Otsego·County¶
HAZARD·MITIGATION·PLAN¶

2021¶

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OTSEGO COUNTY
HAZARD MITIGATION PLAN
2021

Otsego County, Michigan

Prepared for:

Otsego County
and the
Jurisdictions in Otsego County

Prepared by:

Otsego County Emergency Management/911
100 McLouth
P.O. Box 642
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and

Northeast Michigan Council of Governments
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Adopted Insert Date

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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. 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 Otsego County, NEMCOG worked with the Emergency Manager and Local Emergency Planning Committee (LEPC) to review and update Otsego 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 Otsego 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 population and housing demographics, and economic indicators.

Chapter 4: Land Use Characteristics

- Reviewed and made minor updates to the chapter.

Chapter 5: Community Services and Facilities

- Reviewed and updated all sections of the chapter.

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 priority index.

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. Two action items were added.

Chapter 9: Plan Maintenance

- Reviewed and made minor changes to the chapter.

Planning Process

Hazard Mitigation Planning in Otsego County

In 2005, Otsego County prepared its first Hazard Mitigation Plan and updated it in 2014. In 2019, NEMCOG began working with the Emergency Manager and LEPC to review and update Otsego County's 2014 Hazard Mitigation Plan. The LEPC is made up of representatives from local governments, law enforcement, fire departments, community organizations, and local, state and federal agencies (Table 1-1). Also, representatives from the local governments, road commission, Catholic Human Services, Otsego County Library, and Otsego County Sheriff's Office participated in updating the mitigation actions and implementation strategies and reviewing the draft hazard mitigation plan (Table 1-2).

Table 1-1 LEPC Membership

Primary Emergency Support Function	Secondary Emergency Support Function
Jon Deming	Jason Melancon
Matt Barresi	Ken Bench
Tim Cherwinski	Dave Duffield
David Parsell	Donny Franckowiak
Joe Hickerson	Robert Hunter
Jackie Haag	Mike De Castro
Tim Johnson	Mel Maier
Ed Tholl	Pam Townsend
Gavin Babieracki	Denise Landrie
Nate Strean	April Buck
Dale Tucker	Brian Flickinger
Ken Borton	Great Lakes Energy
Joe Duff	Derek Carroll
Rachel Frisch	Stephan Crane
Cheryl Collins	Doug Hempenstall
Brian Jergenson	Matt Treinen
Brian Hummel	Brian Webber
Elizabeth Smith	James Mouch
Chuck Edwards	
David Turner	
Missy Fitzgerald	
Sara Herman	
Frank Claeys	
Matt Muladore	
Matt Nowicki	
John Clements	
Judy Hormann	
Jim Keysor	
Pat Bak	
Mark Reetz	
Mary Sanders	

Table 1-2 Jurisdiction Participation Status		
Jurisdiction	**Representative**	**Participation Status**
Otsego County	Rob Pallarito, Board of Commissioners; Rachel Frisch, Administrator; Ken Borton Board of Commissioners; Henry Mason, Board of Commissioners; Ken Glasser, Board of Commissioners	Continuing Participant
Bagley Township	Michelle Noirot, Supervisor; Fred Burns, Trustee	Continuing Participant
Chester Township	Katherine Miller, Treasurer; Melissa Szymanski, Clerk; Wanda Basinski, Trustee; Bonny Miller, Supervisor; Jackie Keyser, Trustee	Continuing Participant
Corwith Township	Debbie Whitman, Clerk; Vernon Kassuba, Supervisor; Tom Kellogg, Planning Commission	Continuing Participant
Dover Township	Rebecca House, Trustee; Janet Kwapis, Clerk	Continuing Participant
Hayes Township	Mary Sanders, Supervisor	Continuing Participant
Livingston Township	Liz Mench, Clerk; Norm Brecheisen, Supervisor; Beth Dipzinski, Trustee; Cheryl Prusukiewicz, Treasurer	Continuing Participant
Otsego Lake Township	Tom Wagar, Supervisor	Continuing Participant
City of Gaylord	Kim Awrey, Assistant City Manager	Continuing Participant
Village of Vanderbilt	Christina Boone, President	Continuing Participant
Elmira Township	Jessica Henke, Trustee; Diane Franckowiak, Supervisor; Dale Holzschu, Trustee; Sue Schaedig, Clerk; Diane Purgiel, Treasurer	Continuing Participant
Charlton Township	Matt Nowak, Supervisor	Continuing Participant
Agencies		
Otsego County Sheriff's Office	Matt Nowicki	
Otsego County Road Commission	Jason Melancon, Manager/County Foreman, William Holewinski, Board of Commissioners, Troy Huff, Board of Commissioners, Michael Dipzinski, Board of Commissioners	
Catholic Human Services	Lynda Rutkowski, Prevention Specialist	
Pigeon River Country Discovery Center	Rudi Edel, Discovery Center Board	
Otsego County Library	Maureen Derenzy, Library Director	

Community Involvement

The neighboring and local jurisdictions, stakeholders, and the public were involved during the drafting phase of the hazard mitigation plan and during the completion of the draft plan before it was adopted. Information was disseminated to the communities and public through public meetings, news releases, and email. 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 pooling of resources and facilitating communication.

Public Participation Survey

The Emergency Manager and LEPC 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 Otsego 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 LEPC, Otsego County Board of Commissioners, and the local jurisdictions' mayor, 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 Otsego 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, LEPC 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 LEPC members and local community officials. All LEPC meetings are open to the public. In addition to the LEPC meetings and discussions, additional meetings were held.

County Emergency Manager Meeting

On April 16, 2019, NEMCOG met with the Emergency Manager and his assistant to review and discuss the hazard mitigation plan update, and to set up input meetings. Attendees included Jon Deming, Jessica Basinski, and NEMCOG staff, Nico Tucker and Christina McEmber.

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.

Kick off Meeting

On May 20, 2019, NEMCOG met with Otsego County's LEPC to provide an overview of the hazard mitigation planning process and information about the grant match. Attendees included D. Robinson, M. Sanders, Cheryl Collins, David Duffield, Frank Claeys, Pat Bak, David Parsell, Jessica Basinski, Rachel Frisch, Brian Jergenson, Carrie Kovolski, Jon Deming, and NEMCOG staff, Christina McEmber.

Plan Review and Update Meeting

On August 26, 2019, NEMCOG met with Otsego County's LEPC to review and update the 2014 Otsego County Hazard Mitigation Plan. A brief overview about the current plan status, grant match, and future steps was discussed. Additionally, the committee reviewed the county's hazard rankings based on their social impact, likelihood of occurrence, and administrative potential, and determined the rankings were still relevant. The committee also reviewed 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 updated each action's responsible agency, financial and technical sources, priority ranking, current progress, and future status. Several action items were moved to the all-hazard mitigation action table and multiple action items were determined to be ongoing projects. Attendees included Jon Deming, Jessica Basinski, David Duffield, Mary Sanders, Cheryl Collins, D. Robinson, Chris Churches, Matt Barresi, Ron Rabineau, Carol Rabineau, John Clements, Brian Webber, Pat Bak, Frank Claeys, and NEMCOG staff, Christina McEmber.

