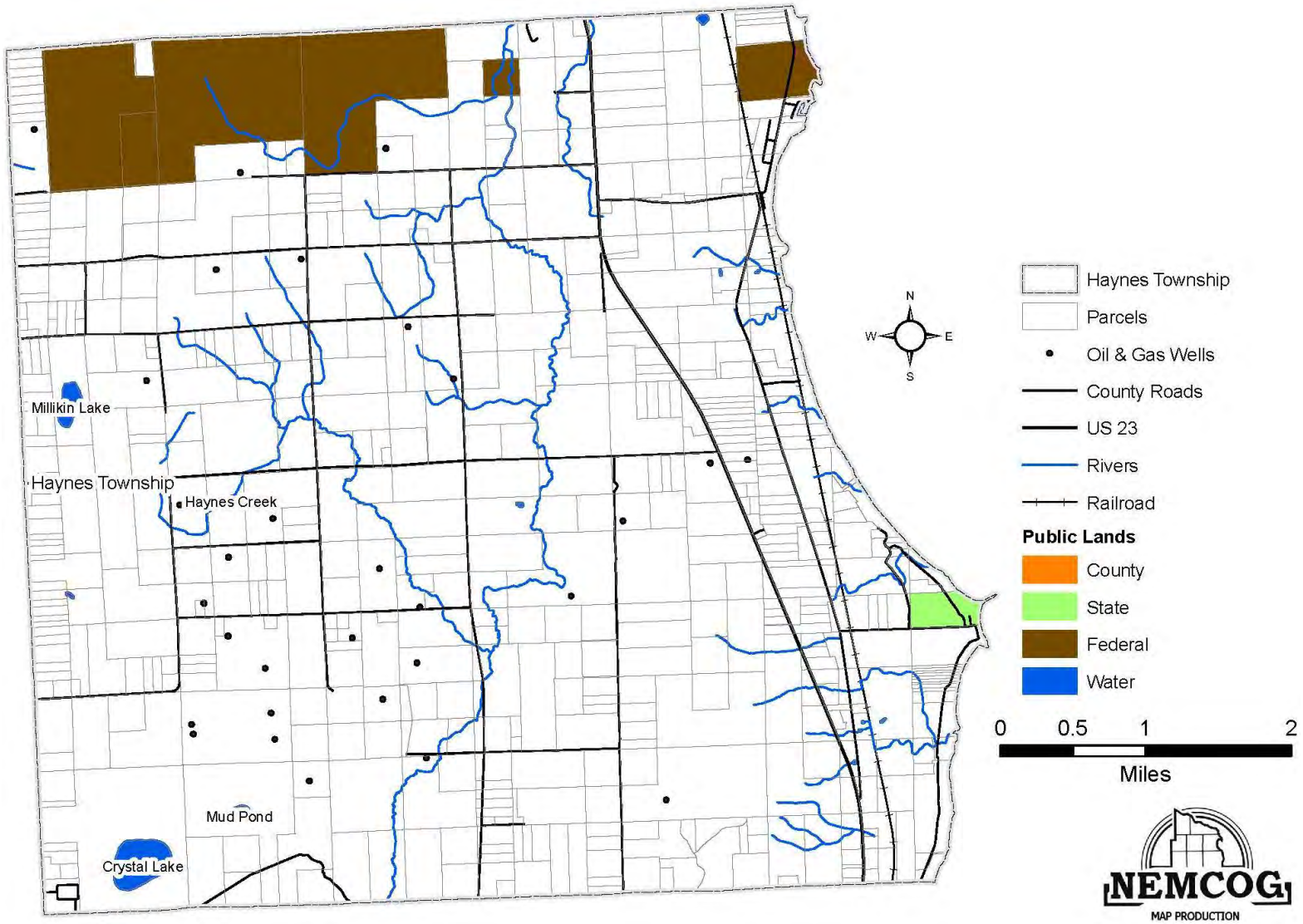

Figure 6-29 Haynes Township Base Map

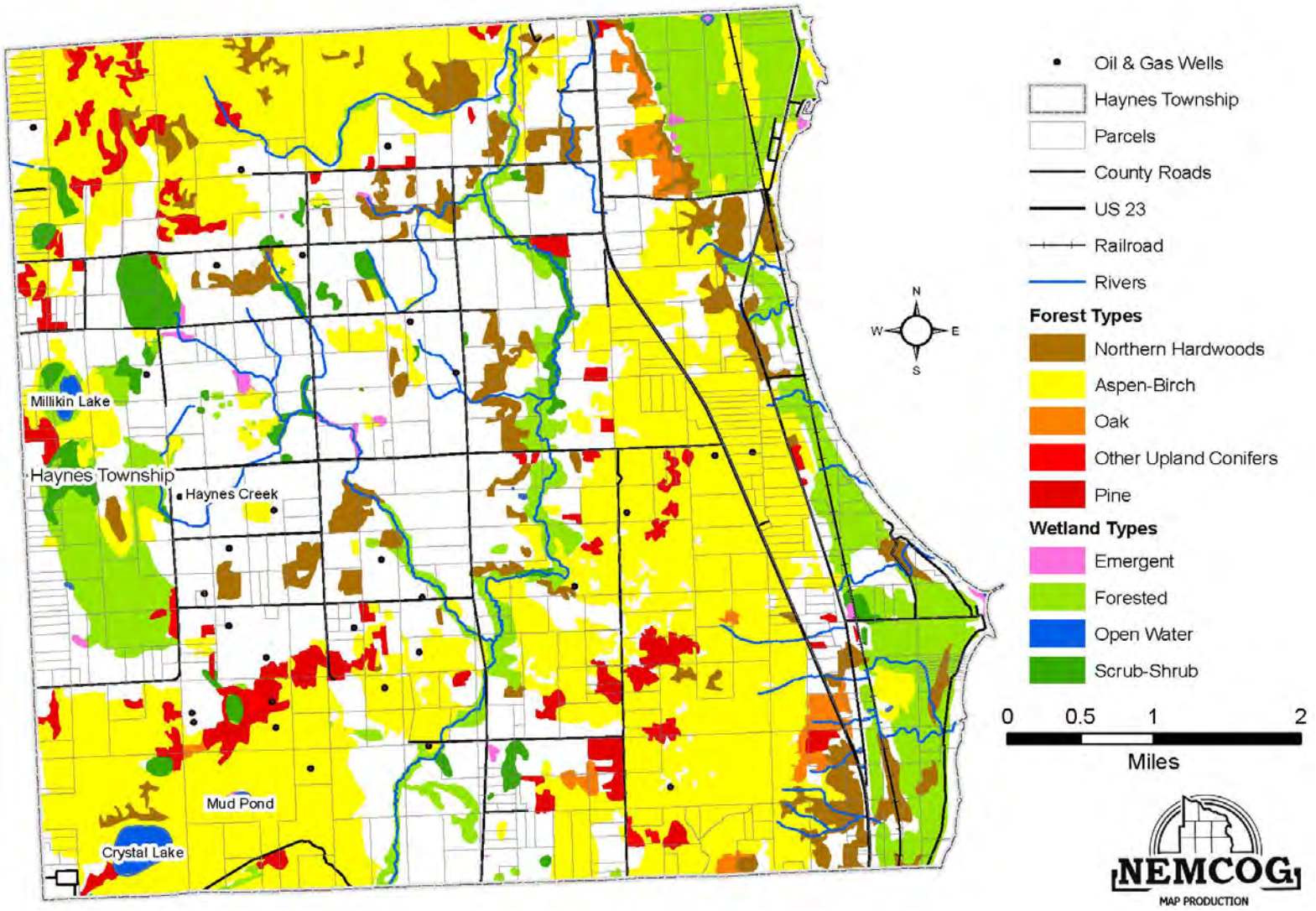

Figure 6-30 Haynes Township Hazard Map

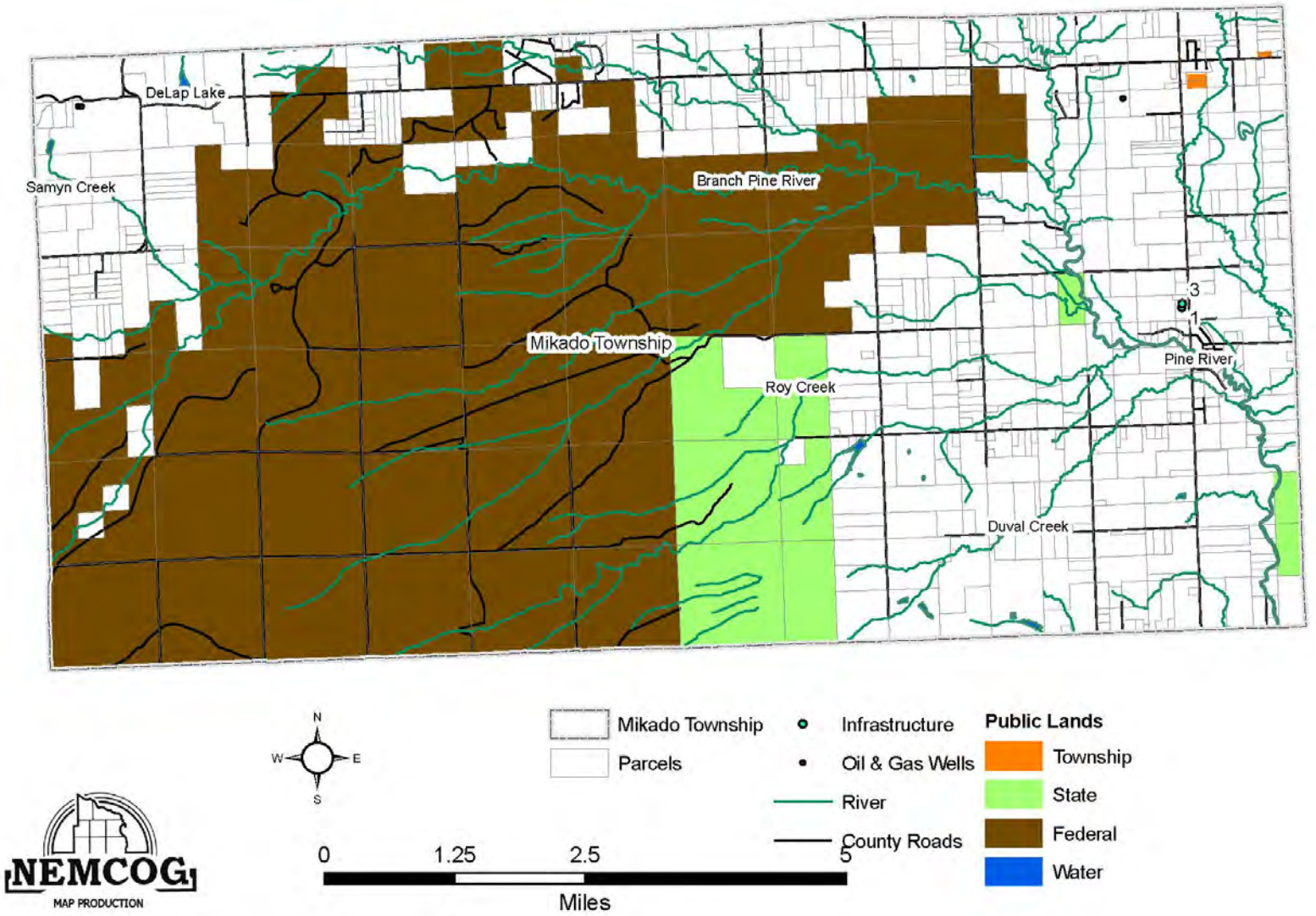

Figure 6-31 Mikado Township Base Map

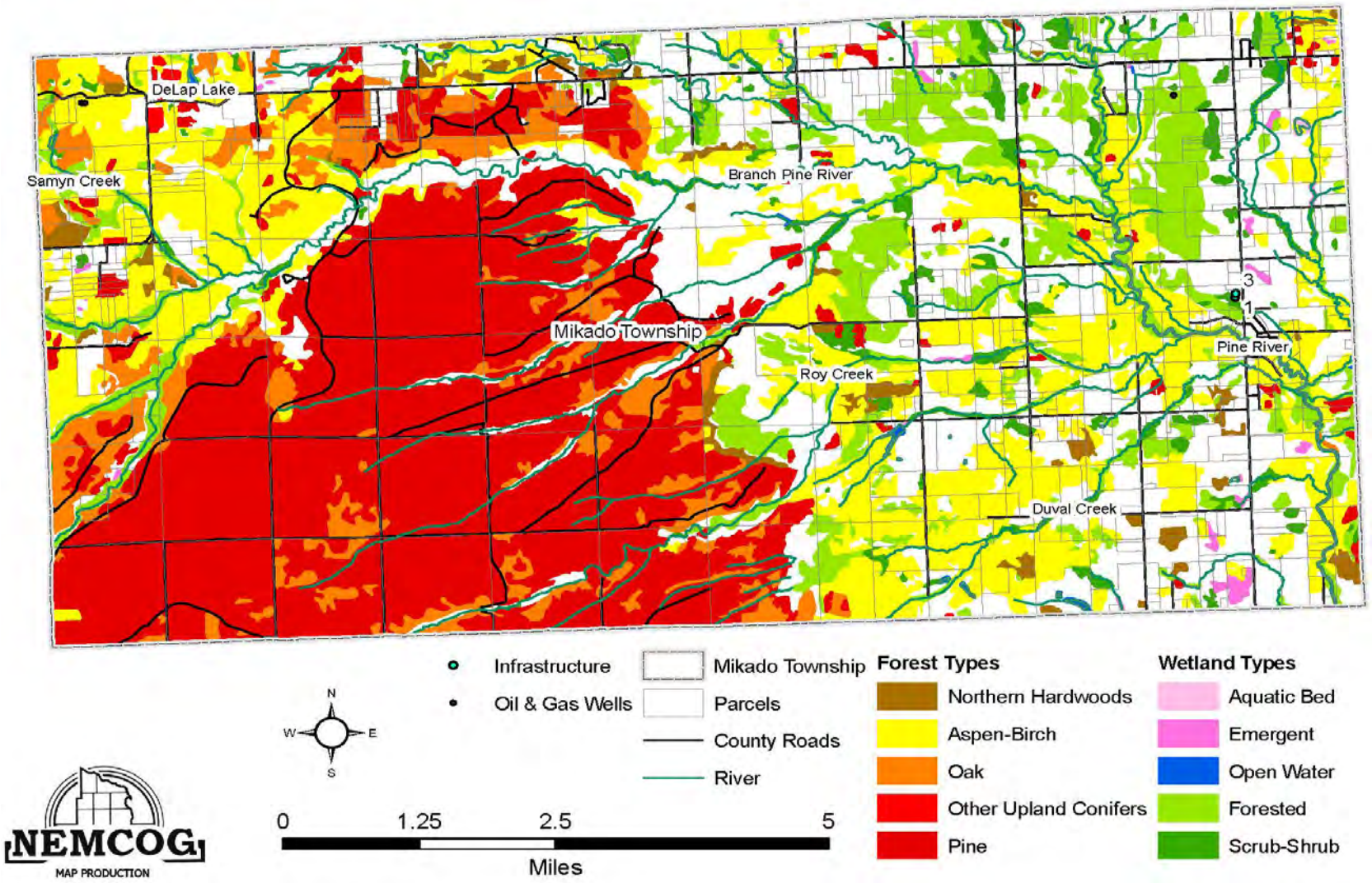

Figure 6-32 Mikado Township Hazard Map

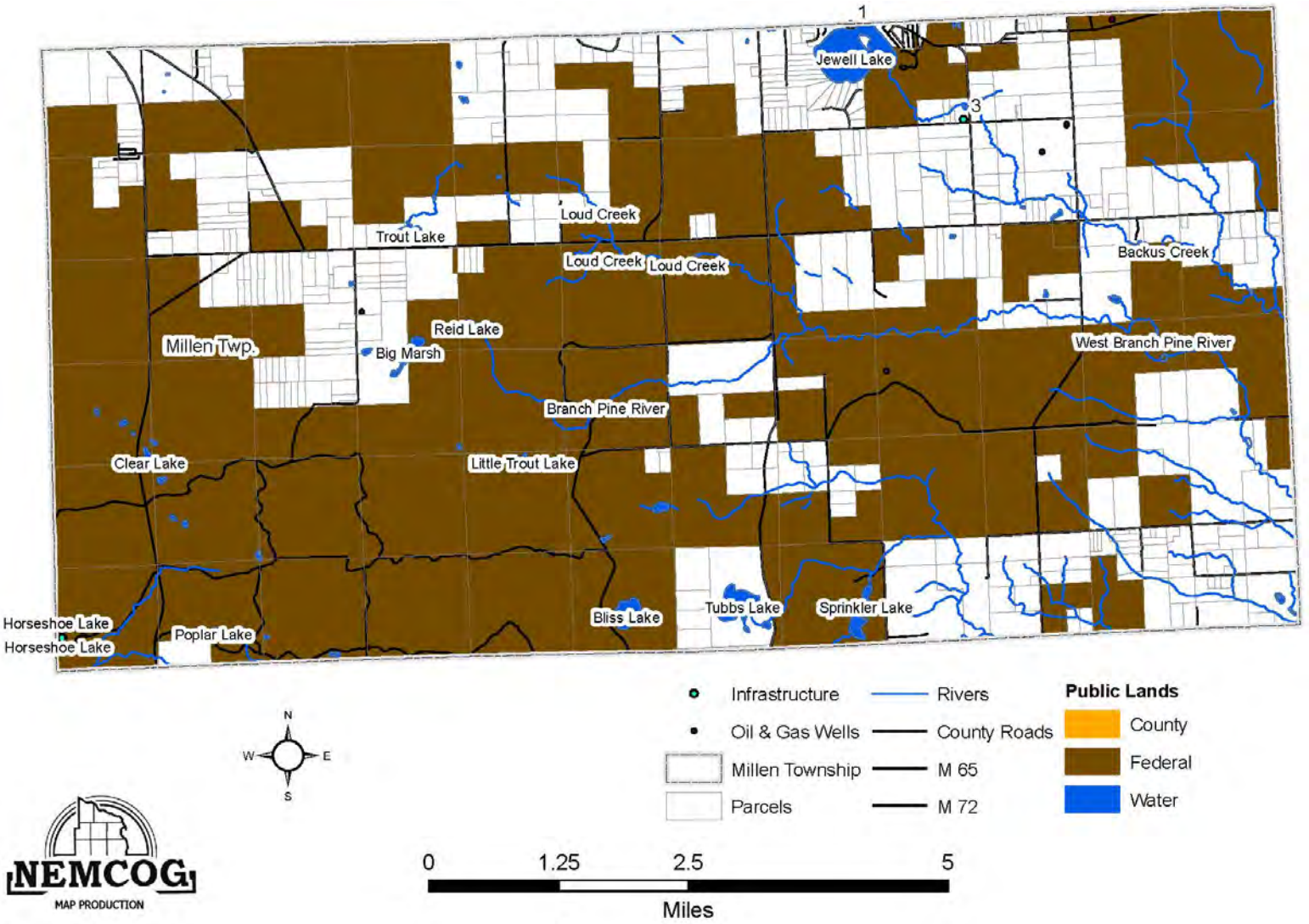

Figure 6-33 Millen Township Base Map

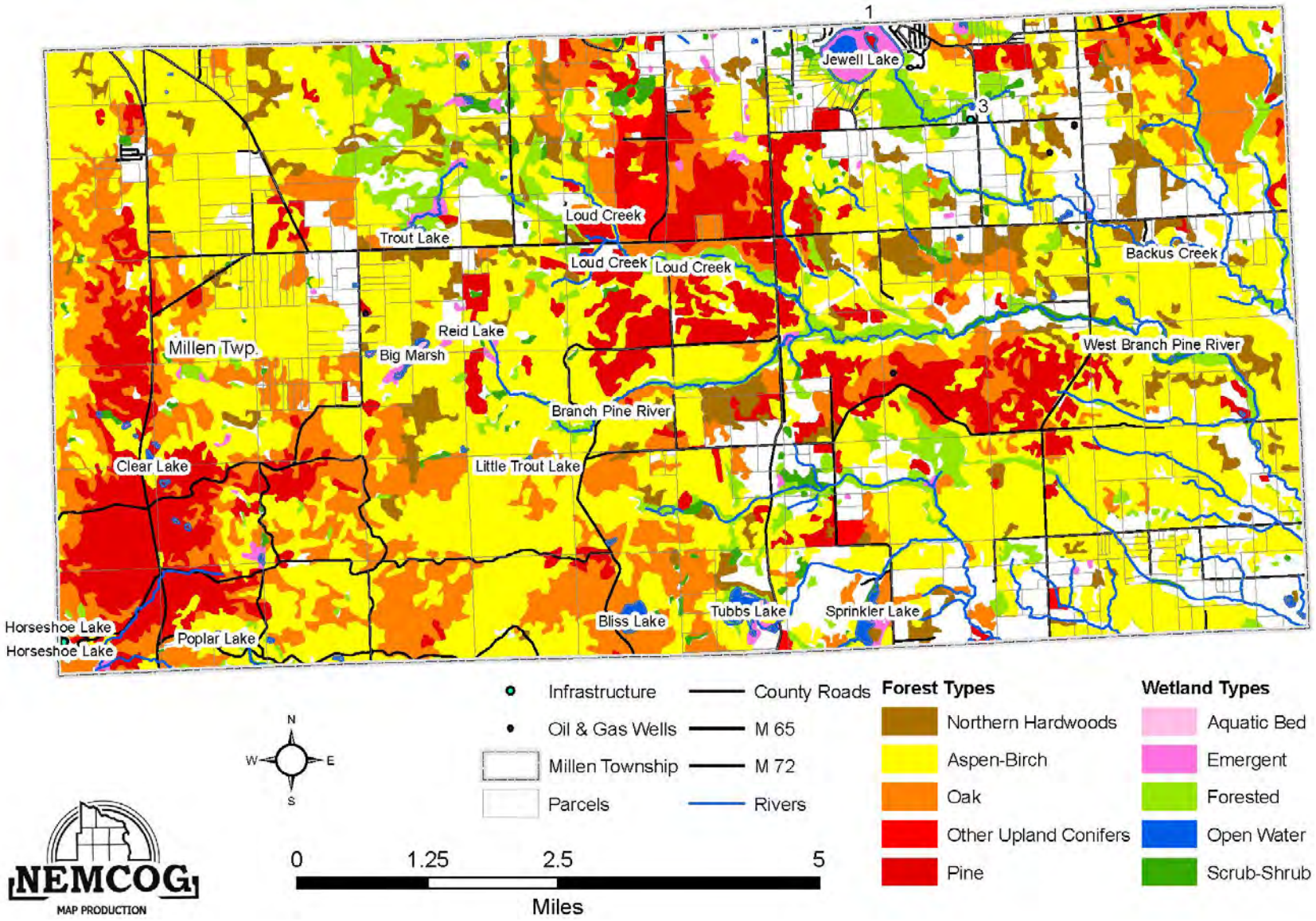

Figure 6-34 Millen Township Hazards Map

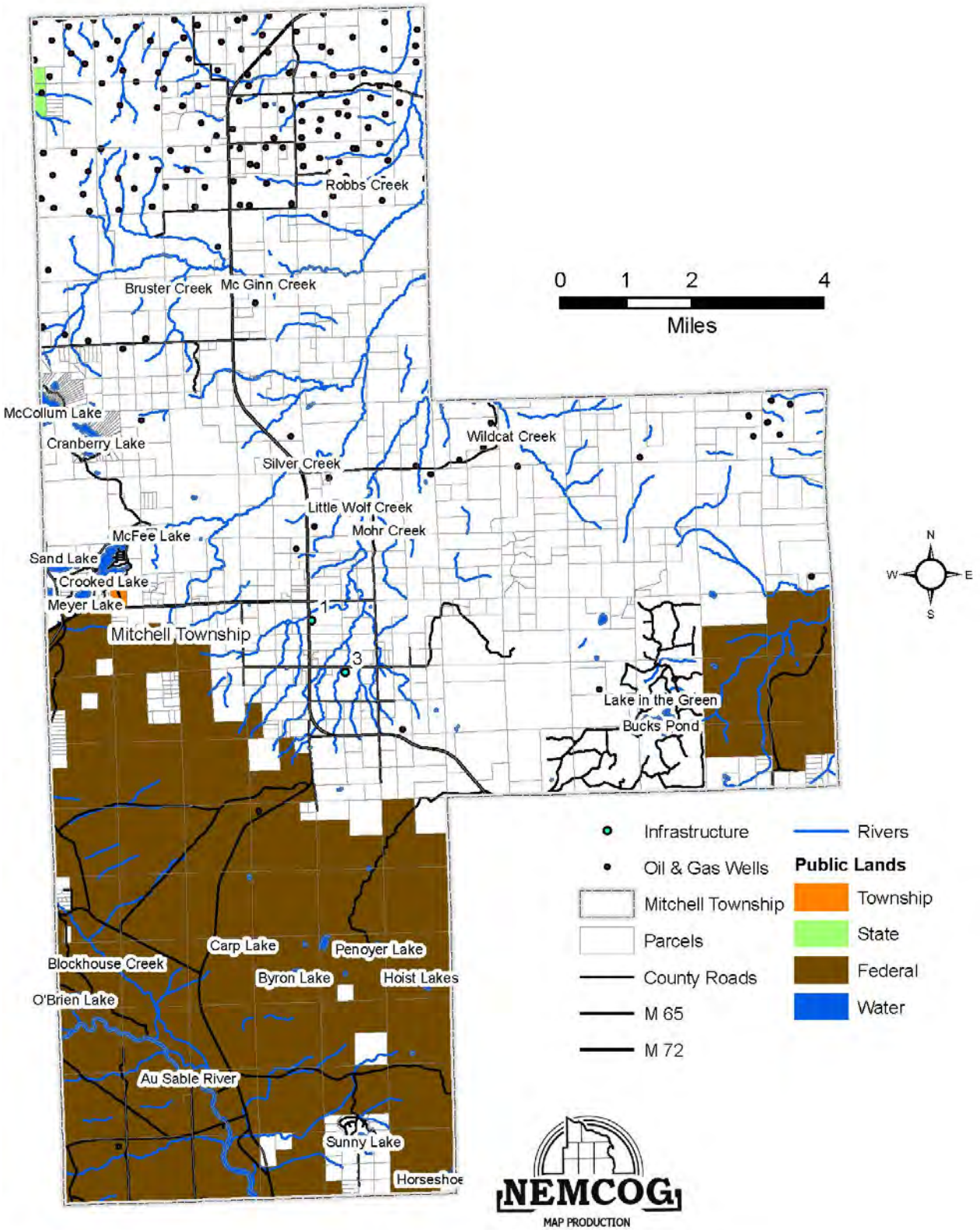

Figure 6-35 Mitchell Township Base Map

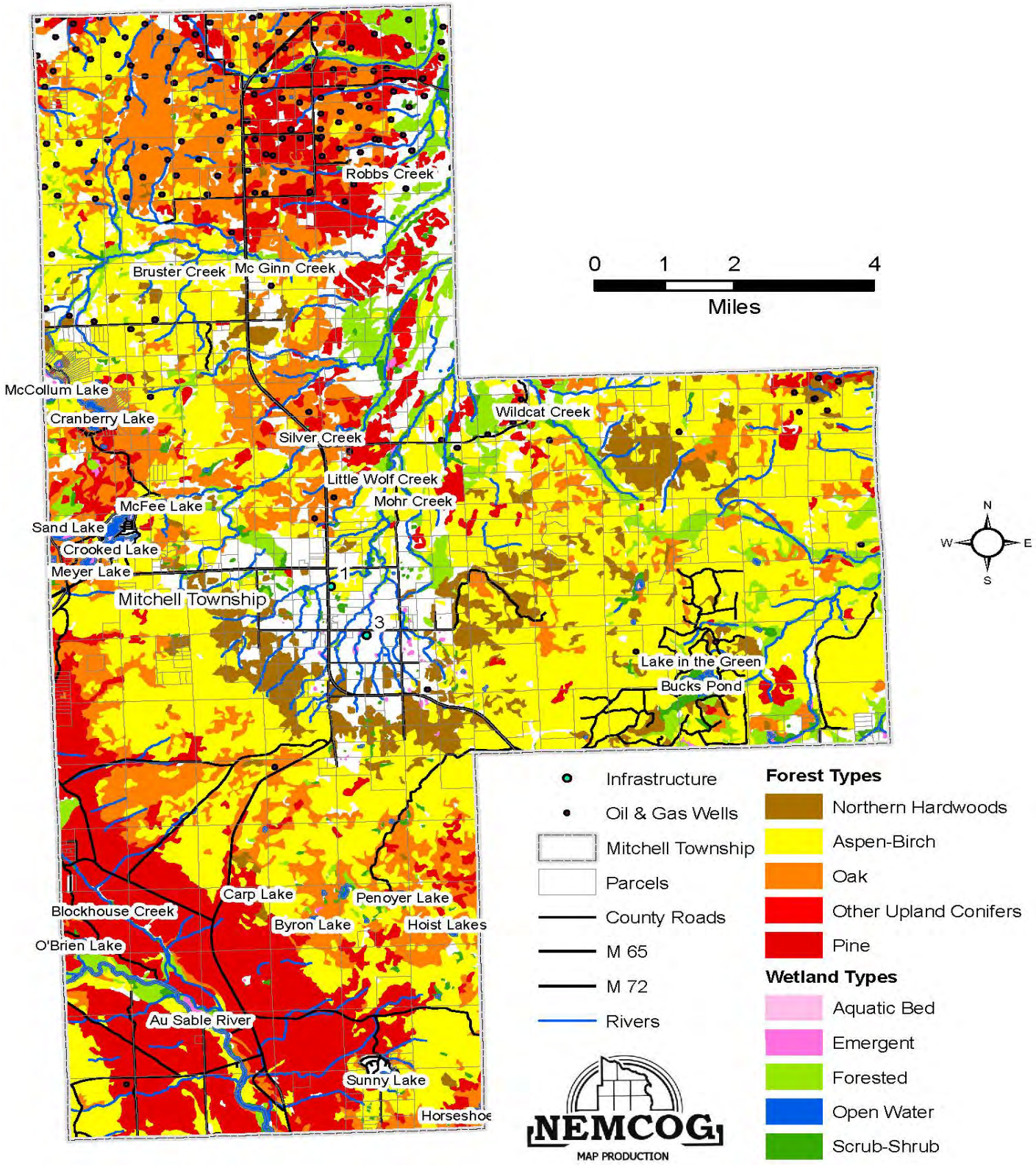

Figure 6-36 Mitchell Township Hazard Map

Risk and Vulnerability Assessments

After identifying which hazards pose a risk in Alcona County, the LPT ranked the hazards based on the Priority Risk Index to determine which hazards pose the greatest threat to the county (Table 6-8). Then, the LPT evaluated the ranked hazards based on their risk and vulnerabilities. It should be noted the sleet and ice storm events, and snowstorm hazard events are displayed as winter weather hazards in the Priority Risk Index.

To begin the hazard ranking process, the LPT selected evaluation criteria by determining which aspects were of most concern to the community. The LPT assigned a level of importance ranging from "Always Important to "Not Worth Considering" for each aspect. The following evaluation criteria were considered: likelihood of occurrence, damage capacity, size of affected area, speed of onset, population impact, economic impacts, duration of threat, seasonal risk pattern, environmental impact, predictability of the hazard, ability to mitigate, availability of warning systems, public awareness, and corollary effects. The LPT rated likelihood of occurrence, damage capacity, economic impacts, population impact, ability to mitigate, and the availability of warning systems as "Always very important." The LPT rated size of affected area, duration of threat, and predictability of the hazard as "Usually important." Finally, the LPT rated speed of onset, seasonal risk pattern, environmental impact, public awareness, and corollary effects as "Sometimes important."

After the rating process for the evaluation criteria, the LPT selected the following six evaluation criteria:

- **Likelihood of Occurrence:** The frequency a particular hazard event occurs. The more frequent the event occurs, the greater potential there will be damage and a negative impact on the community.
- **Damage Capacity:** The destructive capacity of the hazard. While the destructive capacity of some hazard events (e.g., floods and tornadoes) is immediate and readily apparent, some hazards may have significant destructive capacity that is less obvious since it occurs over an extended period of time (e.g., extreme temperatures and drought).
- **Population Impact:** The percent of the county's population that may be affected directly or indirectly by a hazard event.
- **Availability of Warning Systems:** The relative ease at which the public can be warned of a hazard. This criterion addresses the overall warning system capability for a hazard and does not address the availability of warning systems in a community. For example, the public may be warned about a flood, but not warned about a structural fire. Hazards that have little or no availability of warning systems tend to have a greater hazard potential in a community.
- **Economic Impacts:** The monetary damages incurred from a hazard event that include public and private damages. Direct physical damages costs and indirect impact costs, such as lost business and tax revenue, are included in this criterion.
- **Ability to Mitigate:** The relative ease a particular hazard event can be mitigated through the application of structural and/or non-structural mitigation strategies. The easier it is to mitigate a hazard, the less likely the hazard will pose a threat (e.g., loss of life and property damage) to the community in the future.

Then, the LPT assigned relative weights to each evaluation criteria to express the criterion's level of important in analyzing the hazard. The relative weights were converted into percentages since the sum of the weights must equal 100%. After determining the impact each evaluation criterion has on each hazard, the LPT created evaluation scales for each evaluation criterion. The point values on the scales ranged between 1 and 10 and were assigned based on the criterion's relative severity and negative impacts. These scales can be found below. Finally, the LPT used a spreadsheet to rank the county's hazards based on the evaluation scales for each criterion (Table 6-8).