Michigan Township Association Meeting

On October 15, 2019, NEMCOG met with the representatives from the local jurisdictions to provide an overview of the hazard mitigation plan, information regarding the adoption process, and future steps. Representatives from Otsego County, the City of Gaylord, and the following townships: Bagley, Chester, Corwith, Dover, Hayes, Livingston, Otsego Lake, and Elmira participated in the planning process. Attendees included Lynda Rutkowski, Mike Dipzinski, Troy Huff, Kim Awrey, Jason Melancon, Diane Franckowiak, Dal Holzsohn, Jessica Henke, Rebecca House, Janet Kwapis, Fred Burns, Michelle Noirot, Debbie Whitman, Vernon Kassuba, Tom Kellogg, Pat Coultes, Henry Mason, Jon Deming, Matt Nowicki,

Jackie Keyser, Melissa Szymanski, Katherine C. Miller, Wanda Basinski, Maureen Derenzy, Beth Dipzinski, Ken Glasser, Ken Borton, Rachel Frisch, Rob Pallarito, Liz Mench, Tom Wagar, William Holewinski, Susan Schaedig, Diane Purgiel, Bonny Miller, Norm Brecheisen, Rudi Edel, Cheryl Prusukiewicz Mary Sanders, 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 Otsego 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 informing the residents about the draft plan and where it could be reviewed on November 7, 2019 and November 14, 2019. The draft plan was posted on Otsego County's website and NEMCOG's website. On November 4, 2019, the draft plan was emailed to the local jurisdictions' mayor, supervisors, clerks, and Board of Commissioners for review and comment.

On November 19, 2019, a public hearing was held to receive comments and suggestions on the draft plan. The comments and suggestions included the following: updating contact information, changing color schemes in tables to highlight differences in data, and the addition of a mitigation strategy to address floodplain damages. Comments and suggestions obtained in the review process were incorporated into the final plan. Attendees included Jon Deming, Jessica Basinski, Chris Churches, Mary Sanders, Lt. Michael de Castro, and Christina McEmber.

The draft plan was submitted to the Michigan State Police and FEMA for approval before adoption by the Otsego County Board of Commissioners and local municipalities.

INSERT DATE, the Otsego County LEPC approved a motion to recommend adoption of the Otsego County Hazard Mitigation Plan by the Otsego County Board of Commissioners and all local municipalities within Otsego County.

Plan Adoption

INSERT DATE, the Otsego County Hazard Mitigation Plan received "approvable pending adoption" status from the State and FEMA. A public notice was sent to the local newspaper informing residents when the County Board of Commissioners would be considering adoption of the draft plan. **INSERT DATE,** NEMCOG presented the Otsego County Hazard Mitigation Plan to the Otsego County Board of Commissioners for adoption and the plan was adopted. After adoption by the County, the local

jurisdictions were notified about the County's adoption of the plan and were requested to also adopt the plan.

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 (MIRIS), USGS topographic maps, the National Oceanic and Atmospheric Administration's National Centers for Environmental Information Data Center (NOAA), the USDA's Soil Surveys, NRCS soils maps, Michigan Department of Transportation (MDOT), 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 (EGLE), U.S. Forest Service, Michigan State Police Emergency Management and Homeland Security Division, and the 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

The natural environment and rural character of Northern Michigan is its greatest attraction, major economic base, and income generator. Recreational opportunities, such as hunting, fishing, golfing, snowmobiling, and boating attract people from around Michigan and other states.

Otsego County encompasses 527 square miles (337,415 acres of land and water) in Michigan's north central Lower Peninsula. It is located along the I-75 corridor and is 60 miles from Lake Michigan, 55 miles from the Straits of Mackinac, and 70 miles from Lake Huron. It is bordered by Cheboygan, Montmorency, Crawford, Charlevoix, and Antrim Counties. The county is composed of nine townships, a city, a village, and three unincorporated places (Figure 2-1):

- City of Gaylord (county seat)
- Village of Vanderbilt
- Waters (unincorporated place)
- Elmira (unincorporated place)
- Johannesburg (unincorporated place)
- Corwith Township
- Elmira Township
- Livingston Township
- Dover Township
- Hayes Township
- Bagley Township
- Otsego Lake Township
- Chester Township
- Charlton Township

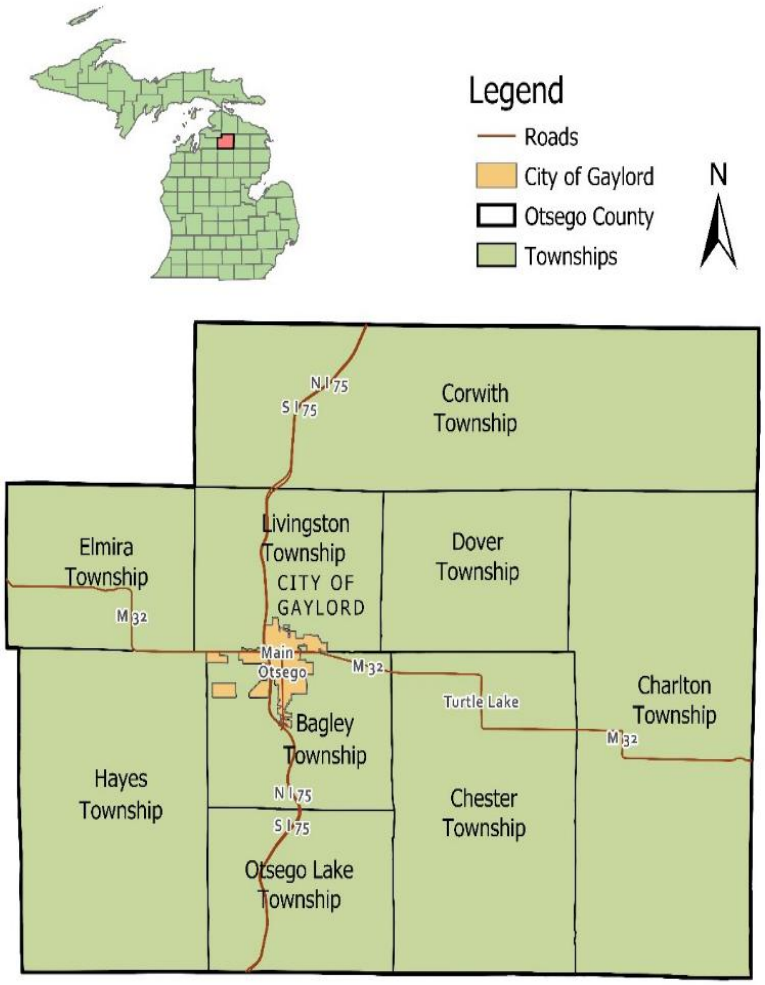

Figure 2-1 Location of Otsego County's Townships and City

Climate

Climate data obtained from the Michigan Climatological Resources Program (Gaylord, Michigan Station) indicates the county's climate is humid continental and is not strongly influenced by the climate moderation of the Great Lakes, which results in the county experiencing temperature and precipitation extremes (Table 2-1). Gaylord is in the heart of northern Michigan's snowbelt and experiences heavy snowfall due to the prevailing westerly winds and high elevations (Figure 2-2).

Temperature data shows the county's highest recorded temperature was 104°F on August 6, 1946 and the lowest recorded temperature was -38°F on February 6, 1895. Between November and March, approximately 93% of the days have temperatures ranging from 32°F or below. Approximately 20 days a year experience below zero temperatures. The average date for the first freezing temperature is September 17, while the average date for the last freezing temperature is May 28.

Generally, the summer months are sunny with moderately warm temperatures. On average, there are five days with temperatures exceeding 90°F. The county receives an average of 19.18 inches of precipitation and has thunderstorms approximately 25 days per year. The growing season averages 112 days between April and September.

The winter months generally have cloudy skies and frequent snow flurries. The average seasonal snowfall is 143.3 inches with 133 days per season receiving an inch or more of snowfall. During the 1970-1971 season, the snowfall totaled 205.5 inches with the greatest daily snowfall of 15 inches occurring on November 7, 1971. According to the Midwest Regional Climate Center, the greatest snowfall in the county was recorded at 207 inches during the 1996-1997 season.