The following evaluation scales were used to evaluate each hazard:

Likelihood of Occurrence	
Excessive Occurrence (Occurs one or more times per year)	10 pts
High Occurrence (Occurs every 2-3 years)	7 pts
Medium Occurrence (Occurs every 5 years)	4 pts
Low Occurrence (Potential yearly occurrence)	1 pt
Unable to be Determined	0 pts

Damage Capacity	
High Capacity	10 pts
Medium Capacity	7 pts
Low Capacity	4 pts
No Capacity	1 pt
Unable to be Determined	0 pts

Availability of Warning Systems	
Warning systems are in place and operational	10 pts
Some warning systems are in place and operational	7 pts
Warning systems are in place, but are not operational	4 pts
No warning systems are available	1 pt

Economic Impacts	
Significant Impact (Over $500,000 in monetary damages incurred)	10 pts
Medium Impact ($300,001 to $500,000 in monetary damages incurred)	7 pts
Low Impact ($100,000 to $300,000 in monetary damages incurred)	4 pts
Minimal Impact (Less than $100,000 in monetary damages incurred)	1 pt
No Impact	0 pts

Population Impact	
75% to 100% of the population impacted	10 pts
50% to 74% of the population impacted	7 pts
25% to 49% of the population impacted	4 pts
1% to 24% of the population impacted	1 pt
No Population Impact	0 pts

Ability to Mitigate	
Easy to Mitigate (Variety of structural/non-structural measures)	10 pts
Possible to Mitigate (Some structural/non-structural measures)	7 pts
Difficult to Mitigate (Limited structural/non-structural measures)	4 pts
Impossible to Mitigate (Impossible to mitigate future events)	1 pt

Risk and Vulnerability Assessment Summaries

The county's risk and vulnerability assessments can be found in Table 6-9. The goal of the risk assessment is to determine where the hazards exist, their frequency, and their impact. The county's risk was determined by the hazard's likelihood of occurrence, the county's ability to mitigate it, the hazard's damage capacity, and the availability of warning systems in the county. The risk is classified as follows:

- **High Probability/High Impact:** The hazard will most likely happen and has a high potential to affect existing and future buildings and populations.
- **Low Probability/High Impact:** The hazard has a small chance of happening and has a high potential to affect existing and future buildings and populations.
- **High Probability/Low Impact:** The hazard will most likely happen and has a low potential to affect existing and future buildings and populations.
- **Low Probability/Low Impact:** The hazard has a small chance of happening and has a low potential to affect existing and future buildings and populations.

The vulnerability assessment determines where the population and critical facilities overlap with the hazards. The county's vulnerability assessment was evaluated based on the county's population and economic impacts. The vulnerability is classified as follows:

- **Severe:** The hazard event will have severe impacts over a large geographic area or in densely populated areas and will have a serious financial impact on residents and businesses.
- **Noticeable:** The hazard event will have confined impacts and financial burdens on residents and businesses.
- **Minor:** The hazard event will have minimal impacts and financial burdens on residents and businesses.

Table 6-8 Alcona County Priority Risk Index								
		Evaluation Criteria						
Rank	Hazard	Likelihood of Occurrence (20%)	Damage Capacity (20%)	Population Impact (20%)	Ability to Mitigate (20%)	Availability of Warning Systems (10%)	Economic Impacts (10%)	Score
1	Wildfires	10	10	4	7	7	10	7.90
1	Infrastructure Failures	1	10	10	10	7	10	7.90
3	Winter Weather Hazards (ice and sleet storms, and snowstorms)	10	4	10	10	10	1	7.90
4	Severe Winds (Derecho)	10	7	10	7	7	1	7.60
5	Drought	7	7	10	7	1	7	7.00
6	Public Health Emergency	10	1	10	4	10	10	7.00
7	Extreme Temperatures (Extreme Heat and Extreme Cold)	7	7	10	7	1	4	6.70
8	Riverine and Urban Flooding	10	7	4	7	1	10	6.70
8	Dam Failure	1	10	4	10	7	10	6.70
10	Oil and Gas Accidents (well and pipeline)	1	4	7	10	10	10	6.40
11	Transportation Accident (air/land/water)	10	7	1	7	7	4	6.10
12	Great Lakes Shoreline Flooding and Erosion	10	7	1	7	1	10	6.10
12	Transportation Hazardous Material Accident	7	7	1	7	7	10	6.10
12	Scrap Tire Fire	1	10	1	10	7	10	6.10
15	Hailstorms	10	4	4	7	7	1	5.80
16	Tornadoes	1	10	1	7	7	10	5.50
17	Fixed Site Hazardous Material Accident	1	7	1	10	7	10	5.50
18	Lightning	1	7	10	4	7	1	5.20
19	Structural Fire	0	4	1	7	1	10	3.50

Table 6-9 Alcona County's Risk and Vulnerability Assessment Summaries			
Rank	**Hazard**	**Risk Assessment**	**Vulnerability Assessment**
1	Wildfires	High Probability/High Impact	Severe
1	Infrastructure Failures	High Probability/High Impact	Severe
3	Winter Weather Hazards (ice and sleet storms, and snowstorms)	High Probability/High Impact	Minor
4	Severe Winds (Derecho)	High Probability/High Impact	Noticeable
5	Drought	Low Probability/High Impact	Severe
6	Public Health Emergency	Low Probability/High Impact	Severe
7	Extreme Temperatures (Extreme Heat and Extreme Cold)	Low Probability/Low Impact	Noticeable
8	Riverine and Urban Flooding	High Probability/High Impact	Noticeable
8	Dam Failure	Low Probability/High Impact	Severe
10	Oil and Gas Accidents (well and pipeline)	Low Probability/High Impact	Noticeable
11	Transportation Accident (air/land/water)	High Probability/Low Impact	Minor
12	Great Lakes Shoreline Flooding and Erosion	High Probability/High Impact	Noticeable
12	Transportation Hazardous Material Accident	High Probability/High Impact	Severe
12	Scrap Tire Fire	Low Probability/High Impact	Severe
15	Hailstorms	High Probability/Low Impact	Noticeable
16	Tornadoes	Low Probability/High Impact	Noticeable
17	Fixed Site Hazardous Material Accident	Low Probability/High Impact	Noticeable
18	Lightning	Low Probability/Low Impact	Noticeable
19	Structural Fire	High Probability/High Impact	Minor

Chapter 7 Goals and Objectives

Overview

The community goals and objectives for Alcona County were developed through the analysis of the county's existing social and economic conditions, critical services and facilities, environmental conditions, existing land use, hazard analysis, and vulnerability assessment. The local communities are encouraged to incorporate the hazard mitigation goals and objectives into their other planning activities, such as their master plans and capital improvement plans.

Goals and Objectives

The following goals and objectives will be used to guide the hazard mitigation efforts within Alcona County. The goals are broad in nature with slightly more specific objectives. Detailed action items can be found in Chapter 8: Mitigation Strategies and Priorities.

GOAL 1: Protect Public Health and Safety

Objectives

- Provide community-wide hazard warning systems (natural, health, and terrorism).
- Provide information and resources to increase hazard awareness and education.
- Maintain existing resources and provide necessary training.
- Identify and obtain necessary resources and equipment to prevent or minimize the effects of hazards.

GOAL 2: Minimize Damage to Public and Private Property

Objectives

- Adopt policies to make property less vulnerable to hazards.
- Apply proactive mitigation measures to prevent hazard damage.
- Obtain necessary equipment, resources, and training to protect property if a hazard occurs.
- Conduct training sessions and exercises to prepare for possible hazards.

GOAL 3: Maintain Essential Services

Objectives

- Inspect, maintain, and upgrade all critical infrastructure and facilities.
- Repair or replace critical infrastructure and facilities that are damaged or degraded.
- Protect critical infrastructure and facilities from damage caused by hazards.
- Obtain necessary resources and equipment to ensure essential services are maintained in the event of a hazard.

GOAL 4: Guide Growth/Development

Objectives

- Develop hazard resistant growth policies.
- Discourage development in high hazard areas.
- Integrate hazard mitigation planning into land use planning.
- Encourage sustainable development.
- Protect and conserve natural resources.

GOAL 5: Build partnerships to support emergency response services and hazard mitigation activities on a regional basis

Objectives

- Continue to work cooperatively with agencies and communities in Alcona County.
- Continue to work cooperatively with agencies and communities in Northern Michigan.
- Develop regional grant applications for hazard mitigation implementation.
- Continue to participate in the Region 3 Homeland Security Board.

GOAL 6: Develop, update, and maintain geographic information system (GIS) data sets

Objectives

- Develop GIS data sets for usage by county officials, the emergency management office, and 911 staff.
- Evaluate data sets annually and update, if necessary.

Chapter 8 Mitigation Strategies and Priorities

Overview

After determining Alcona County's goals and objectives, hazard mitigation actions were developed based on the following categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. The mitigation action and implementation strategies were prioritized and evaluated to determine the effect they will have on the goals and objectives. During the prioritization process, each action was evaluated based on its social impact, technical feasibility, future visions, administrative potential, political impact, legal ramification, environmental impact, overall benefit, and cost effectiveness.

Utilizing all the considerations above, each strategy was assigned a priority level of High, Medium, or Low.

High Priority Projects: Projects may address many goals and objectives or mitigate multiple hazards, benefits exceed cost, funding is likely under existing programs or grant sources, technical resources to complete the action are available, and there is strong local commitment to the strategy.

Medium Priority: Projects may address several goals and objectives or mitigate multiple hazards, benefits exceed costs, funding may be available through existing programs or grants sources, technical resources may be available but are not secured, and there is a moderate amount of local commitment to the strategy.

Low Priority: Projects may address fewer goals and objectives and mitigate multiple hazards, benefits exceed costs, funding is not available and grant eligibility is unknown, technical resources to complete the action are not available or have not been determined, and there is little local commitment to the strategy.

Mitigation Action and Implementation Strategies Tables

In the previous hazard mitigation plan, the mitigation action and implementation strategies were categorized based on the hazard(s) they addressed (Appendix D). When the LPT reviewed the strategies, they moved many action items to the all-hazard mitigation table, three action items were deemed no longer relevant in the county (and will be removed from future plans), and many items were determined to be ongoing/long-term projects. The Fall 2020 FEMA review determined this categorization was not adequate since it did not provide a purpose for each mitigation action item. To rectify this issue, the mitigation actions and implementation strategies were re-categorized based on the categories used to develop the action items: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. Additionally, a line item was added under each action item to address which hazard(s) the action item mitigates.

Prevention Action and Implementation Strategies

The purpose of the prevention action and implementation strategies is to address the strategies related to government administrative or regulatory actions and processes that influence how land is developed and buildings are constructed. Also, public activities that reduce hazard losses are included in this category. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations. For each mitigation strategy in this category, the strategies are designed to reduce deaths and injuries, reduce structural damage and deterioration, prevent the interruption of businesses, prevent insurance losses, reduce capital costs for repairs, and reduce the degradation of cultural and natural resources.

1. Build the capabilities of the county GIS program to address hazards. Create and/or update datasets (e.g., parcels/ownership, location of all structures, driveways with ingress/egress conditions, roads, forest types, ownership types, floodplains, utilities (e.g., power lines, gas lines and water lines), wetlands, water features, bridges and culverts, and SARA III sites).

Priority Level: High
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Drought, Public Health Emergency, Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County Road Commission, District Health Department, Salvation Army, U.S. Forest Service, Michigan Department of Natural Resources
Financial and Technical Resources: County, State, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Federal Government, NEMCOG
Progress/Status: Ongoing/Long term throughout the entire county. Major update of 911 CAD mapping system. County uses ArcGIS for parcel mapping.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

2. Maintain a list of homes and facilities with vulnerable residents (e.g., elderly, infirmed, disabled individuals) to contact during hazard events to assess their needs.

Priority Level: High
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Drought, Public Health Emergency, Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, District Health Department, Salvation Army, Civic groups and churches, State, American Red Cross, Medical
Financial and Technical Resources: County Emergency Management Office, County, State, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Federal Government, Civic groups and churches, District Health Department
Progress/Status: Ongoing/Long term throughout the entire county. In progress, list is compiled and updated.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

3. Update emergency response plans for schools, campgrounds, fairgrounds, parks, community events and marinas.

Priority Level: High
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Public Health Emergency, Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County Emergency Management Office, Salvation Army, Civic groups and churches, Schools
Financial and Technical Resources: County Emergency Management Office, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Ongoing updates for EOPs.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

4. Maintain a community public health system with sufficient disease monitoring and surveillance capabilities to adequately protect the population from large-scale outbreaks.

Priority Level: High
Hazards Addressed: Public Health Emergency
Responsible Agencies: District Health Department, State, Medical, Federal Government

Financial and Technical Resources: District Health Department, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. In place.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

5. Develop a Community Wildfire Protection Plan with the local fire departments, U.S. Forest Service and Michigan Department of Natural Resources.

Priority Level: High
Hazards Addressed: Wildfires, Scrap Tire Fire
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, MSU Extension
Financial and Technical Resources: County, U.S. Forest Service, Michigan Department of Natural Resources, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Federal Government , NEMCOG
Progress/Status: Ongoing/Long term throughout the entire county. No Progress.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

6. Local communities should plan for their future needs through the development of master plans, capital improvement plans, zoning ordinances, subdivision regulations, open space regulations, etc. Incorporate floodplain/coastal zone management and Firewise strategies into the plans.

Priority Level: High
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Public Health Emergency, Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Gustin Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County Road Commission
Financial and Technical Resources: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Gustin Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Federal Governments, Local Fire Departments
Progress/Status: Ongoing/Long term throughout the entire county. Communities update their

master plans. Minor Progress for incorporation of Firewise strategies.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

7. Enforce ordinances that protect the entire community and respect individual rights.

Priority Level: High
Hazards Addressed: Wildfires, Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Great Lakes Shoreline Flooding and Erosion, Scrap Tire Fire, Fixed Site Hazardous Material Accident, Structural Fire
Responsible Agencies: City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Financial and Technical Resources: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county. In Progress.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented. However, the strategy was modified to focus on zoning code requirements instead of building code requirements.

8. Develop plans to identify and inform persons about the location of safe areas during festivals and events (signs and directions to shelters).

Priority Level: Medium
Hazards Addressed: Severe Winds (derecho), Extreme Temperatures (Extreme Heat and Extreme Cold), Hailstorms, Tornadoes, Lightning
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Fire Departments, County Road Commission, Salvation Army, Civic Groups and Churches, Local Businesses
Financial and Technical Resources: Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. In Progress. Rides are shut down; people are notified when hazards occur.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

9. Develop and implement a strategy to introduce the Firewise program in at-risk communities.

Priority Level: Medium
Hazards Addressed: Wildfires
Responsible Agencies: County Emergency Management Office, County, City of Harrisville,

Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Department, U.S. Forest Service, Michigan Department of Natural Resources, MSU Extension, American Red Cross
Financial and Technical Resources: State, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Information distributed at events.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has changed since the strategy has been implemented and is continually reviewed and updated, if necessary.

10. Strictly enforce open burning regulations.

Priority Level: Medium
Hazards Addressed: Wildfires
Responsible Agencies: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Department, U.S. Forest Service, Michigan Department of Natural Resources, Salvation Army
Financial and Technical Resources: U.S. Forest Service, Michigan Department of Natural Resources, Federal Government, Local Fire Departments
Progress/Status: Ongoing/Long term throughout the entire county. Signs in community.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has changed since the strategy is implemented and is continually monitored.

11. Provide a chipper for disposal of woody debris in conjunction with composting programs and spring clean-up days.

Priority Level: Medium
Hazards Addressed: Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Hailstorms
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Departments, Civic and Church groups, Insurance Companies, Local Businesses, Utility Companies
Financial and Technical Resources: Federal Government, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county. Woody debris taken to the Viking Cogeneration facility in the Village of Lincoln.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

12. Improve regional and watershed cooperation activities.

Priority Level: Medium
Hazards Addressed: Riverine and Urban Flooding, Dam Failure, Great Lakes Shoreline Flooding and Erosion
Responsible Agencies: County Emergency Management Office, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County, Huron Pines
Financial and Technical Resources: State, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

13. Develop evacuation plans and a community outreach program to increase community awareness about evacuation procedures.

Priority Level: Medium
Hazards Addressed: Wildfires, Oil and Gas Accidents (well and pipeline), Winter Weather Hazards (ice and sleet storms, and snowstorms)
Responsible Agencies: County Emergency Management Office, Salvation Army, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, Civic and Church Groups, American Red Cross
Financial and Technical Resources: Federal Government, County Emergency Management Office, U.S. Forest Service, Michigan Department of Natural Resources, Local Fire Departments, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county. In progress.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

14. Develop a Wildfire Safety Coalition that organizes neighborhood wildfire safety programs that provide wildfire education about escape routes, sprinkler systems, power lines, etc.

Priority Level: Low
Hazards Addressed: Wildfires
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Departments, Landowners, MSU Extension
Financial and Technical Resources: County Emergency Management Office, County, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, City of Harrisville,

Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county. In Progress.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented.

15. Continue pre-planning efforts for debris management staging and storage areas.

Priority Level: Low
Hazards Addressed: Wildfires, Severe Winds (derecho), Dam Failure, Scrap Tire Fire, Hailstorms, Tornadoes, Lightning
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County Road Commission
Financial and Technical Resources: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Departments
Progress/Status: Ongoing/Long term throughout the entire county. Sites identified and reviewed periodically.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented.

16. Identify optimal staffing levels for the county, local governments, police, fire departments, EMS, District Health Department, etc. Seek funding to meet the optimal levels.

Priority Level: Low
Hazards Addressed: Wildfires, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Public Health Emergency, Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Financial and Technical Resources: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually reviewed and implemented.

Property Protection Action and Implementation Strategies

The purpose of the property protection action and implementation strategies is to address the strategies related to actions involved in the modification of existing buildings or structures to protect them from a hazard or remove them from a hazardous area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass. For each mitigation strategy in this category, the strategies are designed to reduce structural damage and deterioration, prevent the interruption of businesses, prevent insurance losses, and reduce capital costs for repairs.

1. Thin flammable vegetation, create fuel breaks, and use fire-retardant materials and vegetation to manage wildfire fuel.

Priority Level: High
Hazards Addressed: Wildfires
Responsible Agencies: U.S. Forest Service, Michigan Department of Natural Resources, Landowners, State, Federal Government
Financial and Technical Resources: U.S. Forest Service, Michigan Department of Natural Resources, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. MDNR and USFS are active on public lands.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

2. Identify and map flood prone areas and structures affected by flooding.

Priority Level: High
Hazards Addressed: Infrastructure Failures, Public Health Emergency, Riverine and Urban Flooding, Dam Failure, Great Lakes Shoreline Flooding and Erosion
Responsible Agencies: County Emergency Management Office, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Gustin Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Financial and Technical Resources: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Gustin Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Federal Governments
Progress/Status: Ongoing/Long term throughout the entire county. FEMA completed mapping.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

3. Work with power companies to inventory the condition of power line right of ways. Identify priority sections for branch and tree clearing from power lines to create and maintain a disaster-resistant landscape.

Priority Level: Medium

Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Scrap Tire Fire, Hailstorms, Tornadoes, Lightning
Responsible Agencies: County Emergency Management Office, County Road Commission, Utility Companies, Landowners
Financial and Technical Resources: Federal Government, Landowners, Local Businesses
Progress/Status: Ongoing/Long term throughout the entire county. Progress made, Consumers and the Road Commission cut back vegetation.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

4. Bury and protect power and utility lines, where feasible and cost effective.

Priority Level: Low
Hazards Addressed: Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Extreme Temperatures (Extreme Heat and Extreme Cold), Hailstorms, Tornadoes, Lightning
Responsible Agencies: County Emergency Management Office, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Utility Companies
Financial and Technical Resources: Utility Companies
Progress/Status: Ongoing/Long term throughout the entire county. As utility lines and phone lines are upgraded, they are buried.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented.

5. Promote and implement solutions to keep roads and driveways accessible to vehicles and fire equipment.

Priority Level: Low
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Scrap Tire Fire, Structural Fire
Responsible Agencies: County Emergency Management Office, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Departments, Landowners, County Road Commission
Financial and Technical Resources: County Emergency Management Office, County, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county. MDNR and USFS media announcements.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually

implemented.

6. Encourage mobile home park developments to anchor manufactured homes and exterior structures (e.g., carports, porches, etc.), and install tornado/wind shelters.

Priority Level: Low
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Hailstorms, Tornadoes
Responsible Agencies: State
Financial and Technical Resources: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented.

7. Demolish and clear vacant, condemned structures in populated areas.

Priority Level: Low
Hazards Addressed: Public Health Emergency, Structural Fire
Responsible Agencies: County, Local Businesses, District Health Department
Financial and Technical Resources: District Health Department, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Ongoing at the township level.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented.

8. Coordinate with the health department and local communities to assure proper location, installation, cleaning, monitoring, and maintenance of septic tanks.

Priority Level: Low
Hazards Addressed: Infrastructure Failures, Public Health Emergency, Riverine and Urban Flooding, Great Lakes Shoreline Flooding and Erosion
Responsible Agencies: City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, District Health Department
Financial and Technical Resources: District Health Department, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented.

9. Elevate flood prone structures above the 100-year flood level. Dry floodproof structures in flood prone areas.

Priority Level: Low
Hazards Addressed: Riverine and Urban Flooding, Dam Failure, Great Lakes Shoreline Flooding and Erosion
Responsible Agencies: State, Landowners, Federal Government
Financial and Technical Resources: Landowners, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. No Progress.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually reviewed and implemented.

Public Education and Awareness Action and Implementation Strategies

The purpose of the public education and awareness action and implementation strategies is to address the strategies related to actions that inform and educate citizens, elected officials, and property owners about hazards and the potential ways to mitigate them. Examples include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs. For each mitigation strategy in this category, the strategies are designed to reduce deaths and injuries, reduce structural damage and deterioration, prevent the interruption of businesses, prevent insurance losses, reduce capital costs for repairs, and reduce the degradation of cultural and natural resources.

1. Maintain an outreach program for vulnerable populations during and after all hazard events that impact the community.

Priority Level: High
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Drought, Public Health Emergency, Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County Emergency Management Office, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Department, District Health Department, Salvation Army, Civic groups and churches, U.S. Forest Service, Michigan Department of Natural Resources, State, American Red Cross, National Weather Service
Financial and Technical Resources: Federal Government, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County, American Red Cross, District Health Department, County Emergency Management Office
Progress/Status: Ongoing/Long term throughout the entire county. Aid is available. EMS building is opened during extreme temperature events.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

2. Increase public awareness about the causes, symptoms, and protective actions for

disease outbreaks and other potential public health emergencies. Encourage residents to receive immunizations against communicable diseases.

Priority Level: High
Hazards Addressed: Public Health Emergency
Responsible Agencies: District Health Department, Schools, Civic groups and churches, Medical, American Red Cross, State
Financial and Technical Resources: District Health Department, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Progress made.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

3. Expand community support for free or reduced-expense clinics and school health services.

Priority Level: Medium
Hazards Addressed: Public Health Emergency
Responsible Agencies: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Civic groups and churches, District Health Department, State, Medical
Financial and Technical Resources: District Health Department, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. In place, ongoing.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be implemented.

4. Provide information to the public about pollution control, enforcement, cleanup, and the proper disposal of chemicals and scrap materials.

Priority Level: Medium
Hazards Addressed: Public Health Emergency, Scrap Tire Fire
Responsible Agencies: County, County Emergency Management Office, Local Businesses, District Health Department, Schools, State, Federal Government
Financial and Technical Resources: District Health Department, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. In place, ongoing.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

5. Encourage communities that are vulnerable to flood hazards to join the National Flood Insurance Program (NFIP).

Priority Level: Medium
Hazards Addressed: Riverine and Urban Flooding, Great Lakes Shoreline Flooding and Erosion
Responsible Agencies: Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Gustin Township, Harrisville Township, City of Harrisville, Hawes Township, Haynes Township, Mikado Township, Millen Township
Financial and Technical Resources: Federal Government

Progress/Status: Ongoing/Long term throughout the entire county. Mitchell Township and the Village of Lincoln are not part of NFIP. All other townships and the City of Harrisville participate.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

6. Expand the public education program for all hazards that threaten the community, including an education, emergency preparedness, and awareness program in schools (e.g., classroom presentations and demonstrations, and incorporating hazard preparedness information into curriculums and driver education classes), displays and workshops at community events, and displays and education materials at libraries. Encourage residents to develop a Family Disaster Plan, including the preparation of a Disaster Supplies Kit.

Priority Level: Medium
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Drought, Public Health Emergency, Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Departments, Civic Groups and Churches, U.S. Forest Service, Michigan Department of Natural Resources, American Red Cross, National Weather Service, Schools, State, District Health Department, Insurance Companies
Financial and Technical Resources: Federal Government, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, State, Police, Civic Groups and Churches, American Red Cross, District Health Department
Progress/Status: Ongoing/Long term throughout the entire county. Information distributed at events. Weather spotter workshops available each year. American Red Cross distributes information, fire departments present in schools, tornado and fire drills, Future Farmers of America and science classes provide information. Information and strategies provided in driver education classes. Kits are raffled.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

7. Distribute wildfire education materials to homeowners and businesses that include information about creating defensible space around structures in fire prone areas. Promote media broadcasts about fire weather and warnings.

Priority Level: Medium
Hazards Addressed: Wildfires
Responsible Agencies: County Emergency Management Office, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township,

Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, Insurance Companies, Utility Companies, MSU Extension, National Weather Service
Financial and Technical Resources: County Emergency Management Office, Federal Government, U.S. Forest Service, Michigan Department of Natural Resources, Local Fire Departments, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county. Information on website, distributed at events, and sent to residents. MDNR and USFS media announcements about fire weather and fire warnings.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

8. Increase public awareness about permits required to build in floodplain areas.

Priority Level: Medium
Hazards Addressed: Infrastructure Failures, Public Health Emergency, Riverine and Urban Flooding, Great Lakes Shoreline Flooding and Erosion
Responsible Agencies: County Emergency Management Office, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County, State, Federal Government
Financial and Technical Resources: State, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

9. Increase public awareness about radon dangers and the prevention efforts that can be taken to reduce concentrations of radon in homes and buildings.

Priority Level: Low
Hazards Addressed: Public Health Emergency, Fixed Site Hazardous Material Accident
Responsible Agencies: State, District Health Department
Financial and Technical Resources: District Health Department, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. In place.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented.

10. Identify communities and neighborhoods for the development of Firewise demonstration projects.

Priority Level: Low

Hazards Addressed: Wildfires
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, MSU Extension, American Red Cross
Financial and Technical Resources: County Emergency Management Office, County, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county. Minor Progress.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented.

11. Acquire portable/changeable message signs to provide information and to direct crowds.

Priority Level: Low
Hazards Addressed: Wildfires, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Public Health Emergency, Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County Emergency Management Office, County road Commission
Financial and Technical Resources: Civic Groups and Churches, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county. Road Commission has a sign.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually reviewed and implemented.

Natural Resource Protection Action and Implementation Strategies

The purpose of the natural resource protection action and implementation strategies is to address the strategies related to actions that minimize hazard losses and preserve or restore the functions of natural systems. Examples include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation. For each mitigation strategy in this category, the strategies are designed to reduce deaths and injuries, reduce structural damage and deterioration, prevent the interruption of businesses, prevent insurance losses, reduce capital costs for repairs, and reduce the degradation of cultural and natural resources.

1. Protect and restore wetlands and natural water retention areas to improve natural stormwater retention systems.

Priority Level: Medium
Hazards Addressed: Infrastructure Failures, Riverine and Urban Flooding, Great Lakes Shoreline Flooding and Erosion
Responsible Agencies: City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County, U.S Forest Service, Michigan Department of Natural Resources
Financial and Technical Resources: State, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Progress made at Cedar Lake.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

2. Work with the Federal Emergency Management Agency (FEMA) to identify floodplains.

Priority Level: Low
Hazards Addressed: Infrastructure Failures, Riverine and Urban Flooding, Great Lakes Shoreline Flooding and Erosion
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County road Commission, Federal Government
Financial and Technical Resources: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. FEMA completed mapping.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented.

3. Detection and prevention/discouragement of illegal discharges into stormwater sewer systems from home footing drains, downspouts, and sump pumps.

Priority Level: Low
Hazards Addressed: Public Health Emergency
Responsible Agencies: City of Harrisville, Village of Lincoln, Landowners, County
Financial and Technical Resources: County, City of Harrisville, Village of Lincoln
Progress/Status: Ongoing/Long term throughout the City of Harrisville and the Village of Lincoln.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented.

Emergency Services Action and Implementation Strategies

The purpose of the emergency services action and implementation strategies is to address the strategies related to actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities. For each mitigation strategy in this category, the strategies are designed to reduce deaths and injuries and reduce the interruption of businesses.

1. Provide trained, equipped, and prepared search and rescue teams, and local hazardous materials emergency response teams.

Priority Level: High
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Structural Fire
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Department, Salvation Army
Financial and Technical Resources: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

2. Continue increasing the number of weather spotters through training.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Drought, Extreme Temperatures (Extreme Heat and Extreme Cold), Hailstorms, Tornadoes, Lightning
Responsible Agencies: County Emergency Management Office, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Salvation Army, National Weather Service
Financial and Technical Resources: National Weather Service
Progress/Status: Ongoing/Long term throughout the entire county. National Weather Service sponsors weather watcher workshops.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be implemented.

3. Conduct multi-agency, inter-county emergency management response exercises for fire suppression.

Priority Level: High
Hazards Addressed: Wildfires, Scrap Tire Fire, Structural Fire
Responsible Agencies: County Emergency Management Office, County, Local Fire Departments, American Red Cross, Salvation Army
Financial and Technical Resources: Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Exercise conducted.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

4. Establish redundancies in the utility and communication systems through the determination and inventory of the systems. Upgrade systems, if necessary.

Priority Level: High
Hazards Addressed: Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Extreme Temperatures (Extreme Heat and Extreme Cold), Transportation Accident (air/land/water), Transportation Hazardous Material Accident, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Department, Salvation Army, Utility Company
Financial and Technical Resources: Federal Government, Landowners, Local Businesses, State, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County
Progress/Status: Ongoing/Long term throughout the entire county. RACES/HAM services in place. Utility and communications systems have been inventoried and are currently being reviewed.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

5. Prearrange shelters or establish heating/cooling centers and shelters for vulnerable populations.

Priority Level: High
Hazards Addressed: Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Great Lakes Shoreline Flooding and Erosion, Hailstorms, Tornadoes, Structural Fire
Responsible Agencies: County Emergency Management Office, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County, Civic Groups and Churches, Salvation Army, American Red Cross, State
Financial and Technical Resources: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township,

District Health Departments, Federal Government, County Emergency Management Office, American Red Cross, Local Fire Departments
Progress/Status: Ongoing/Long term throughout the entire county. Sites identified and reviewed periodically. Minor progress in prearranging shelters for stranded motorists and tourists.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

6. Ensure the county and communities have adequate equipment and training.

Priority Level: Medium
Hazards Addressed: Transportation Accident (air/land/water)
Responsible Agencies: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Local Fire Departments, County Road Commission, Salvation Army
Financial and Technical Resources: Federal Government, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County
Progress/Status: Ongoing/Long term throughout the entire county. Progress made.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

7. Use NOAA radios as an early warning emergency system. Subsidize the purchase and distribute radios to county residents, organizations, and businesses to expand coverage.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Extreme Temperatures (Extreme Heat and Extreme Cold), Hailstorms, Tornadoes, Lightning
Responsible Agencies: County Emergency Management Office, National Weather Service
Financial and Technical Resources: Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Received grant to distribute radios to critical sites, individuals and special events. Installed and are replaced if no longer functioning. Working with the FCC regarding frequencies.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

8. Identify areas with adequate water supplies and areas lacking adequate water supplies for emergency firefighting.

Priority Level: Medium
Hazards Addressed: Wildfires, Scrap Tire Fire, Structural Fire
Responsible Agencies: Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, County Road Commission

Financial and Technical Resources: County, U.S. Forest Service, Michigan Department of Natural Resources, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

9. Continue to develop the Emergency Response Team program to prepare for all hazard events.

Priority Level: Medium
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Drought, Public Health Emergency, Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County Emergency Management Office, Local Fire Departments, County Road Commission, District Health Department, U.S. Forest Service, Michigan Department of Natural Resources, American Red Cross
Financial and Technical Resources: County Emergency Management Office, Federal Government, District Health Department
Progress/Status: Ongoing/Long term throughout the entire county. Active LEPC, LPT, Incident Management Team and Regional Response Team.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be implemented.

10. Purchase and maintain an adequate number of emergency power generators to supply back up power for critical facilities, emergency water needs, wastewater processing, and shelters.

Priority Level: Medium
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Drought, Public Health Emergency, Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning, Structural Fire
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Salvation Army, Medical, Federal Government, Schools
Financial and Technical Resources: County, Federal Government, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township

Progress/Status: Ongoing/Long term throughout the entire county. Generators purchased for critical facilities. Generator need is evaluated on an ongoing basis.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has changed since the strategy has been implemented and is continually reviewed.

11. Improve agencies' capabilities to carry-out road closures and provide traffic control.

Priority Level: Medium
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Extreme Temperatures (Extreme Heat and Extreme Cold), Riverine and Urban Flooding, Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident, Scrap Tire Fire, Tornadoes, Fixed Site Hazardous Material Accident
Responsible Agencies: County Road Commission, Salvation Army
Financial and Technical Resources: Federal Government, County Road Commission
Progress/Status: Ongoing/Long term throughout the entire county. Procedures in place.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

12. Ensure key gasoline stations have the capacity to pump gasoline during power outages.

Priority Level: Low
Hazards Addressed: Wildfires, Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Extreme Temperatures (Extreme Heat and Extreme Cold), Dam Failure, Oil and Gas Accidents (well and pipeline), Transportation Accident (air/land/water), Transportation Hazardous Material Accident, Scrap Tire Fire, Hailstorms, Tornadoes, Fixed Site Hazardous Material Accident, Lightning
Responsible Agencies: County Emergency Management Office, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
County Road Commission, Salvation Army, Local Businesses
Financial and Technical Resources: Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Portable generator is available; two gas stations have generators.
Previous Plans: This item has been retained from the 2014 plans, in which it was classified as a medium priority. The priority has changed since the strategy is implemented and reviewed.