Source: Michigan Committee for Severe Weather Awareness

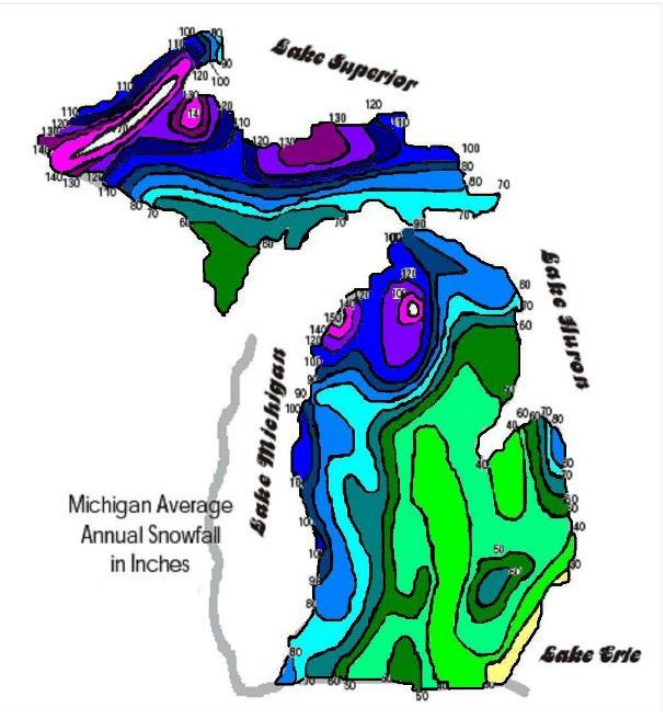

Figure 2-2 Michigan Average Annual Snowfall

Table 2-1 Otsego County Climate Data 1981-2019					
Year	Mean Temperature	Minimum Temperature	Maximum Temperature	Annual Precipitation (Inches)	Annual Snowfall (Inches)
1981	43.8	-30	94	29.08	121.5
1982	42.3	-32	92	36.07	138.7
1983	43.4	-27	95	40.39	128.0
1984	42.5	-31	88	35.65	100.1
1985	-	-	-	-	-
1986	43.2	-22	91	42.70	125.5
1987	45.9	-14	93	32.39	126.5
1988	44.3	-13	95	41.82	182.5
1989	41.9	-15	91	32.51	198.9
1990	44.6	-17	85	40.26	148.0
1991	45.1	-15	94	40.04	130.5
1992	41.8	-14	88	33.90	162.0
1993	41.8	-14	91	36.82	126.5
1994	42.8	-23	92	37.04	114.5
1995	42.8	-16	94	45.73	195.0
1996	41.9	-14	90	32.74	171.5
1997	42.2	-20	90	32.73	158.3
1998	46.4	-5	89	34.25	129.5
1999	45.4	-13	91	33.38	108.5
2000	44.3	-10	87	29.91	146.1
2001	45.9	-6	95	35.25	127.5
2002	44.6	-7	90	33.27	158.5
2003	43.2	-21	93	32.21	144.6
2004	43.2	-15	87	40.59	189.3
2005	44.6	-16	92	33.88	148.0
2006	46.2	-2	96	33.14	151.5
2007	44.6	-13	91	34.60	163.0
2008	42.3	-9	90	34.11	163.9
2009	41.7	-14	94	26.66	119.1
2010	45.3	-9	92	24.13	63.1
2011	43.4	-17	94	35.17	108.7
2012	46.1	-9	92	31.88	122.7
2013	41.9	-13	92	38.91	197.8
2014	38.9	-23	87	43.71	166.5
2015	41.1	-35	89	34.56	85.2
2016	43.9	-26	91	34.28	167.8
2017	42.9	-25	89	43.70	133.9
2018	41.7	-28	96	34.87	105.6
2019	-	-25	90	-	-

Source: Midwest Regional Climate Center, Gaylord, MI
*According to the Midwest Regional Climate Center, the 1985 data is missing

Topography

Otsego County is dominated by hilly lands ranging in elevation from 800 feet in the northeast to 1400 feet in the central and southwest regions. A narrow plain runs from the western county line (near Elmira) through Gaylord to the county's east and southeast boundaries. The hilly ridges south of Gaylord trend north-south, whereas the ridges north of Gaylord trend southwest-northeast and southeast-northwest, intersecting approximately 6.3 miles north of Gaylord. Drainage flows in outwash valleys between moraines, which make swampy lowlands and kettle lakes common within the county.

Geology

The glaciers created the moraines, outwash plains, and kettle lakes in Otsego County. Moraines are linear, hilly ridges that were created by the deposition of sand, gravel, rock and clay at the margins of a glacier. Moraines occur to the north and south of the Gaylord area. Outwash plains are water laid, stratified deposits of sand and gravel, and occur to the southeast and southwest of Gaylord. Kettle lakes consist of water-filled depressions and dry depressions that were created when sediment collapsed around melting blocks of ice in the outwash plains. Kettle lakes can be found on the outwash plains around Gaylord.

Glacial deposits in Otsego County range between 400 to 1,000 feet deep and between 650 to 750 feet thick and consist of sand and gravel with sparse bits of clay. The county's bedrock consists of deposits of shale, limestone, and dolomite. Significant oil and gas deposits can be found in a band running southwest to northeast across the county.

Soils

Soil types are an important consideration for land development in the county. The placement of individual wells and on-site waste disposal systems outside of the City of Gaylord's sewer and water service area will impact the potential for contamination of wells, groundwater, and surface waters.

The USDA's Soil Conservation Service identified ten soil associations in Otsego County. A soil association is a group of soils that commonly occur in proximity to one another (Table 2-2). According to available information, 90% of Otsego County has soils with moderate to rapid permeability. This permeability allows liquids to move through the soils with little or no cleansing and recharge the groundwater. The placement of septic systems and drain fields in areas with moderate to rapid permeable soils should take into consideration the potential for surface water and groundwater contamination. In the eastern portion of the county, there are areas with less permeable soils.

The Natural Resource Conservation Service completed a detailed soil survey of Otsego County that was acquired from the Michigan Center for Geographic Information. Hydric soils and soils with slopes of 18% or greater should have lower density and less intensive development directed to them (Figure 2-3). Hydric soils tend to be saturated, flooded or ponded and are classified as poorly drained and very poorly drained. In Otsego County, hydric soils can be found near streams and creeks. The wetness and ponding of these soils make them difficult and costly to develop. Additionally, these areas may be classified as wetlands and require a permit to develop them. Hills and steeply sloped terrain are also more difficult and costly to develop since they require severe building constraints. Special design considerations for sloped areas include erosion control measures, limiting the size of disturbed areas, retaining natural vegetation, re-vegetation, slope stabilization and on-site retention of water run-off from impervious surfaces.