Structural Projects Action and Implementation Strategies

The purpose of the structural projects action and implementation strategies is to address the strategies related to actions involving the construction of structures to reduce the impact from a hazard. Examples include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms. For each mitigation strategy in this category, the strategies are designed to reduce deaths and injuries, reduce structural damage and deterioration, prevent the interruption of businesses, prevent insurance losses, reduce capital costs for repairs, and reduce the degradation of cultural and natural

resources.

1. Inventory problem sections of roads and road/stream crossings. Obtain community support and seek funding to make roads flood-resistant (e.g., construct elevated or alternative roads that are not affected by flooding), limit blowing and drifting of snow (e.g., place snow fences or vegetation along critical roadways).

Priority Level: High
Hazards Addressed: Infrastructure Failures, Winter Weather Hazards (ice and sleet storms, and snowstorms), Riverine and Urban Flooding, Transportation Accident (air/land/water), Great Lakes Shoreline Flooding and Erosion, Transportation Hazardous Material Accident
Responsible Agencies: County Road Commission, State, Medical, Federal Government, Salvation Army, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Financial and Technical Resources: Landowners, Federal Government, County Road Commission, State, NEMCOG, Civic groups and churches, U.S. Forest Service, Michigan Department of Natural Resources
Progress/Status: Ongoing/Long term throughout the entire county. Received money from MDOT for snow fences. Problem road/stream crossings have been fixed and are monitored.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually reviewed and implemented.

2. Construct safe areas and storm shelters at campgrounds, fairgrounds, parks, and outdoor recreational facilities.

Priority Level: High
Hazards Addressed: Severe Winds (derecho), Hailstorms, Tornadoes, Lightning
Responsible Agencies: County Emergency Management Office, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, U.S. Forest Service, Michigan Department of Natural Resources, Local Businesses, Schools
Financial and Technical Resources: County Emergency Management Office, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Safe areas identified and reviewed periodically.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority has not changed since the strategy will be continually implemented.

3. Implement structural projects to increase drainage or absorption capacities. Construct drainage easements to allow for the planned and regulated public use of privately-owned land for temporary water retention and drainage.

Priority Level: Medium

Hazards Addressed: Infrastructure Failures, Riverine and Urban Flooding, Dam Failure, Great Lakes Shoreline Flooding and Erosion
Responsible Agencies: County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, County Road Commission
Financial and Technical Resources: Federal Government, Landowners, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township
Progress/Status: Ongoing/Long term throughout the entire county. County Road Commission is addressing issues, where possible.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority has not changed since the strategy will be continually implemented.

4. Encourage the installation of NOAA weather radios in new structures.

Priority Level: Low
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Extreme Temperatures (Extreme Heat and Extreme Cold), Hailstorms, Tornadoes, Lightning
Responsible Agencies: State
Financial and Technical Resources: State, County, City of Harrisville, Village of Lincoln, Alcona Township, Caledonia Township, Curtis Township, Greenbush Township, Harrisville Township, Hawes Township, Haynes Township, Mikado Township, Millen Township, Mitchell Township, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a low priority. The priority has not changed since the strategy will be continually implemented. However, the strategy was re-worded since the county cannot amend the State's building codes.

Removed Hazard Mitigation Actions and Implementation Strategies from the 2021 Alcona County Hazard Mitigation Plan

1. Change real estate disclosure laws to require sellers to identify a structure's location in a shoreline flooding or erosion area.

Priority Level: Medium
Responsible Agencies: Real Estate Companies, State
Funding Sources: State
Application: Countywide
Previous Plans: This item was removed from the 2014 plan.

2. Implement community wildland fire education program utilizing the Student Conservation Association- Fire Education Corps. to provide land managers and communities with tools and information designed to reduce the negative impact of wildland fires on individuals living in the wildland-urban interface.

Priority Level: Low
Responsible Agencies: County Emergency Management Office, County, Local Governments, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, American Red Cross, MSU Extension
Funding Sources: County Emergency Management Office, County, Local Governments, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources
Application: Countywide
Previous Plans: This item was removed from the 2014 plan.

3. Change real estate disclosure laws to require sellers to identify a structures location in a floodplain.

Priority Level: Medium
Responsible Agencies: Real Estate Companies, State
Funding Sources: State
Application: Countywide
Previous Plans: This item was removed from the 2014 plan.

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Chapter 9 Plan Maintenance

Implementation, Monitoring, and Evaluation

The Alcona County Board of Commissioners (BOC) and the Alcona County Emergency Management Office (EM) are the primary entities responsible for implementing the Alcona County Hazard Mitigation Plan. The BOC will need to evaluate funding and staffing required to implement the hazard mitigation plan since the current resources, both staff and financial, may not accommodate the expanded role of the EM and the Alcona County Local Planning Team (LPT). GIS data sets and maps will be updated and maintained by the local governments for future use in the implementation and monitoring of hazard mitigation activities.

The LPT meets on a regular basis to carry out its duties and has expanded its role to function as the Hazard Mitigation Committee (HMC). The HMC and Emergency Management Coordinator will be responsible for monitoring and implementing the mitigation plan. Staff support will be provided by the EM and will coordinate with the BOC. The Emergency Management Coordinator will provide program administration and project oversight.

The roles related to the HMC may be defined/re-defined by the committee. The HMC will develop a five-year project list from the mitigation strategies identified in the Alcona County Hazard Mitigation Plan and will perform an annual review of the hazard mitigation plan to determine what projects have been accomplished and to add new projects to the five-year action list. The HMC may also assist other agencies in accomplishing projects, such as determining overall costs and funding sources, identifying the staff and agencies required to complete the project, and determining timelines. The HMC may also support grant writing to seek funding to complete projects, address specific issues and circumstances arising from an event that caused a disaster declaration, evaluate the need for new projects and amend the hazard mitigation plan, review reports from agencies involved in implementing mitigation projects, prepare an annual mitigation activity report for the BOC, and function as a clearinghouse for mitigation grant applications. During the hazard mitigation plan update process, the HMC will advertise and facilitate two public meetings to obtain input from the general public, businesses, townships, and agencies. A notice will be posted to advertise any meeting of the HMC where the committee will be reviewing and/or updating the mitigation plan. Additional emergency management staff time will be required to assist the HMC in completing its duties.

Additionally, the HMC and the EM will be responsible for evaluating the effectiveness of the plan during the five-year update or more often, if necessary. The evaluation will keep the hazard mitigation plan current and will include an assessment about whether the goals and objectives address current and expected conditions, the risks have changed in nature, magnitude or type, there are implementation issues, the current resources are appropriate for implementing the plan, there have been favorable outcomes, and other agencies and stakeholders have participated as expected.

Local governments, county departments, and local, state and federal agencies will have the ability to propose projects and sponsor projects identified in the hazard mitigation plan. Coordinating with the HMC will support plan implementation and allow the committee to monitor the plan's progress, determine timelines, and evaluate the plan for revisions.

Partnerships with the following agencies and organizations will strengthen the county's hazard mitigation program to efficiently leverage available resources:

- Alcona County Board of Commissioners
- Alcona County Departments
- City of Harrisville
- Village of Lincoln
- Alcona Township
- Caledonia Township
- Curtis Township
- Greenbush Township
- Gustin Township
- Harrisville Township
- Hawes Township
- Haynes Township
- Mikado Township
- Millen Township
- Mitchell Township
- Township, City and Village Fire Departments
- Alcona Conservation District
- Alcona County Road Commission
- Northeast Michigan Council of Governments
- Michigan Department of Natural Resources
- Michigan Department of Environment, Great Lakes, and Energy
- U.S. Forest Service
- Michigan State University Extension
- Michigan Department of Agriculture and Rural Development
- Natural Resource Conservation Service
- District Health Department
- Huron Pines
- American Red Cross
- Insurance Companies
- Real Estate Companies
- Local Businesses
- Civic Groups and Churches
- Federal Emergency Management Administration
- Northeast Michigan Community Service Agency
- Michigan State Police

Integration

Alcona County, the City of Harrisville, the Village of Lincoln, all townships in Alcona County, and the local and state agencies will consider integrating information from the hazard mitigation plan into their capital improvement, comprehensive and operations plans. Land use planning and zoning is administered at the city, village, and township level. All communities in the county are encouraged to adopt zoning regulations to minimize hazard effects.

Five Year Plan Review and Update

The Stafford Act, as amended by the Disaster Mitigation Act of 2000, requires the Alcona County Hazard Mitigation Plan to be updated, adopted, and re-submitted for Federal Emergency Management Agency (FEMA) approval every five years. The plan will be reviewed by the HMC every five years in alignment with federal regulations. The update will include determining changes in the county, such as changes in development, an increase in exposure to hazards, an increase or decrease in the communities' capability to address hazards, the addition and/or removal of

mitigation actions and strategies, reviewing goals, and a change in federal or state legislation. Upon plan review and update completion, the plan will be sent to the State Hazard Mitigation Officer at the Michigan State Police for final review and approval in coordination with FEMA. When the plan has received an "approved pending adoption" status from FEMA, the BOC and local jurisdictions will review, approve, and adopt the plan. In order to properly update the plan, Alcona County will need to seek funding from appropriate state and federal agencies.

Continued Public Involvement

Alcona County is committed to keeping the public involved in the implementation and update of the hazard mitigation plan. Copies of the plan will be available at the county libraries, county clerk's office, all township offices, and will be posted on the communities' websites and/or regional planning agency website. The EM will be responsible for keeping a record of public comments about the plan.

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APPENDIX A

Regional Public Participation Survey

The survey results for individuals residing in Alcona County are included within this appendix and are represented with graphs, tables, and dated comments. The results for the entire regional survey can be viewed at: http://www.discovernortheastmichigan.org/downloads/regional_survey_results.pdf.

Five respondents indicated they lived within Alcona County and 80% indicated they have received information about how to make their household safer from natural, technological, or human-related hazards with information coming from the U.S. Forest Service, USDA, fire departments, American Red Cross, and other emergency organizations. The majority of respondents indicated the newspaper and radio was the most effective way to distribute information, followed by television, internet, mail, and public workshops/meetings. All respondents reported they have not experienced a hazard event in the last five years.

Natural Hazards

Respondents are very concerned or somewhat concerned about the following hazards:

- Snow/ice storms, tornadoes, wildfires, and windstorm/high winds: 80%
- Extreme cold events, flooding, and thunderstorms: 60%

Respondents are not very concerned or not concerned about the following hazards:

- Drought, and extreme heat events: 60%

One respondent was very concerned about an earthquake.

Respondents feel Alcona County is best prepared to handle snow/ice storms (80%), extreme cold and extreme heat events (80%), flooding (60%), wildfire (60%), and thunderstorms (80%). Approximately 80% of respondents were either unsure (40%) or feel the county is least prepared (40%) to handle drought. Additionally, 80% of respondents were either unsure (40%) or feel the county is best prepared (40%) to handle a tornado, while 60% of respondents were either unsure (20%) or feel the county is best prepared (40%) to handle windstorm/high winds.

Technological Hazards

Respondents are very concerned or somewhat concerned about the following hazards:

- Communications failure, and power failure: 80%
- Dam failure, hazardous material spill, and oil and gas accidents, road accidents, structural fires, and terrorism/sabotage: 60%

Respondents are not very concerned or not concerned about the following hazards:

- Water or Wastewater Treatment System Failure: 60%

Respondents are split on their concern level for the following hazards:

- Air transportation accidents, water transportation accidents, and railroad accidents: 40% are somewhat concerned, while 40% are not very concerned or not concerned.

Respondents feel Alcona County is best prepared to handle road accidents (100%), structural fires (100%), dam failure (80%), hazardous material spill (60%), oil and gas accidents (80%), and power failure (80%). Respondents feel the county is least prepared to handle terrorism/sabotage events (60%) and 60% of respondents are unsure if the county is prepared to handle railroad accidents, or water or wastewater treatment system failures. Respondents were either unsure (40%) or feel the county is least prepared (40%) to handle air transportation accidents. Additionally, the respondents were split on how prepared the county is to handle communications failure and water transportation accidents with 40% feeling the county was best prepared and 40% feeling the county is least prepared.

Human-Related Hazards

Respondents are very concerned or somewhat concerned about the following hazard:

- Cyber-attacks: 60%

Respondents are split on their concern level for the following hazard:

- Chemical or biological attack: 40% are somewhat concerned, while 40% are not very concerned or not concerned.

One respondent was somewhat concerned about a mass shooting.

Respondents feel Alcona County is least prepared to handle cyber-attacks (60%). Respondents were split on how prepared the county is to handle chemical or biological attacks with 40% feeling the county is best prepared and 40% feeling the county is least prepared.

Community Assets

Respondents ranked the following community assets from the most vulnerable to the least vulnerable to the hazard impacts:

1. Human (death/injuries)
2. Infrastructure (damage or loss of bridges, utilities, schools, etc.)
3. Governance (ability to maintain order and/or provide public amenities and services)
4. Economic (business closures, job losses, etc.)
5. Environmental (damage or loss of forests, waterways, etc.)
6. Cultural/Historic (damage or loss of libraries, museums, fairgrounds, etc.)

Regulatory Approaches

Respondents supported the following approaches to reduce risk and loss associated with disasters:

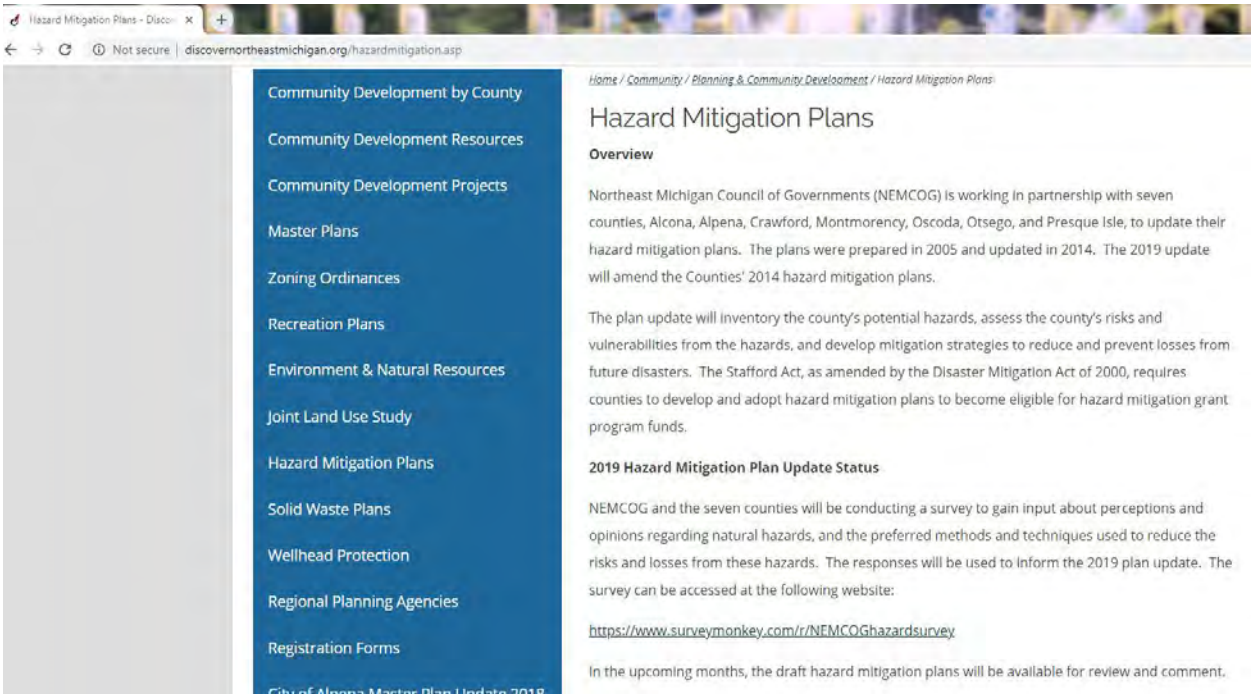
- Making their home more disaster-resilient (100%)
- Taking steps to safeguard the local economy following a disaster (100%)
- Creating an inventory of at-risk buildings and infrastructure (100%)
- Improving the disaster preparedness of local schools (80%)
- Disclosing natural hazard risk on real estate transactions (80%)
- Policies to prohibit development in areas subject to natural hazards (80%)
- Non-regulatory approaches (80%)
- Protecting historical or cultural structures (75%)
- The use of tax dollars to reduce risk and losses from natural disasters (60%)
- Regulatory approaches (60%)

Respondents recommended bringing specialists into the county to inspect it and assist with mitigating hazards, installing broadband throughout the entire county, holding companies responsible for mitigating hazards (e.g. Consumers Energy marked trees several years ago and have not trimmed or removed them), increase hazard mitigation education efforts, and increasing support for emergency services.