Table 2-2 Otsego County Soil Permeability			
Soil Association	**Permeability**	**Acres**	**Percent**
Rubicon-Grayling	Rapid	105,000	
Kalkaska-East Lake-Mancelona	Rapid	68,000	
Rubican-Graycalm-Montcalm	Rapid	27,000	
Kalkaska-Blue Lake	Rapid	27,000	
	SUB TOTAL	**227,000**	**67%**
Coventry-Karlin	Moderate-Rapid	3,000	
Leelanau-Emmet-Kalkaska	Moderate-Rapid	41,000	
Carbondale-Tawas-Roscommon	Moderate-Rapid	34,000	
	SUB TOTAL	**78,000**	**23%**
Emmet-Leelanau	Moderate-Moderately Rapid	17,000	
	SUB TOTAL	**17,000**	**5%**
Nester-Kawkawlin-Iosco	Moderately Slow	7,000	
	SUB TOTAL	**7,000**	**2%**
Ubly-Nester-Menominee	Moderately Slow-Mod. Rapid	10,000	
	SUB TOTAL	**10,000**	**3%**
	GRAND TOTAL	**339,000**	**100%**
Source: U.S. Dept. of Ag., Natural Resource Conservation Service: Rapid: 6-20 in./hr.; Mod-Rapid: 2-6 in./hr.; Moderate: 0.6-2 in./hr.; Mod-Slow: 0.2-0.6 in./hr			

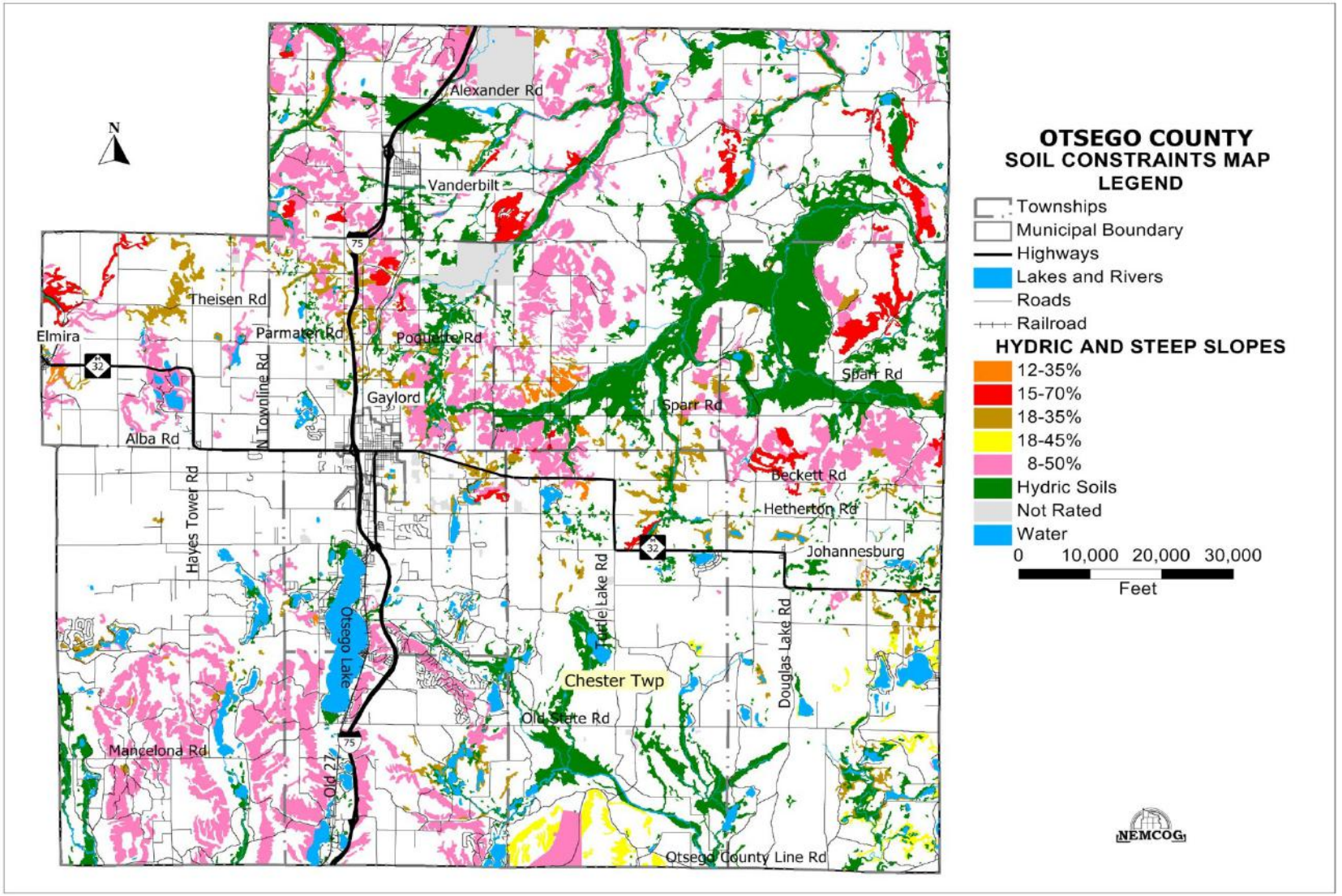

Figure 2-3 Otsego County Soil Constraints

Water Resources

The inland waters in Otsego County cover 7,280 acres (2.1% of the county) with the majority of the county located in the Cheboygan and Au Sable watersheds. The waters in the western portion of the county flow into either the Boyne or Manistee watersheds.

The county has an abundance of high-quality streams and numerous lakes. The headwaters of the Au Sable River (Chester Township), Black River (Corwith Township), Manistee River (Hayes Township), Pigeon River (Corwith and Dover Townships), Sturgeon River (Livingston and Corwith Townships), and Boyne River are located within the county. The Black, Pigeon, and Sturgeon rivers are located in the Cheboygan River watershed. The county has 136 miles of inland lake shoreline; however, only 13.5 miles are open to the public. The largest waterbody is Otsego Lake (Bagley Township) at 1,964 acres and the next largest waterbody is Big Bear Lake at 333 acres. Kolke Creek flows through Hayes Township and Duck Stream flows through Dover Township.

Wetlands

Wetlands account for 2.2% of the land in Otsego County and are found along waterways (Figure 2-4). These areas filter out nutrients and sediments to maintain and enhance the purity and clarity of the lakes and streams.

Development on waterfront properties should consider maintaining the undeveloped wetland areas to prevent water quality issues, property flooding, and improperly functioning septic systems. This maintenance would protect property values, prevent property damage to surrounding properties (e.g., downstream flooding), and prevent public health issues (e.g., water quality issues).

Groundwater

Groundwater maintains the county's river and is used as the sole source of drinking water in the county. Wells extract the water from aquifers that are approximately 60-100 feet below the surface. However, there are specific areas where the depth ranges between five and several hundred feet. The availability of groundwater ranges from 400 to 500 gallons per minute from wells with a 10-inch diameter.

The county's aquifers vulnerable to contamination from surface or subsurface discharges due to the sand and gravel soil types (Figure 2-5). Generally, contaminated groundwater travels unobserved until it is detected in a water supply well. Contaminated groundwater may persist for decades. Once detected, it is difficult and costly to clean-up the contamination. Land use planning and contamination clean-up activities should consider the direction and flow rate of groundwater since the water discharges into lakes and streams.

The Department of Natural Resources and the Department of Public Health conducted a groundwater survey in the City of Gaylord to delineate the zone of contribution of ground water for the municipal water supply protection program (City of Gaylord Wellhead Protection Program). The survey determined three municipal wells draw from an unconfined sand and gravel aquifer, which is estimated to be 700 feet thick. The depth to the water table ranges from 45 to 150 feet below the ground surface depending on the location of the well. The survey also reported the Gaylord area groundwater flows in an easterly to northeasterly direction with a gradient varying from 0.0008 ft/ft to 0.0026 ft/ft and flows towards the headwaters of the Sturgeon and the Au Sable Rivers. Approximately one-half mile south of the city, a groundwater divide exists along the Consumer's Power right-of-way.