APPENDIX B

Planning Process Supporting Documents

Regional Public Participation Survey Publicity



Meeting Agendas, Minutes, and Sign-in Sheets

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MINUTES
OF THE
NORTHEAST MICHIGAN COUNCIL OF GOVERNMENTS
BOARD OF DIRECTORS' MEETING

April 18, 2019

University Center
Gaylord, MI

Call to Order
The Northeast Michigan Council of Governments (NEMCOG) Board of Directors Meeting was called to order by Robert Heilman, Board President, at 10:02 a.m.

A quorum was declared.

Roll Call

Board Members Present:	Dan Gauthier, Dave Karschnick, John Wallace, James Kargol, Kyle Yoder, Robert Pallarito, Carl Altman, Adam Poll, Marisue Moreau, Robert Heilman, Doug Baum, Dave Post, Bill Wishart and Norman Brecheisen
Staff Present:	Diane Rekowski, Theresa Huff and Karen Cole

Approval of Minutes
R. Heilman presented the Minutes of the March 21, 2019 meeting. R. Pallarito moved, seconded J. Wallace to approve the minutes as presented. Yes all, motion carried.

Financial Report
K. Cole reviewed the March, 2019 financial statements. D. Baum moved, seconded by A. Poll to receive and file the March, 2019 Financial Report as presented. Yes all, motion carried.
K. Cole informed the Board that the FY2018 Audit is still in progress and expects one more meeting with the auditors.

Presentation: Lindsey Miller, MEDC
Lindsey introduced herself to the board as MI Economic Development Corporation's (MEDC's) Community Assistance Team (CAT) staff for the NEMCOG region. She also covers the three counties below (Roscommon, Ogemaw and Iosco) and three counties in the Upper Peninsula. Information on Community Assistance programs offered by MEDC was then reviewed along questions taken from the Board.

President's Report

Regional Project Review: R. Heilman stated there were (6) Federal Grant projects for regional review; (0) Other projects for regional review and (1) public notice. D. Baum moved, seconded by M. Moreau to approve all the Projects as presented. Yes all, motion carried.

MI Association of Regions (MAR): D. Rekowski informed the Board that funding for the Regional Prosperity Initiative (RPI) was not included in the Governor's Budget. MAR is working with Legislators to restore funding.

Director's Report

RPI: D. Rekowski updated the Board on the RPI Mini-grant program. 34 Mini-Grant applications were received. Program is very popular within the Region. The Resolution the NEMCOG Board approved last meeting has been sent to the Region's Representatives. Meetings have been organized to discuss in detail the success of the RPI in the region. The resolution will be sent to the board members for possible action from local boards.

Small Business Development Center (SBDC) Update: D. Rekowski will be meeting with Marisue Moreau, SBDC and Kirtland Community Colleges to discuss possible collaboration to ensure small business counseling services continue in the region. May be a good topic that the new Executive Committee for the RPI Council could explore.

Staff Program Highlight: Hazard Mitigation

Christina McEmber was introduced to the board as a new staff member at NEMCOG. She gave a brief status update of the Hazard Mitigation process, includes 7 counties and is in the early stage of planning and meeting with Emergency Managers in the region.

Coming Events: D. Rekowski provided a handout of coming events including May 1, 2019, Solid Waste/Sustainable Materials Workshop in Hillman, MSUE- Opportunity Zones Workshop, May 13th, Munetrix, May 16 NEMCOG Board meeting and Coastal Resiliency Workshop, May 21st at NOAA.

Committee Reports

RPI Committee: D. Baum stated there was not a meeting last month; too many members were out of town due to Spring Break.

Previous Business

None

New Business

None

County Updates

Alcona Co.: Sheriff is retiring May 1st. The Under Sheriff will fill the Sheriff's position. Have a new Emergency Manager. Union staff got a wage increase, now having to look at non-union staff wage increase.

Alpena Co.: New jail at $12 million, funded by a millage. New Airport Terminal moving along fast.

Cheboygan Co.: New jail expansion is complete. Jail increased from 80 to 105 beds. Meijer is a possibility as a review of a 425 agreement is underway

City of Alpena: Finishing first CRP grant. Lots of interest in rental rehab program.

City of Gaylord: Approved Elmer's for street construction projects this summer. Pilot program-55 town houses behind Family Fare. Project on East Side of town will have 228 apartments coming in. T-Mobile is opening a store. Will be ripping out Shell Station/Schnapps and Hopps parking lot. Lucky's will be going in by Meijer's and south Townline.

City of Grayling: Approved Construction Manager to work with Architect on the Hub project. Working on site plan review. Arauco had their grand opening this week. Board will tour in the fall. Arauco is a 520,000 square foot facility with full technology. Northern Michigan Law Enforcement Training Group is still having problems with the Camp Grayling and they no longer have an office on the base. Blake Davis was hired for marketing and scheduling the training with area police departments.

Emmet Co.: City of Petoskey Pit/Hole has been sold and there are plans to construct a building at the site.

Livingston Township: Approved right of way with Consumers to increase lines to grow facilities.

MI Works!: Career Fairs are going on. The next one will be in Alpena next Tuesday. 3 have been completed. Have done well, except low number in Mackinaw. Career Quest is fast approaching. 1,600 students, 4 quadrants with several employers. Have VIPs, can stop by, let Marisue know. Volunteers are welcome. If anyone wants to volunteer, let Marisue know.

Mackinaw City: Lawsuit back to ZBA. "Suer" back to Circuit Court. 3 businesses in town have had their roofs collapse due to the heavy snow and have been condemned. Straits pretty much free of ice.

Oscoda Co.: Court house update – meeting with contractor for estimate and design for the build. Hope to start in near future. Interested in learning more about Dark Skies. Oscoda County dismissed from State Law Suite. Having some road issues near airport to residents who leave near there.

Otsego Co.: Approved second round of Recycling RFP. Had issues with 1st round with American Waste vs. Emmet County. Goes to board for approval next week. Otsego County transit having funding issues. Will go to vote in August for a significant millage.

Presque Isle Co.: It's fairly quiet, looking for bids for jail roof. RFP has been released for the sale of the Onaway Airport.

Village of Hillman: A test well for water was completed and didn't go very well, back to the drawing board. Redoing plumbing to see if that'll help. Doing storm drain work, gearing up for summer. Dark Skies event last week, did very well. Hillman Community Radio website has a Dark Skies section and there are several amazing photos displayed. Hillman Airport 5k Run and Walk on July 6th. Will have planes and restaurants there.

ALCONA COUNTY

Local Emergency Planning Committee (LEPC) & Local Planning Team (LPT)

EMS Building / EOC 2600 E. M-72 Harrisville, MI 49740 (989) 724-8185

MEMBERS/ Reps from

A Representative from each agency : (LEPC Chair & Fire) Ralph Klotz ; (B C Also is LEPC Vice Chair) Carolyn Brummund ; (Communications) Jeff Brackett ; (EMC/Secretary) Scott Rice ; (EMS) Toni Rhoads; (Law Enforcement/Co) Scott Stephenson or Keith Meyers ; (LE/State) ; (Hospitals) ; (Local Government) Darrell Kenyon; (Public Works) Mike Escarino (Public Health) Cori Upper ; (RACES) Stanley Darmofal ; (Red Cross) Carol Rabineau; (Schools)
Guests: all others

Agenda for: Monday October 21, 2019 @ 1pm

1. Introductions/Public Comment
2. Approval of or additions to today's Agenda
3. Previous Minutes
4. Correspondence
5. Presentation
   Christina McEmber – Hazard Mitigation Plan update.
6. Old Business:
   a. Review 1, or more, SARA Tier I &/or II plan(s): – Klotz
7. New Business:
   Need for a new Local Government representative on the LEPC.
8. Meeting schedule for 2018/2019 (based upon State fiscal year/HMEP) 1pm on: Oct 22, 2019; Jan, 20,2020; April 15,2020; Aug 20, 2020 @ Fair at 12:30pm!!!
9. Adjourn LEPC

--- Local Planning Team ---

Representatives as above:
Guests: all others
Introductions
Approval of Agenda
Previous Minutes
Standing Reports

a. Red Cross - Rabineau
b. Amateur Radio – Darmofal
c. HCC Planning Board – Upper
d. CERT – Upper or Rice
e. Communications – Brackett
f. Emergency Management Report: - Rice
   THIRA, RHSS, & Related grant requests/priority types of projects
g. Hazard Mitigation Plan Update: Covered during the LEPC Meeting

Alcona County LEPC/ LEPT Minutes October 21, 2019

LEPC Called to order by Ralph Klotz at 1:00 pm at Alcona County Courthouse
106 5th St. Harrisville, MI 48740

October 21, 2019

Representative Members:

LEPC Chair: Ralph Klotz
BOC: Carolyn Brummund
Communications: Deanna Morgan
EMC/Secretary: Scott Rice
EMS: Toni Rhoads
Fire: Ralph Klotz
Law Enforcement/Co: Scott Stephenson/Keith Myers
LE/State:
Hospitals
Local Government: Rod Cordes
Public Health: Cori Upper
RACES: Stanley Darmofal
Red Cross: Carol Rabineau

Guests Present:

Introductions: Carol & Ron Rabineau / Red Cross

No public comments answered the call for same

MOTION by: Cori Upper to approve Agenda as presented
2nd by: Keith Myers. MOTION CARRIED

MOTION by Carolyn Brummund to approve Minutes of February 15, 2019 as presented.
2nd by: Keith Myers MOTION CARRIED

Correspondence:
SARA Title I and II plan(s) – Eagle Creek Renewable Energy.
No updates on Linn Energy

Old Business:
None

New Business:

LEPC/LEPT Meeting Schedule –
Jan 27
Apr 20
Aug 20

Local Government Rep has been Darrell Kenyon. He is no longer an elected official in Alcona County. The Alcona Chapter of the MTA will address this vacancy in their October 2019 meeting and select a nre rep for the LEPC/LEPT.

Motion to adjourn: Carolyn Brummund 2nd Toni Rhoads @ 1311 hrs.

LEPC Adjourned at 13:11.
Next LEPC Meeting will be January 27, 2020 @ Alcona County Courthouse at 1:00 pm.
Minutes recorded by Scott Rice, EMC.

LPT called to Order by Keith Meyers @ 1:11 pm.

Members present: Representatives as noted during the LEPC.

Introductions:

Suggestion to allow Christine McEmber give her presentation prior to the LEPT Meeting.

Guests: Christine McEmber, NEMCOG. Hazard Mitigation Plan presentation.

Motion by: Ralph Klotz to approve agenda as presented
2nd by: Keith Myers
MOTION CARRIED

Motion by: Ralph Klotz to approve the LPT Minutes of February 05, 2019 as presented.
2nd by: Toni Rhoads
MOTION CARRIED

Standing Reports:

Red Cross: (Carol Rabineau)
Thank you to Stan Darmofal and the local Fire Depts for the installation of the smoke detectors. As of July 01 – 40 smoke alarms have been installed in approximately 10-15 residences with approximately 8 homes remaining.

New direct phone number for house fires. 911 should be making the requests for service not the Fire Chief, EMS or law enforcement.

Northeast Michigan Council of Governments
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Gaylord, MI 49734
Direct: 989-705-3730 Fax: 989-705-3729
www.discovernortheastmichigan.org

2pm-3:45pm 1.75

Sign in Sheet

Project Name:	Hazard Mitigation
Project Number:	340
County:	Alcona

Date	Name and Title	Agency/Jurisdiction/Organization	Hourly Rate	Signature: I verify the hourly rate associated with my name is accurate.
10/21/2019	STANLEY L. DARMOFAL Emerg. Coord & Radio Officer	(RACES) RADIO AMATEUR Civil Emergency Serv.	?	Stanley L. Darmofal, WB8SZ
10/21/2019	911 Dispatcher DeAnna Morgan	Alcona Co Central Dispatch		DeAnna Morgan
10/21/2019	Joni Rhoads Alcona County EMS Assist. Director	Alcona County EMS		Joni M Rhoads
10/21/2019	SCOTT RICE EMERGENCY MGMT COORDINATOR	ALCONA COUNTY EMERGENCY MGMT		
10/21/2019	Keith W. Myers Alcona County Sheriffs office - undersheriff	Alcona County Sheriffs office		
10/21/2019	Carolyn Brummund	Board of Comm. Alcona Cty		Carolyn Brummund
10/21/2019	Michael Escarcno	Public Works Alcona County Rd. Comm.		
10/21/2019	RALPH M. KLOTZ	LEPC CHAIR/FIRE SERVICE		Ralph M. Klotz
10/21/2019	Carol Rabideau	Red Cross		

Appendix B

Alcona City #340 Haz Mit

10/21/2019	Ron Rabineau - Volunteer	American Red Cross		K Rulen
10/21/2019	Cori Upper	Emergency Preparedness Coor. District Health Dept. No. 2		Cori Upper
10/21/2019	Rod Cordes	Barton City Fire Chief		

Appendix B

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MINUTES
OF THE
NORTHEAST MICHIGAN COUNCIL OF GOVERNMENTS
BOARD OF DIRECTORS' MEETING

December 19, 2019

University Center
Gaylord, MI

Call to Order

The Northeast Michigan Council of Governments (NEMCOG) Board of Directors Meeting was called to order by Robert Heilman, President, at 10:00 a.m.

Roll Call

Board Members Present:	Dan Gauthier, Dave Karschnick, Daryl Peterson, Kyle Yoder, Robert Pallarito, Carl Altman, Adam Poll, Marisue Moreau, Robert Heilman, Bruno Wojcik, Scott McLennan, Doug Baum, Dave Post and Norm Brecheisen
Staff Present:	Diane Rekowski, Theresa Huff, Karen Cole, Steve Schnell, Nico Tucker, Christina McEmber and Denise Cline (by videoconference)
Public Present:	None

Approval of Minutes

R. Heilman presented the Minutes of the October 17, 2019 meeting. C. Altman moved, seconded by D. Karschnick to approve the minutes as presented. Yes all, motion carried.

Financial Report

K. Cole reviewed the November, 2019 financial statements. C. Altman moved, seconded by D. Post to receive and file the November, 2019 Financial Report as presented. Yes all, motion carried.

K. Cole stated that the FY19 Audit is going very well, expectations this year should be better than last year.

Special Presentation: Tom Stephenson/Connect Michigan

T. Stephenson gave an update on the broadband status and progress within the region. Also provided an overview of the new tool for Internet Service Providers, NE MI's Vertical Asset Inventory developed to help improve high-speed internet access in Northeast Michigan.

President's Report

Regional Project Review: R. Heilman stated there were (0) Federal Grant project for regional review; (0) other projects for regional review and (2) public notices.

MI Association of Regions (MAR): D. Rekowski reported that MAR is in the strategic planning process with the Final Plan expected in January.

Director's Report

D. Rekowski – EDA has invited NEMCOG to submit a three (3) year grant proposal, has a short deadline. The proposal requires a resolution of Financial Commitment for NEMCOG's Regional Economic Development Planning Grant and also a resolution for Contract Signatory.

D. Baum moved to waive the reading of the Resolution for Financial Commitment for NEMCOG's Regional Economic Development Planning Grant, seconded by D. Karschnick. Yes all, motion carried. B. Wojcik moved to approve the resolution, seconded by D. Karschnick, A roll call vote was taken. Yes all, motion carried.

A. Poll moved to waive the reading of the Resolution for Contract Signatory, seconded by R. Pallarito. Yes all, motion carried. D. Baum moved to approve the resolution, seconded by B. Wojcik, A roll call vote was taken. Yes all, motion carried.

Staff Updates:

S. Schnell: Project Updates were provided on the following: Northeast Regions Entrepreneurial Network, new website, currently waiting for URL; YouTube video: Rising Tide of Food and Farming in Northeast Michigan, created to promote small Agriculture; YouTube video: Youth Entrepreneurial-ship; Census 2020 and Local Area Unemployment Statistics for Northeast Lower Michigan Region for 2018 and 2019.

C. McEmber: Provided a status of County Hazard Mitigation Plan updates and explained the process for approval.

N. Tucker: Updated the Board on the Rural Task Force, Road Projects and Integrated Asset Management Plans.

D. Cline: Updated the Board on the following: writing/revising 14 Zoning Ordinances; presented an example of a recent interactive Zoning Ordinance; involved with Master Plans; Camp Grayling/Alpena JMTC Joint Land Use Study; Redevelopment Ready Communities; US23 Heritage Route; Up North Trails; US23 Byways brochures and atlases.

Committee Reports

Finance Committee: None

RPI Collaborative: D. Baum stated that RPI was not funded for2020. The Regional Prosperity Collaborative will continue to meet on Regional Economic and Community Development and oversee the RPI and Comprehensive Economic Development Strategy (CEDS). Funding for projects will continue to be pursued.

Previous Business
None

New Business
None

Public Comment
None

County Updates

Alcona Co.: Busy with year-end; adopted 2020 budget; committees are working on broadband. Brownfield project is going on, has been delayed a little.