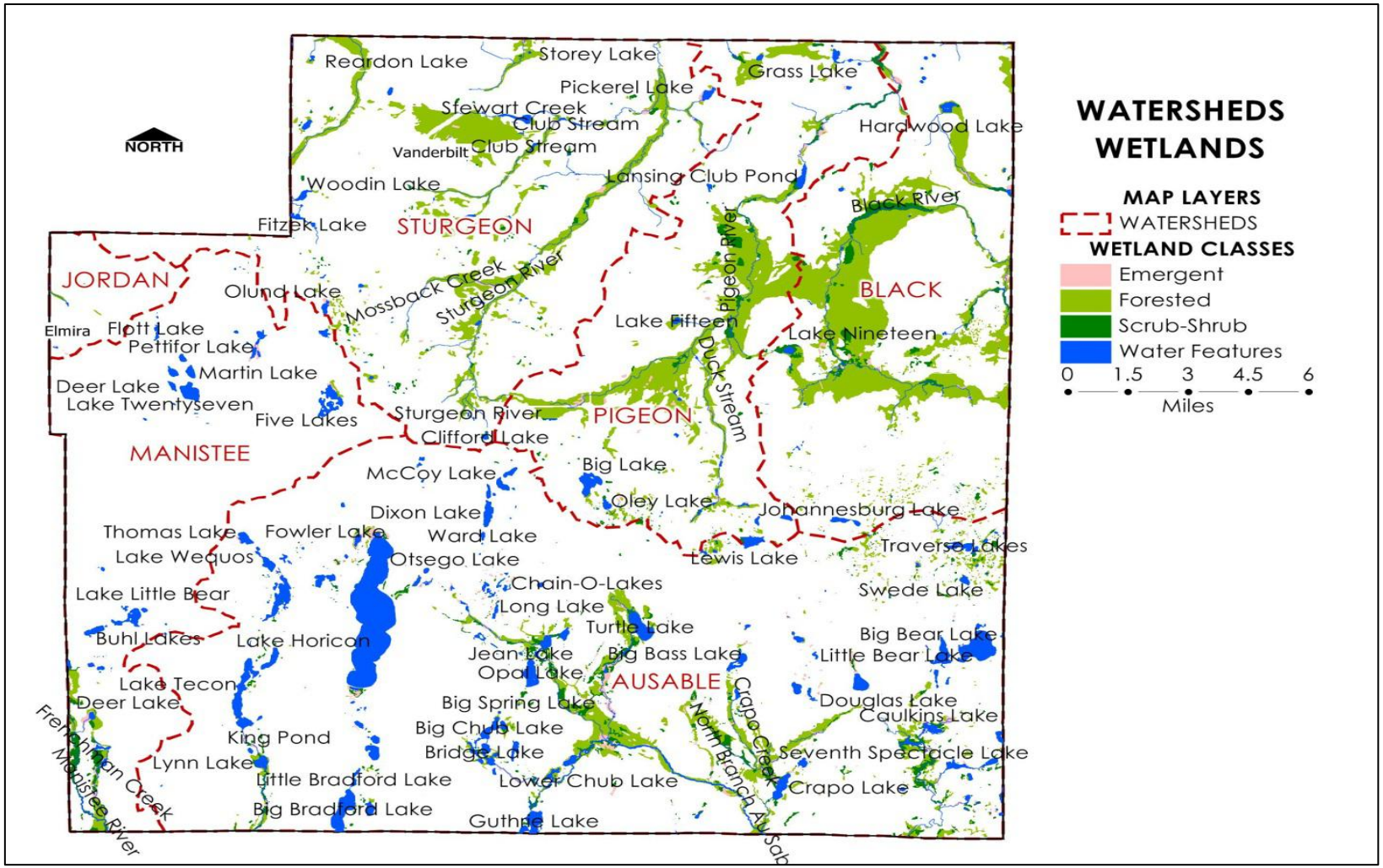

Figure 2-4 Otsego County Watershed and Wetland Locations

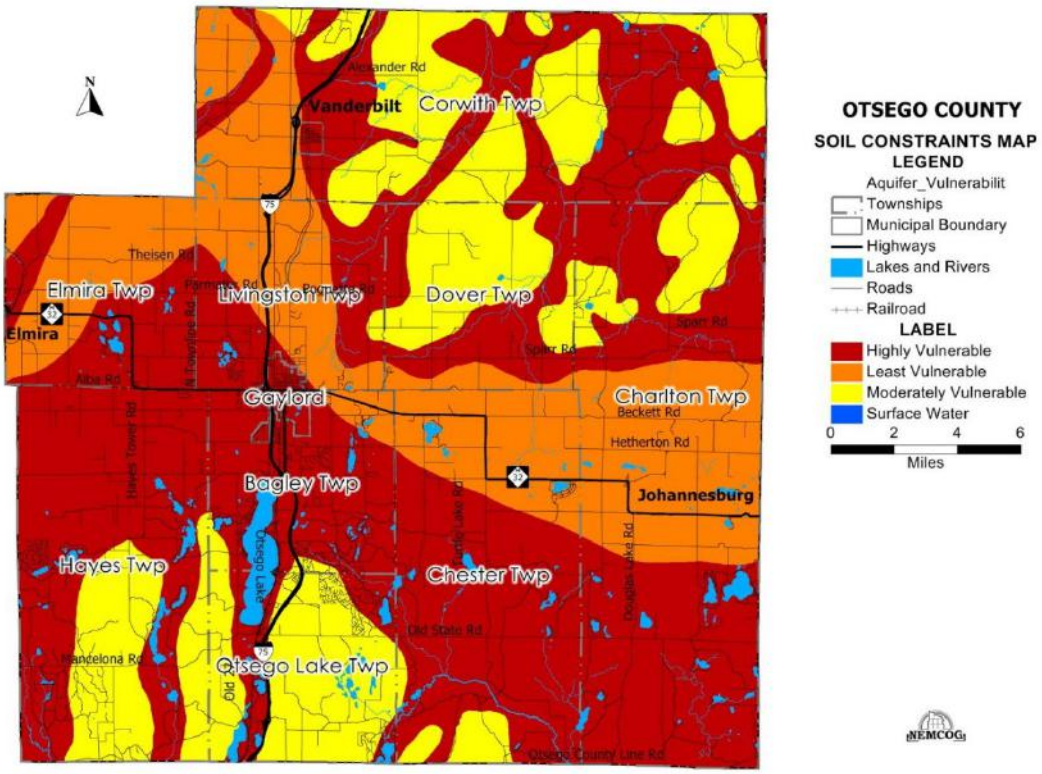

Figure 2-5 Otsego County Aquifer Vulnerability

Forestlands

According to the U.S. Forest Service, 80% of the county's land is forestland with 42% owned by the State and 58% privately-owned (Table 2-3). The lands provide wildlife habitat and are used for timber, fiber, and recreation activities. The forestland is primarily composed of Maple/Beech/Birch (42%) and Aspen (23%). Other forestlands are composed of Red Pine (12%), Jack Pine (10%), Oak/Hickory Group (4%), Eastern White Pine (3%), Balsam Fir (2%), Elm/Ash/Cottonwood (2%), Exotic Softwoods Group (1%), and Hard Maple/Basswood (0.06%). The aspen/birch, oak and pine forests are most prevalent in the northwestern and southern parts of the county (Figure 2-6). The droughty, low fertility sandy soils in these areas support jack pine forests that have been perpetuated by wildfires over the years.

Table 2-3 Otsego County Forestlands

Forest Species	State	Private	Total	Percent
Maple/Beech/Birch Group	31,485.3	71,173.7	102,659.0	41.9%
Aspen	19,414.3	37,968.0	57,382.2	23.4%
Red Pine	19,447.9	9,075.7	28,523.6	11.6%
Jack Pine	24,335.8	-	24,335.8	9.9%
Oak/Hickory Group	5,186.1	5,186.1	10,372.2	4.2%
Eastern White Pine	3,152.1	5,186.1	8,338.2	3.4%
Balsam Fir	-	5,186.1	5,186.1	2.1%
Elm/Ash/Cottonwood Group	-	5,186.1	5,186.1	2.1%
Exotic Softwoods Group	-	2,845.1	2,845.1	1.2%
Hard Maple/Basswood	-	136.7	136.7	0.06%
TOTAL	103,021.4	141,943.5	244,964.9	

Source: U.S. Forest Service 2001

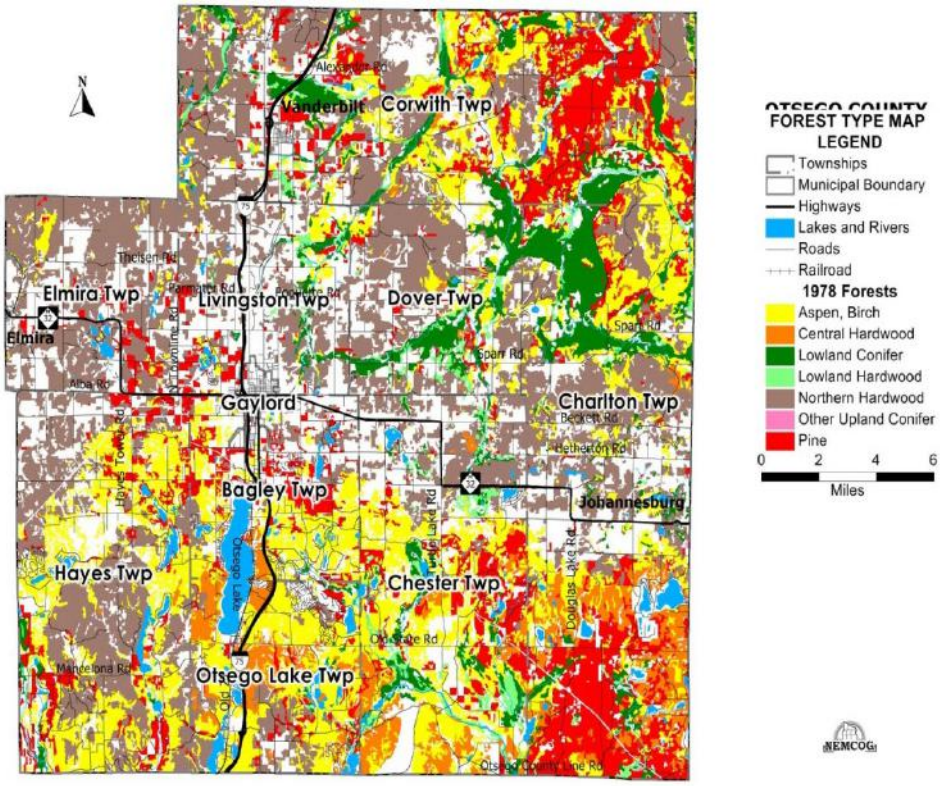

Figure 2-6 Otsego County Forest Types
Lowland hardwoods consist of black ash, slippery elm and red maple and lowland conifers consist of northern white cedar, black spruce and eastern tamarack.

Sites of Environmental Contamination

The Michigan Environmental Response Act (Part 201 of PA 451 of 1994, as amended) provides for the identification, evaluation and risk assessment of sites of environmental contamination in Michigan. The Environmental Response Division (ERD) is charged with administering this law. A site of environmental contamination, as identified by ERD, is "a location at which contamination of soil, ground water, surface water, air or other environmental resources are confirmed, or where there is potential for contamination of resources due to site conditions, site use or management practices." The database provides information for Sites of Environmental Contamination (Part 201), Leaking Underground Storage Tanks (Part 213) and Baseline Environmental Assessments (BEAs). A BEA is completed when a property is purchased, leased or foreclosed on to document the contamination and provide liability protection for the clean-up of existing contamination on the property. Twenty-seven sites were listed as sites of environmental contamination, ten were listed as leaking underground storage tanks and twenty sites have completed BEAs.

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. Five NPDES permits have been issued in Otsego County (Table 2-4).

Table 2-4 National Pollutant Discharge Elimination System Permits				
Site Name	**Address**	**Site Type**	**Permit Number**	**Expiration Date**
Amec Foster Wheeler-H&H Tube GWCU	8903 Nowak Road	Groundwater Cleanup	MI0047392	10/1/2021
Baker Hughes-Gaylord	1245 Anna Drive	Industrial	NEC157863	3/11/2020
FedEx Express-GLRA	1099 Aero Drive	Industrial	NEC186636	5/16/2022
Huron Pines Incorporated-Nuisance Plant	US 23	Pesticide	MIG031045	2/1/2022
UPS - Gaylord	1640 Dickerson Road	Industrial	NEC157875	3/12/2020
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 are eleven groundwater discharge permits issued in Otsego County (Table 2-5).

Table 2-5 Groundwater Discharge Permits				
Site Name	**Address**	**Site Type**	**Permit Number**	**Expiration**
Alpine Auto Auction	5216 Old 27 N	GW-Commercial	GW1110808	9/1/2022
Beaver Creek Resort Condominium	5004 West Otsego Lake Drive	Campground	GW1110375	10/1/2019
Cooper Standard Automotive Inc.	594 Alpine Road	Industrial	GW1310036	11/1/2016
Gaylord WWTP	500 East Seventh Street	Municipal Sanitary-Public	GW1810128	2/1/2019
Hayes 22 CPF	9527 Mount Frederick Road	GW-Commercial	GW1810215	4/1/2019
MDNR-Otsego Lake State Park	7136 Old 27 South	Campground	GW1010262	9/1/2019
Northern Tank Truck Service Inc.	various locations	GW-Commercial	GW1550008	4/1/2020
Nottingham Forest MHC	1665 West M-32	Municipal Sanitary-Private	GW1110455	12/1/2022
Star Truck Rentals-Gaylord	179 Expressway Court	Industrial	GW1520014	4/1/2020
Treetops Acquisition-Resort	3962 Wilkinson Road	Municipal Sanitary-Private	GW1810170	9/1/2022
Up North Camping LLC	5101 Campfires Parkway	Campground	GW1110325	2/1/2024
Source: Michigan Department of Environment, Great Lakes, and Energy, Retrieved May 2019				

Air Discharge (Renewable Operating Permit (ROP)/ 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 are eight renewable operating permits issued in Otsego County (Table 2-6).

Table 2-6 Renewable Operating Permits

Company	Facility
Consumers Energy	Gaylord Combustion Turbine Plant
Jaguar Energy	Otsego Lake 27 Gas Plant
ANR Storage Company	South Chester Compressor Station
ANR Pipeline Company	Central Charlton Compressor Station
DCP Antrim Gas LLC	South Chester CO2 Removal Facility
BreitBurn & Riviera	Wilderness CO2 & Hayes 29
CMS Generation	Livingston Generating Station
Wolverine Power	Gaylord Generating Station

Source: Michigan Department of Environment, Great Lakes, and Energy, Retrieved May 2019

Chapter 3
Community Profile

Brief History of Otsego County

In 1840, Otsego County was created from Michilimackinac County and named Okkuddo County. In 1843, the county was renamed to Otsego County after Otsego County, New York.

Population

The 2017 American Community Survey shows Otsego County is the only county in Northeast Michigan to experience a population increase from 2000 to 2017. The county's population has increased by 946 people (4.1%) since 2000. The county's population has more than quadrupled since 1930 (an increase of 18,693 people). The largest population increase was recorded between 1970 and 1980 (43.9% increase). The county's population density is 47.1 persons per square mile.

Population by Municipality

Between 2000 and 2017, slightly more than half of all municipalities in Otsego County increased in population (Table 3-1). Elmira Township gained the most residents (14.0 %) followed by Otsego Lake Township (12.8%) and Hayes Township (10.4 %). However, Dover Township lost 10.7 % of its population.