Alpena Co.: Alpena County will have a grand opening ceremony for the renovated airport in May 2020. Jail project is progressing, should be enclosed by Mid-February, work is running 3-4 weeks behind. No Circuit Judge yet. 911 Center received $800,000 in new equipment.

City of Alpena: Greg Sundin has retired and Rachel Smolinski was hired as the new city manager. The Yearend resulted in black!

City of Grayling: No report.

Livingston Township: No report.

MI Works!: Unemployment is at an all-time low. Anything less than 4% is considered full employment. Governor reinstated funds that were removed for at- risk youth program, Going Pro, etc. Effective January 1, 2020, Medicaid recipients work requirement begins at 80 hours a month. MI Works is partnering with Health Agencies to assist with the program.

Montmorency County: County negotiation's meeting with the Union ended shortly and will need mediation services. Hired a new board secretary and waiting for the Governor to appoint a new Circuit Court Judge, in replacement for Judge Mack. Budget is completed; with about a $2,000 fund balance. Working on bonding and health insurance changes and promoting the census.

Oscoda Co.: Government building nearly completed; will be moving staff in January. Will be open to the public by February.

Otsego Co.: Finished budget; will amend after they get word from Governor. Had some renovations this past fall to the County building that have been completed. Jail is the next project. 1/6/2020 will have a presentation from the Consultants on the Jail Study.

Presque Isle Co.: Electrical Inspector is retiring. Considering sharing Plumbing Inspector with Montmorency County. Onaway received funding for a trail head and will also use a place for the Farmers Market. Presque Isle County sold the Onaway Airport to Presque Isle Electric & Gas for $1.00, now dealing with tax abatement issues.

Rogers City: Lake Huron shoreline and trail have experienced severe damage from high water issues. Rogers City will receive Redevelopment Ready Community Certification status in the 1st quarter of 2020. Pension liability issues have been resolved.

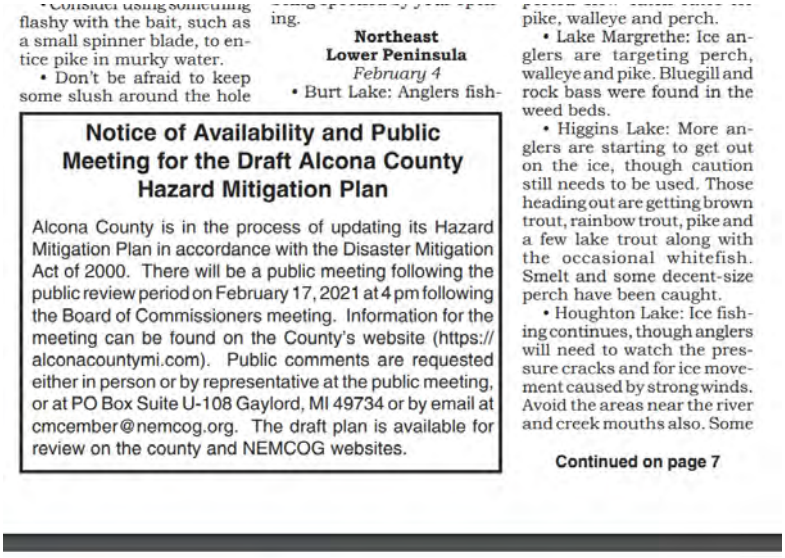
Village of Hillman: Dealing with housing shortage and the high cost of building.

Village of Mackinaw City: Experiencing some high water issues. Damage has occurred around Mackinac Island. Some others are experiencing flooding.

Adjournment

The meeting was adjourned at 11:30 a.m. The next Board Meeting will be held on Thursday, January 16, 2020 at the University Center in Gaylord.

Public Notice for the availability of the draft plan for review and the public meeting



flashy with the bait, such as a small spinner blade, to entice pike in murky water.

• Don't be afraid to keep some slush around the hole

ing.

Northeast Lower Peninsula

February 4

• Burt Lake: Anglers fish-

pike, walleye and perch.

• Lake Margrethe: Ice anglers are targeting perch, walleye and pike. Bluegill and rock bass were found in the weed beds.

• Higgins Lake: More anglers are starting to get out on the ice, though caution still needs to be used. Those heading out are getting brown trout, rainbow trout, pike and a few lake trout along with the occasional whitefish. Smelt and some decent-size perch have been caught.

• Houghton Lake: Ice fishing continues, though anglers will need to watch the pressure cracks and for ice movement caused by strong winds. Avoid the areas near the river and creek mouths also. Some

Continued on page 7

Notice of Availability and Public Meeting for the Draft Alcona County Hazard Mitigation Plan

Alcona County is in the process of updating its Hazard Mitigation Plan in accordance with the Disaster Mitigation Act of 2000. There will be a public meeting following the public review period on February 17, 2021 at 4 pm following the Board of Commissioners meeting. Information for the meeting can be found on the County's website (https://alconacountymi.com). Public comments are requested either in person or by representative at the public meeting, or at PO Box Suite U-108 Gaylord, MI 49734 or by email at cmcember@nemcog.org. The draft plan is available for review on the county and NEMCOG websites.

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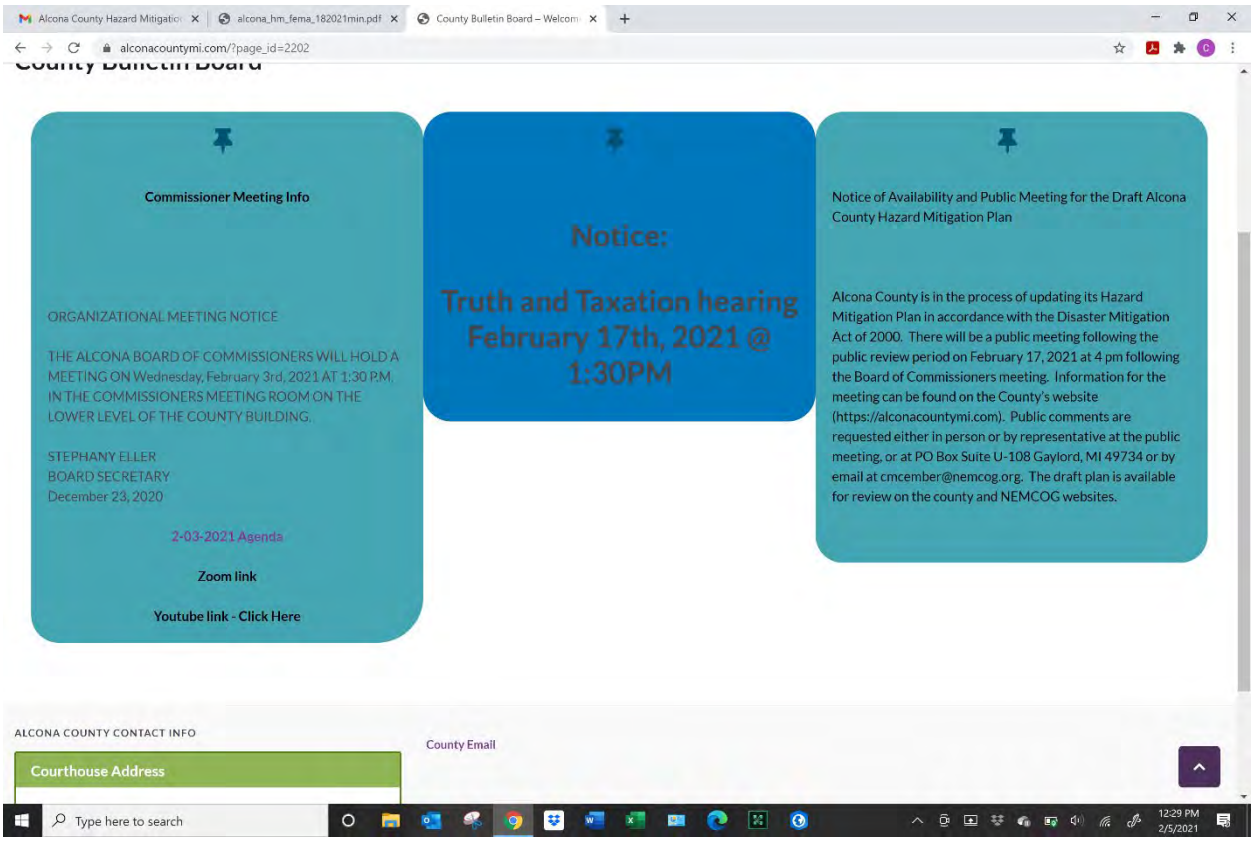

Public Meeting Minutes

Alcona County Public Meeting Minutes for February 17, 2021 through Zoom

Present: Dan Gauthier, William Thompson, Carolyn Brummund, Adam Brege, Terry Small, Stephany Eller, John Hartley, Diane, and Christina McEmber

Carolyn Brummund called the meeting to order at 4:00 pm. One member of the public was present at the meeting. Comments and suggestions about the plan were discussed. These included updating the information for the campgrounds/hunt clubs, climate data source, emergency medical services, warning siren locations, and information regarding the City of Harrisville. Next steps were discussed: the draft plan will be submitted to the State and FEMA for approval pending adoption after the Alcona LPT re-reviews the mitigation strategies and makes the necessary changes. After the plan receives approval pending adoption, the plan will be submitted to the County's Board of Commissioners and local jurisdictions for adoption. Implementation of the plan was discussed, and Christina McEmber will contact Mike Sobocinski for clarification regarding implementation updates after the plan is approved. The meeting closed at 4:30 pm.

Submitted by Christina McEmber

APPENDIX C

Adoption Resolutions

The adoption resolutions for Alcona County and the local jurisdictions are included in this appendix.

Adoption Resolution

Alcona County
Michigan

Resolution No. 2022 11

A RESOLUTION OF ALCONA COUNTY ADOPTING THE 2021 ALCONA COUNTY HAZARD MITIGATION PLAN

WHEREAS the Alcona County Board of Commissioners recognizes the threat that natural hazards pose to people and property within Alcona County; and

WHEREAS Alcona County has prepared a multi-hazard mitigation plan, hereby known as the 2021 Alcona County Hazard Mitigation Plan in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the 2021 Alcona County Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Alcona County from impacts of future hazards and disasters; and

WHEREAS adoption by the Alcona County Board of Commissioners demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the 2021 Alcona County Hazard Mitigation Plan.

NOW THEREFORE, BE IT RESOLVED THAT:

The 2021 Alcona County Hazard Mitigation Plan is hereby adopted as an official plan of Alcona County. The content of this document, together with all maps attached to and contained herein are hereby adopted by the Alcona County Board of Commissioners as the 2021 Alcona County Hazard Mitigation Plan on this [redacted] day of March, 2022.

Motion: Carolyn Drummond
Second: William Thompson

Ayes: 4

Nays: 0

Absent: Dan Gauthier

Board of Commissioners Chairman

Stephany Ellen
Clerk

APPENDIX D

Previous Plan's Mitigation Actions and Strategies

The following tables present the mitigation actions and strategies that were included in the 2014 Alcona County Hazard Mitigation Plan. Updated inclusion and priority information can be found in Chapter 9: Mitigation Strategies and Priorities.

Mitigation Actions & Implementation Strategies A. Multi-Hazard Actions, #1	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Maintain outreach program to vulnerable populations during and after hazard events, including wildfires, extreme winter and summer weather events, periods of extreme temperatures, public health emergencies, and other hazards that can impact the community.	High	A. D. H. I. J. N. O. V.	B. C. I. T	Countywide	Minor Progress	2007	Ongoing
2. Build the capabilities of the county GIS program to function as a tool to address multiple hazards. This effort would require the creation/updating of datasets such as parcels/ownership, location of all structures, driveways with ingress/egress conditions, roads, forest types, ownership types, floodplains, utilities (power lines, gas lines and water lines), wetlands, water features, bridges and culverts, (SARA III sites)	High	A. B. C. E. F. H. J. V.	B. C. Q. T	Countywide	Major update of 911 CAD mapping system. County using ArcGIS for parcel mapping	Ongoing	Ongoing
3. Communities will acquire and maintain an adequate level of emergency power generators to supply emergency water needs, wastewater processing, and shelters.	High	A. B. C.	B. C. T	Countywide	Purchased portable generator, generators purchased for critical facilities	2015	2015
4. Enhance and expand a public education program for all natural hazards that threaten the community.	Med	A. J. O.	B. C. T	Countywide	Distribution of information at county fair and other events. Weather Service weather watcher programs each year	Ongoing	Ongoing
5. Conduct workshops at community gatherings to encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.	Med	A. I. J. K. N.	B. C. H. I. N. T	Countywide	Weather Service weather watcher programs each year. Distribution of information at county fair and other events. Raffled kits.	2006	Ongoing
6. Continue to develop Emergency Response Team program to help prepare for all hazard events in the county.	Med	A. D. H. I. J. E.	A. H. T	Countywide	Active Local Emergency Planning Committee, Local Planning Team, Incident Management Team and Regional Response Team.	Ongoing	Ongoing

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
B. County	**H.** District Health Dept.	**N.** Civic Gr.& Churches	**T.** Federal Government
C. Local Units of Gov.	**I.** American Red Cross	**O.** National Weather Service	**U.** landowners
D. Local Fire Dept.	**J.** USFS & MDNR	**P.** Utility Company	**V.** Salvation Army
E. County Road Commission	**K.** Insurance Companies	**Q.** State	**W.** Police
F. NEMCOG	**L.** Real Estate Co.	**R.** Schools	

Mitigation Actions & Implementation Strategies **A. Multi-Hazard Actions, #2**	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
7. Distribute family emergency preparedness information relating to all natural hazards affecting the County.	Med	A. D. H. I. J. N.	B. C. H. T	Countywide	Information provided at county fair, schools, and National Weather Service weather watchers workshops.	Ongoing	Ongoing
8. Increase usage of NOAA Weather Radio by subsidizing purchase and distribution of radios to county residents, organizations and businesses. Use NOAA radios as a community emergency alert system to information on hazard events.	Med	A.	T	Countywide	Progress made- received grant to distribute radios to critical sites such as senior's centers, and campground. Radios given to individuals and special events	Ongoing	Ongoing
9. Ensure that the County and individual communities have adequate equipment, staff, and training to respond to transportation-related accidents specific to their needs.	Med	B. C. D. E. V.	B. C. T	Countywide	Progress made	2010	2017
10. Enhance and expand an all hazards education and awareness program in schools, which includes classroom presentations and incorporating wildfire and weather hazard preparedness into school curriculums.	Med	A. D. J. O. R.	B. C. T	All schools	Progress made, yearly presentations, FFA and science classes provide information.	2006	Ongoing
11. Develop plans to identify and inform persons of "Safe Areas" during festivals/events. (include signs and directions to shelters)	Med	A. B. C. D. E. M. N. V.	T	Countywide	Minor progress, working on effort	2015	2015
12. Ensure key gasoline stations have the capacity to pump gasoline during power outages.	Med	A. C. E. M. V.	T	Countywide	Portable generator and some gas stations have generators		2015

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
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F. NEMCOG	**L.** Real Estate Co.	**R.** Schools	

Mitigation Actions & Implementation Strategies A. Multi-Hazard Actions, #3	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
13. Work with power companies to inventory condition of power line right-of-ways, and identify priority sections to clear branches and trees from power lines. The end goal is to create and maintain a disaster-resistant landscape in public rights-of-way.	Med	A. E. P. U.	M. T. U	Countywide	Progress made	2007	2017
14. Enforce a balanced system of ordinances that protect the community as-a-whole while respecting the rights of individuals.	Low	C	C	Local jurisdictions	Progress made	2012	2017
15. Where feasible and cost effective (more densely populated areas) bury and protect power and utility lines.	Low	A. C. P.	P	Countywide	Phone lines are being upgraded and buried	2015	2017
16. Communities will work with the Federal Emergency Management Agency (FEMA) to identify flood plains.	Low	A. B. C. E. T.	B. C. T	Countywide	FEMA completed mapping	2015	2017
17. Identify optimal staffing levels for County and community needs – seek funding to meet optimal levels	Low	B. C.	B. C.	Countywide	On-going	2012	2017
18. Acquire portable/changeable message signs to direct crowds and provide information.	Low	A. E.	B. C. N.	Countywide	Michigan DOT has signs available	2007	2017
19. Individual communities should prepare future land use plans and capital improvement programs to plan for their future needs.	Low	C. E.	B, C.	Townships, cities and villages	Communities are updating master plans per state statutes	Ongoing	Ongoing

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
B. County	**H.** District Health Dept.	**N.** Civic Gr.& Churches	**T.** Federal Government
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F. NEMCOG	**L.** Real Estate Co.	**R.** Schools	