Table 3-1 Otsego County and Municipalities Populations, 2000-2017

Municipality	2000 Population	2010 Population	2017 Population	Percent Change	Numeric Change
Otsego County	**23,301**	**24,164**	**24,247**	**4.1%**	**946**
Bagley Township	5,838	5,886	5,894	1.0%	56
Charlton Township	1,330	1,354	1,257	-5.5%	-73
Chester Township	1,265	1,292	1,376	8.8%	111
Corwith Township	1,719	1,748	1,663	-3.3%	-56
Dover Township	614	561	548	-10.7%	-66
Elmira Township	1,598	1,687	1,821	14.0%	223
Hayes Township	2,385	2,619	2,632	10.4%	247
Livingston Township	2,339	2,525	2,554	9.2%	215
Otsego Lake Township	2,532	2,847	2,855	12.8%	323
City of Gaylord	3,681	3,645	3,647	-0.9%	-34
Village of Vanderbilt	587	562	553	-5.8%	-34

Source: U.S. Census Bureau
Note: Green text indicates increase
Red text indicates decline

Seasonal Population

In 2017, the U.S. Census reported 30.3% of the housing units in the county were seasonal. Obtaining accurate numbers of seasonal residents and tourists is difficult. The decennial U.S. Census only reflects the number of persons whose principal residence is in the county. An estimate of the number of seasonal residents can be calculated by multiplying the number of seasonal housing units (4,496) by the county's average number of persons per household (2.41) for a total of 10,835 persons. Therefore, seasonal residents increase the county's total population to 35,082, compared to the 2017 American Community Survey total population of 24,247 persons. However, the seasonal population calculation does not include seasonal visitors or tourists staying in area motels, campgrounds or family homes.

Age Distribution

The 2017 U.S. Census data shows 49.7% of Otsego County's population was 45 years old or older, a 12.0% increase since 2000 (Table 3-2; Figure 3-1). The shift towards an older population may be caused by existing residents getting older along with an influx of retirees. The 45-64 age group is the most populous age group in all municipalities except Otsego Lake Township and the City of Gaylord, where the 65+ age group is the largest. In Otsego County as a whole, the 25-44 age group exceeds the 65+ age group.

The median age of Otsego County residents increased from 37.7 to 44.9 years between 2000 and 2017, which demonstrates a relatively stable population that is getting older and will need access to social, emergency response, and medical services (Table 3-2). Additionally, Michigan's median age increased from 35.5 to 39.6 years. Compared to the state, Otsego County's population is aging at a faster rate which may be caused by younger people moving to other areas for employment. In the county, Charlton Township has the highest median age at 53.1 years, while Bagley Township has the lowest at 40.6 years.

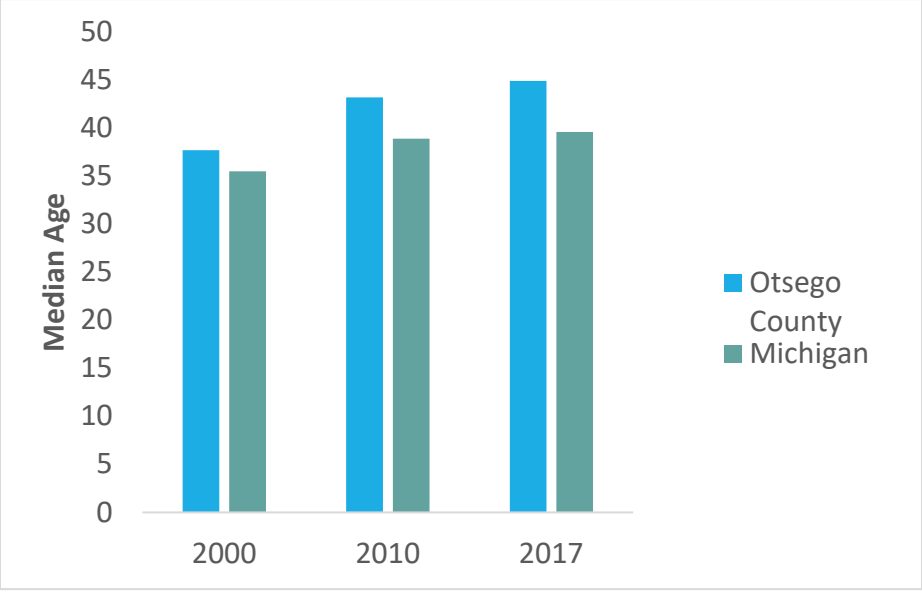

Figure 3-1 Otsego County Median Age Compared to the State of Michigan

Table 3-2 Otsego County Age Distribution by Municipality, 2017													
Community	**< 5 Yrs.**	**Percent***	**5-19 Yrs.**	**Percent***	**20-24 Yrs.**	**Percent***	**25-44 Yrs.**	**Percent***	**45-64 Yrs.**	**Percent***	**65 Yrs. & >**	**Percent***	**Median Age**
Bagley Township	497	8.4	1,171	19.8	384	6.5	1,232	20.9	1,849	31.4	761	12.9	40.6
Charlton Township	19	1.5	228	18.1	51	4.1	131	10.4	425	33.8	403	32.2	53.1
Chester Township	53	3.9	217	15.9	97	7.0	302	22.0	513	37.2	194	14.1	45.7
Corwith Township	79	4.8	213	12.7	37	2.2	381	23.0	650	39.0	303	18.1	49.3
Dover Township	33	6.0	74	13.5	88	16.1	81	14.8	164	30.0	108	19.8	44.8
Elmira Township	70	3.8	362	19.9	76	4.2	320	17.6	576	31.7	417	22.9	47.8
Hayes Township	163	6.2	462	17.6	124	4.7	558	21.2	813	30.9	512	19.5	45.2
Livingston Township	106	4.2	576	22.5	160	6.3	482	18.8	825	32.3	405	15.9	42.9
Otsego Lake Township	140	4.9	474	16.6	125	4.4	668	23.3	709	24.8	739	25.9	46.3
City of Gaylord	183	5.0	622	17.1	314	8.6	807	22.2	785	21.5	936	25.7	43.3
Village of Vanderbilt	31	5.6	87	15.8	18	3.3	133	24.1	188	33.9	96	17.4	46.4
Otsego County	**1,343**	**5.5**	**4,399**	**18.1**	**1,456**	**6.0**	**4,962**	**20.5**	**7,309**	**30.1**	**4,778**	**19.6**	**44.9**
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

Disability status data is based on a sample and is estimated by the American Community Survey (Table 3-3). A person was classified as having a disability if they had a sensory disability, physical disability, mental disability, self-care disability, going outside of the home disability or an employment disability. Of Otsego County's population, 18.1% of individuals are classified as having some type of disability. There are 2,125 individuals between the ages of 18 and 64 that have some type of disability with ambulatory disabilities and independent living disabilities being the most common. Cognitive disabilities are the most common for individuals aged 5-17 years.

Table 3-3 Disability Status	
Status Type	**Number of Persons**
Population under 5 years with a disability	**30**
With a hearing difficulty	16
With a vision difficulty	14
Population 5-17 years with a disability	**298**
With a hearing difficulty	28
With a vision difficulty	20
With a cognitive difficulty	253
With an ambulatory difficulty	23
With a self-care difficulty	70
Population 18-64 years with a disability	**2,125**
With a hearing difficulty	413
With a vision difficulty	290
With a cognitive difficulty	825
With an ambulatory difficulty	1,155
With a self-care difficulty	445
With an independent living difficulty	842
Population 65+ years with a disability	**1,901**
With a hearing difficulty	890
With a vision difficulty	229
With a cognitive difficulty	402
With an ambulatory difficulty	1,120
With a self-care difficulty	311
With an independent living difficulty	678
Source: American Community Survey 2017	

Selected Economic Indicators for Otsego County

As the population has increased in Otsego County, the unemployment rate has decreased from 15.3 % in 2010 to 6.4 % in 2017 (Figure 3-2). Compared to the region-wide rates, the unemployment rate has been consistently lower in the county. However, the number of people in the labor force has dropped from 12,348 in 2000 to 11,634 in 2017.