Mitigation Actions & Implementation Strategies B. Wildfire Actions, #1	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Coordinate countywide wildfire education program: distribution of materials via direct mailings, school presentations, demonstration projects, displays at community events, displays and education materials at community libraries.	High	A. B. C. D. I. J. G. R.	B. C. T	Countywide	Information distributed and county fair and other events	Ongoing	Ongoing
2. Develop and implement strategy to introduce "Firewise" program in at-risk communities.	High	A. B. C. D. I. J. G.	Q. T	Countywide	Information distributed and county fair and other events	Ongoing	Ongoing
3. Strict enforcement of open burning regulations.	High	B. C. D. J. V.	D. J. T	Countywide	Ongoing progress	Ongoing	Ongoing
4. Encourage communities to incorporate Firewise into their planning and zoning programs	Med	A, C, D, F	B. C	Countywide	Minor progress	NEW	Ongoing
5. Develop a Community Wildfire Protection Plan in cooperation with local fire departments, US Forest Service and Michigan DNR. Seek funding from the MDNR to cover costs of developing the plan.	High	A, B, C, D, F, G, J	B. C. J. T	Countywide	No progress will consider this cycle	2008	2016
6. Conduct multi-agency, inter-county emergency management response exercises for fire suppression.	High	A. D. I. V.	T	Countywide	Conducted exercise	2007	2017
7. Promote fuel management by thinning of flammable vegetation, creation of fuel breaks, use of fire-retardant materials/vegetation and selective thinning....	High	J. U.	J. T	Countywide	MDNR and USFS are active on public lands	2007	2017
8. Promote creation of defensible space around structures in fire-prone wildland areas.	Med	A. C. D. I. J. K.	T	Countywide	Information distributed and county fair and other events	2010	2017
9. Community Chipper Days – Organize a program to provide a chipper for properly disposing of woody debris, in conjunction with composting programs and spring clean-up days.	Med	A. B. C. D. K. M. N. P.	B. C. T.	Countywide	Residents can take woody debris to Viking Cogeneration facility in Lincoln	2007	2017
10. Distribute wildfire education materials to homeowners and businesses through tax bill receipts.	Med	A. C. D. J. K. P.	D. J. T	Countywide	Minor progress	2008	2017

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
B. County	**H.** District Health Dept.	**N.** Civic Gr.& Churches	**T.** Federal Government
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E. County Road Commission	**K.** Insurance Companies	**Q.** State	**W.** Police
F. NEMCOG	**L.** Real Estate Co.	**R.** Schools	

Mitigation Actions & Implementation Strategies B. Wildfire Actions, #2	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
11. Develop a program to instruct residents on proper procedures for wildfire evacuation.	Med	A. B. C. D. J. N. I.	B. C. D. J. T	Countywide	Minor progress	2012	2015
12. Identify adequate water supplies for emergency firefighting, areas lacking adequate water supplies and develop strategy to construct dry hydrants.	Med	D. E. J.	B. C. J. T	Countywide	Completed and ongoing	Ongoing	Ongoing
13. Promote media broadcasts of fire weather and fire warnings	Med	A. O. J.	A. B. C. D. J	Countywide	MDNR and USFS media announcements	2010	2017
14. Promote and implement solutions for keeping roads and driveways accessible to vehicles and fire equipment.	Low	A. C. D. E. U.	A. B. C. D. J	Countywide	Minor progress	2007	2017
15. Work with insurance companies to provide wildfire safety information to area residents.	Low	K.	A. B. C. D	Countywide	No progress	2015	2017
16. Organize neighborhood wildfire safety coalitions to plan how residents can work together to prevent wildfire	Low	A. C. D. G.	A. B. C. D	Countywide	No progress	2011	2017
17. Develop program to form Wildfire Safety Coalition to develop neighborhood watch program to instruct others about escape routes, sprinkler systems, power lines, etc…	Low	A. B. C. D. U.	A. B. C. D. J	Countywide	No progress	2015	2017
18. Identify communities or neighborhoods to develop "Firewise" demonstration projects.	Low	A. B. C. D. I. J. G.	A. B. C. D. J	Countywide	Minor progress	Ongoing	2017
19. Implement community wildland fire education program utilizing the Student Conservation Association – Fire Education Corps, to provide land managers and communities with tools and information designed to reduce the negative impact of wildland fires on individuals living in the wildland urban interface.	Low	A. B. C. D. I. J. G.	A. B. C. D. J	Countywide	Removed	2010	NA

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
B. County	**H.** District Health Dept.	**N.** Civic Gr.& Churches	**T.** Federal Government
C. Local Units of Gov.	**I.** American Red Cross	**O.** National Weather Service	**U.** landowners
D. Local Fire Dept.	**J.** USFS & MDNR	**P.** Utility Company	**V.** Salvation Army
E. County Road Commission	**K.** Insurance Companies	**Q.** State	**W.** Police
F. NEMCOG	**L.** Real Estate Co.	**R.** Schools	

Mitigation Actions & Implementation Strategies C. Shoreline Flooding and Erosion	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Initiate a program to identify and map flood-prone areas and structures affected by flooding	High	A. B. E. K. Q. T.	Q. T	Countywide	FEMA completed mapping	Ongoing	Ongoing
2. Communities should incorporate floodplain/coastal zone management into their local planning activities by planning acceptable uses for areas prone to flooding (comprehensive planning, zoning, open space requirements, subdivision regulations, land use and capital improvements planning)	High	C.	Q. T	Countywide	Ongoing	2012	2017
3. Change real estate disclosure laws to require sellers to identify a structures location in a shoreline flooding or erosion area.	Med	L. Q.	Q	Countywide	Removed	2015	NA
4. Construct elevated or alternative roads that are unaffected by flooding, or make roads more flood-resistant	Med	E. S. T.	T. U	Countywide	Progress made and ongoing	2015	2017
5. Communities with flooding hazards should join the National Flood Insurance Program	Med	C.	T	Countywide	Progress made	Ongoing	Ongoing
6. Elevate flood-prone structures above the 100-year flood level where deemed technically feasible and cost effective	Low	Q. T. U.	T. U	Countywide	No progress	2015	2017
7. Dry floodproofing of structures within known flood areas.	Low	Q. T. U.	U	Countywide	No activity	2015	2017
8. Initiate structural projects to increase drainage or absorption.	Low	C. B. E.	B. C.	Countywide	County Road Commission addressing issues where possible	2015	2017

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
B. County	**H.** District Health Dept.	**N.** Civic Gr.& Churches	**T.** Federal Government
C. Local Units of Gov.	**I.** American Red Cross	**O.** National Weather Service	**U.** landowners
D. Local Fire Dept.	**J.** USFS & MDNR	**P.** Utility Company	**V.** Salvation Army
E. County Road Commission	**K.** Insurance Companies	**Q.** State	**W.** Police
F. NEMCOG	**L.** Real Estate Co.	**R.** Schools	

Mitigation Actions & Implementation Strategies D. Riverine and Urban Flooding	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Communities should incorporate floodplain management into their local planning activities by planning acceptable land uses and land use densities for areas prone to flooding	High	C.	B. C. T.	Townships, cities and villages	Progress made	2015	2017
2. Construct elevated or alternative roads that are unaffected by flooding, or make roads more flood-resistant	High	E. S. T.	T. U	Countywide	County Road Commission addressing issues where possible	2015	2017
3. Increase public awareness of the need for permits (MDEQ Part 31) for building in floodplain areas.	Med	A. B. C. Q. T.	Q. T	Countywide	Ngoing	2012	2017
4. Protect and restore wetlands and natural water retention areas to improve natural Stormwater retention systems	Med	B. C. J.	B. C.	Countywide	Minor progress	2015	2017
5. Communities with flooding hazards should join the National Flood Insurance Program	Med	C.	T	Countywide	Several communities have joined	Ongoing	Ongoing
6. Initiate structural projects to increase drainage or absorption capacities.	Med	B. C. E.	U. T	Countywide	County Road Commission addressing issues where possible	2015	2017
7. Change real estate disclosure laws to require sellers to identify a structures location in a floodplain	Med	Q. L.	Q	Countywide	Removed	2015	NA
8. Elevate flood-prone structures above the 100-year flood level where deemed technically feasible and cost effective	Low	Q. T. U.	U	Countywide	No known activity	2015	2017
9. Dry floodproofing of structures within known flood areas.	Low	Q. T. U.	U	Countywide	No known activity	2012	2017
10. Enforce basic building code requirements related to flood mitigation.	High	B. Q.	B. C.	Countywide	Being done	2015	2017
11. Drainage easements (allowing the planned and regulated public use of privately owned land for temporary water retention and drainage).	Med	B. C. E.	B, U	Countywide	Minor activity	2015	2017
12. Improve and expand regional and watershed cooperation activities	Med	A. B. C. F.	Q. T	Countywide	Ongoing	2015	2017
13. Detection and prevention/discouragement of illegal discharges into storm-water sewer systems, from home footing drains, downspouts and sump pumps	Low	B. C. U.	B. C	Harrisville and Lincoln	Ongoing activity	2015	2017

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
B. County	**H.** District Health Dept.	**N.** Civic Gr.& Churches	**T.** Federal Government
C. Local Units of Gov.	**I.** American Red Cross	**O.** National Weather Service	**U.** landowners
D. Local Fire Dept.	**J.** USFS & MDNR	**P.** Utility Company	**V.** Salvation Army
E. County Road Commission	**K.** Insurance Companies	**Q.** State	**W.** Police
F. NEMCOG	**L.** Real Estate Co.	**R.** Schools	

Mitigation Actions & Implementation Strategies **E. Summer Weather Hazards Actions**	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Maintain a listing of homes and facilities with vulnerable residents such as elderly, infirmed and disabled individuals. Establish outreach procedures for assisting residents after severe summer storm events	High	A. C. H. N. Q. S.	B. C. Q. T.	Countywide	Significant progress	Ongoing	Ongoing
2. Develop or update emergency response plans for schools, campgrounds, fairgrounds, parks, community events and marinas	High	A. N. R. V.	A. T	Countywide	Updates ongoing	Ongoing	Ongoing
3. Continue training and increased use of weather spotters.	High	A. C. O. V.	O	Countywide	National Weather Service sponsors weather watchers workshops	Ongoing	Ongoing
4. Identify campgrounds, fairgrounds, parks, and outdoor recreational facilities that lack and need "Safe Areas." Where necessary construct safe areas and storm shelters.	High	A. B. C. J. M. R.	A, T	Countywide	Plans in place and being reviewed periodically	2010	2017
5. Increase usage of NOAA Weather Radio by subsidizing purchase and distribution of radios to county residents, organizations and businesses	Med	A. O.	T	Countywide	Progress made- received grant to distribute radios to critical sites such as senior's centers, and campground. Radios given to individuals and special events	Ongoing	Ongoing
6. Require new mobile home parks to have tornado/wind shelters	Low	Q.	B. C.	Countywide	No mobile home parks have been developed since 2005	2015	2017
7. Include safety strategies for severe weather events in driver education classes and materials	Low	M. Q. R.	R	Countywide	Information provided	2015	2017
8. Amend building codes to require anchoring of manufactured homes and exterior structures such as carports and porches	Low	Q.	B. C.	Countywide	Progress made	Ongoing	NA
9. Continue pre-planning efforts for debris management staging and storage areas	Low	A. B. C. E.	A. B. C. D.	Countywide	Sites identified and being reviewed periodically	2015	2017
10. Amend building codes to require installation of weather radios in new structures, similar to smoke detectors	Low	Q.	B. C. Q. T	Countywide	No activity	2015	2017

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
B. County	**H.** District Health Dept.	**N.** Civic Gr.& Churches	**T.** Federal Government
C. Local Units of Gov.	**I.** American Red Cross	**O.** National Weather Service	**U.** landowners
D. Local Fire Dept.	**J.** USFS & MDNR	**P.** Utility Company	**V.** Salvation Army
E. County Road Commission	**K.** Insurance Companies	**Q.** State	**W.** Police
F. NEMCOG	**L.** Real Estate Co.	**R.** Schools	

Mitigation Actions & Implementation Strategies F. Winter Weather Hazards	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Establish heating centers/shelters for vulnerable populations	High	A. B. C. I. N. V.	B. C. H. T.	Township, city and village halls	Sites identified and being reviewed periodically	Ongoing	Ongoing
2. Complete and inventory problem sections of roads. Place snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments	High	E. V.	E. T.	Countywide	Minor progress made	2015	2017
3. Compile a listing of homes and facilities with vulnerable residents such as elderly, infirmed and disabled individuals; and establish outreach procedures for assisting residents after severe winter storm events	Med	A. C. H. N. Q. V.	A. H. T.	Countywide	Completed and ongoing	2008	2017
4. Prearrange for shelters for stranded motorists/travelers.	Low	A. N. Q. V.	A. D. I.	Countywide	Minor progress	2015	2017

Mitigation Actions & Implementation Strategies G. Infrastructure Failures	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Establish redundancies in utility and communications systems, especially "lifeline" systems	High	A. B. C. D. P. V.	M. T. U	Countywide	Progress made and ongoing	Ongoing	Ongoing
2. Purchase and/or maintain generators for backup power at critical facilities	High	A, B, C, R. S. T. V.	B. C. T	Countywide	Purchased generators for facilities and portable generator	2010	Ongoing
3. Establish and improve programs/networks for contacting elderly or homebound persons during periods of infrastructure failure, to assess whether they have unmet needs	Med	A. B. I. N. V.	N. T	Countywide	Minor progress made	2010	2017
4. Protect electrical and communications systems from lightning strikes by completing an inventory of protection systems and where necessary upgrade systems.	Med	A. B. C. F.	B. C. Q. T.	Countywide	Completed and being reviewed	2010	2017
5. Identify sites, obtain support and seek funding to improve critical road/stream crossings	Low	E. F. Q. C.	E, J, N.	Countywide	Progress made and ongoing	2010	2017

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
B. County	**H.** District Health Dept.	**N.** Civic Gr.& Churches	**T.** Federal Government
C. Local Units of Gov.	**I.** American Red Cross	**O.** National Weather Service	**U.** landowners
D. Local Fire Dept.	**J.** USFS & MDNR	**P.** Utility Company	**V.** Salvation Army
E. County Road Commission	**K.** Insurance Companies	**Q.** State	**W.** Police
F. NEMCOG	**L.** Real Estate Co.	**R.** Schools	

Mitigation Actions & Implementation Strategies H. Public Health Emergencies	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Maintain a community public health system with sufficient disease monitoring and surveillance capabilities to adequately protect the population from large-scale outbreaks	High	H. Q. S. T.	H. T	Countywide	In place	Ongoing	Ongoing
2. Increase public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies	High	H. N. R. S.	H. T	Countywide	Progress made and continue to work on activity	2007	Ongoing
3. Encourage residents to receive immunizations against communicable diseases	Med	H. I. N. Q. S.	H. T	Countywide	Ongoing	Ongoing	Ongoing
4. Expand community support of free or reduced-expense clinics and school health services	Med	B. C. H. N. Q. S.	H. T	Countywide	Continuing to expand programs	2010	2017
5. Inform public and support pollution control, enforcement and cleanup; proper disposal of chemicals and scrap materials	Med	A. B. H. M. Q. R. T.	H. T	Countywide	In place and ongoing	2010	Ongoing
6. Demolish and clear vacant condemned structures in populated areas to prevent rodent infestations	Low	C. B. H.	H. T	Countywide	Progress made and Ongoing	2015	Ongoing
7. Coordinate with health department and local communities to assure proper location, installation, cleaning, monitoring, and maintenance of septic tanks	Low	C. H.	H. T	Countywide	Progress made and Ongoing	2015	2017
8. Increase public awareness of radon dangers and the prevention efforts that can be taken to reduce concentrations of radon in homes and buildings	Low	H. Q.	H. T	Countywide	In place and ongoing	2012	2017

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
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C. Local Units of Gov.	**I.** American Red Cross	**O.** National Weather Service	**U.** landowners
D. Local Fire Dept.	**J.** USFS & MDNR	**P.** Utility Company	**V.** Salvation Army
E. County Road Commission	**K.** Insurance Companies	**Q.** State	**W.** Police
F. NEMCOG	**L.** Real Estate Co.	**R.** Schools	

Mitigation Actions & Implementation Strategies I. Hazardous Material Transportation Incidents	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Provide for trained, equipped, and prepared search and rescue teams	High	A. B. C. D. V.	B. C. T	Countywide	Major progress and ongoing	Ongoing	Ongoing
2. Maintain and enhance trained, equipped and prepared local hazardous materials emergency response teams	High	A. B. C. D. V.	B. C. T	Countywide	Major progress and ongoing	Ongoing	Ongoing
3. Increase coverage and use of NOAA Weather Radio (which can provide notification to the community during any period of emergency, including large scale hazardous material incidents)	Med	A.	T	Countywide	Major progress and ongoing	Ongoing	Ongoing
4. Develop evacuation plans and community awareness of them	Med	A. V.	A. T	Countywide	Major progress and ongoing	2010	2017
5. Improve capability of agencies to carry-out road closures and to provide traffic control in accident areas	Med	E. V.	E. T	Countywide	completed and ongoing	2008	Ongoing

A. County Emergency Management Office	**G.** MSU Extension	**M.** Local Businesses	**S.** Medical
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C. Local Units of Gov.	**I.** American Red Cross	**O.** National Weather Service	**U.** landowners
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