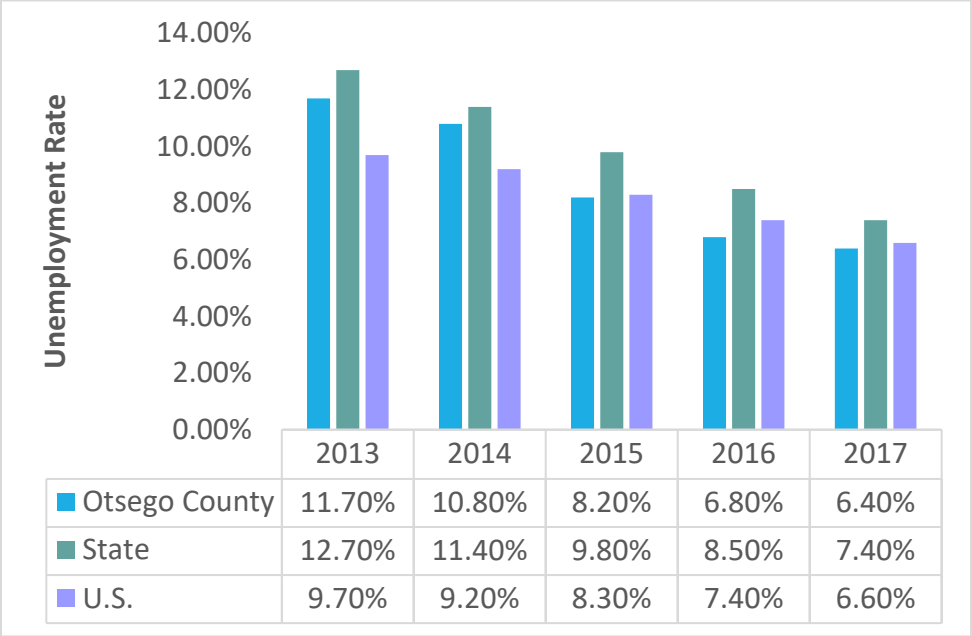

Figure 3-2 Unemployment Rate 2013-2017

Median Income

A reliable measure of the economic health of families is median household income. All eight counties in Northeast Michigan have generally had a steady increase in median income over the past several decades; however, Northeast Michigan lags behind the State (Table 3-4). According to the U.S. Census, Otsego County had the highest median household income at $50,823 in 2017 (96.5 % of the State's household income). As more retirees move to the region and the local economy becomes more reliant on service and tourism job sectors, the gap between the regional and state median household income is expected to increase.

Generally, individuals with steady, year-round employment tend to have higher overall incomes than those who are laid-off for part of the year. With lower incomes in the county, individuals will seek employment opportunities with higher incomes in other areas. Table 3-5 shows the median household income by age group for Otsego County in 2017.

Table 3-4 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

Table 3-5 Otsego County Median Household Income by Age

Age	2017 Median Household Income
15-24 years	$32,303
25-44 years	$57,871
45-64 years	$56,075
65+ years	$41,286

Source: U.S. Bureau of the Census, American Community Survey

Poverty Rates

All other Northeast Michigan counties have higher poverty rates than Otsego County. In 2017, 9.3% of Otsego County families were estimated to be in poverty with the percentage increasing to 19.0% when children are present (Table 3-6). When a female head of household is present, the percentage increases to 27.0% and increases to 34.2% when there are children under 18 in the household. According to the U.S. Census, there are 681 families with a female head of household with children living in poverty in Otsego County.

Table 3-6 Poverty Rates, 2017

Category	Percent
Families	9.3
All families w/related children under 18	19.0
Married couple families	5.5
Married couple families w/related children under 18	12.5
Female householder, no husband present	27.0
Female householder, no husband present w/ related children under 18	34.2
Householder 65+ years	2.8

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

Housing Stock

According to the 2017 American Community Survey, Otsego County has 14,858 housing units with 9,880 occupied housing units and 4,978 vacant housing units (Table 3-7). Bagley Township has the most housing units at 3,238 with Otsego Lake Township following with 2,318 units. Otsego County has a relatively high percentage of seasonal housing units with Charlton Township having 61.2% of its housing units being considered seasonal. Communities with lakes, rivers and forestlands tend to have higher numbers of seasonal housing units and present challenges when mitigating hazards since their geographic location makes them more vulnerable to wildfire and flooding hazards.

Table 3-7 Housing Counts and Occupancy Status, 2017

Jurisdiction	Total Housing Units	Occupied Housing Units	Vacant Housing Units	Vacant Units (%)	Seasonal Housing Units	Seasonal Units (%)*
Otsego County	**14,858**	**9,880**	**4,978**	**33.5**	**4,496**	**30.3**
Bagley Township	3,238	2,210	1,028	31.7	907	28.0
Charlton Township	1,522	559	963	63.3	931	61.2
Chester Township	892	538	354	39.7	316	35.4
Corwith Township	1,090	736	354	32.5	306	28.1
Dover Township	337	197	140	41.5	108	32.0
Elmira Township	858	688	170	19.8	134	15.6
Hayes Township	1,666	1,041	625	37.5	589	35.4
Livingston Township	1,114	957	157	14.1	123	11.0
Otsego Lake Township	2,318	1,190	1,128	48.7	1,068	46.1
City of Gaylord	1,823	1,764	59	3.2	14	0.8
Village of Vanderbilt	269	235	34	12.6	14	5.2

* % of total housing
Source: US Census Bureau

According to the 2017 American Community Survey, the majority of Otsego County's housing units were built between 1970 and 1979 (3,558 units) (Table 3-8). There were 2,269 housing units built prior to 1960 (15.3% of the housing units) with 788 of those housing units built prior to 1940 (5.3% of the housing units). Generally, an older housing unit is more likely to need renovations. However, 32.7% of the housing units were built after 1990.

Table 3-8 Otsego County Housing Units		
Year Built	**Number of Housing Units**	**% of Total Housing Population**
2010 or later	273	1.8%
2000-2009	1557	10.5%
1990-1999	3029	20.4%
1980-1989	2415	16.3%
1970-1979	3558	23.9%
1960-1969	1757	11.8%
1950-1959	995	6.7%
1940-1949	486	3.3%
1939 or earlier	788	5.3%
Source: 2017 American Community Survey 5-Year Estimates		

Agriculture

According to the 2012 USDA Census of Agriculture, there were 180 farms with 32,293 acres of farmland in Otsego County (Table 3-9). The 2012 survey found the market value of products sold to be $7,065,000 with $6,044,000 in crop sales and $1,022,000 in livestock sales.

Table 3-9 Otsego County Agricultural Statistics	
Total cropland	14,295 acres
Total farm production expenses	$6,127,000
Organic Program certified farms	2 farms
Cropland transitioning to the Organic Program certified farm	1 farm
Revenue by vegetables, melons, potatoes, and sweet potatoes	$3,112,000
Revenue by fruits, nuts, and berries	$35,000
Corn for grain	1,080 acres
Wheat for grain	1,018 acres
Total livestock inventory	4,953 animals
Source: 2012 USDA Census of Agriculture	

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Chapter 4
Land Use Characteristics

Land Divisions and Ownership

The majority of land in Otsego County is privately owned with public lands located in the northeast and southern areas of the county (Figure 4-1). Since the land is privately-owned, Otsego County is managing its growth and development by directing more intense development to areas with adequate infrastructure.

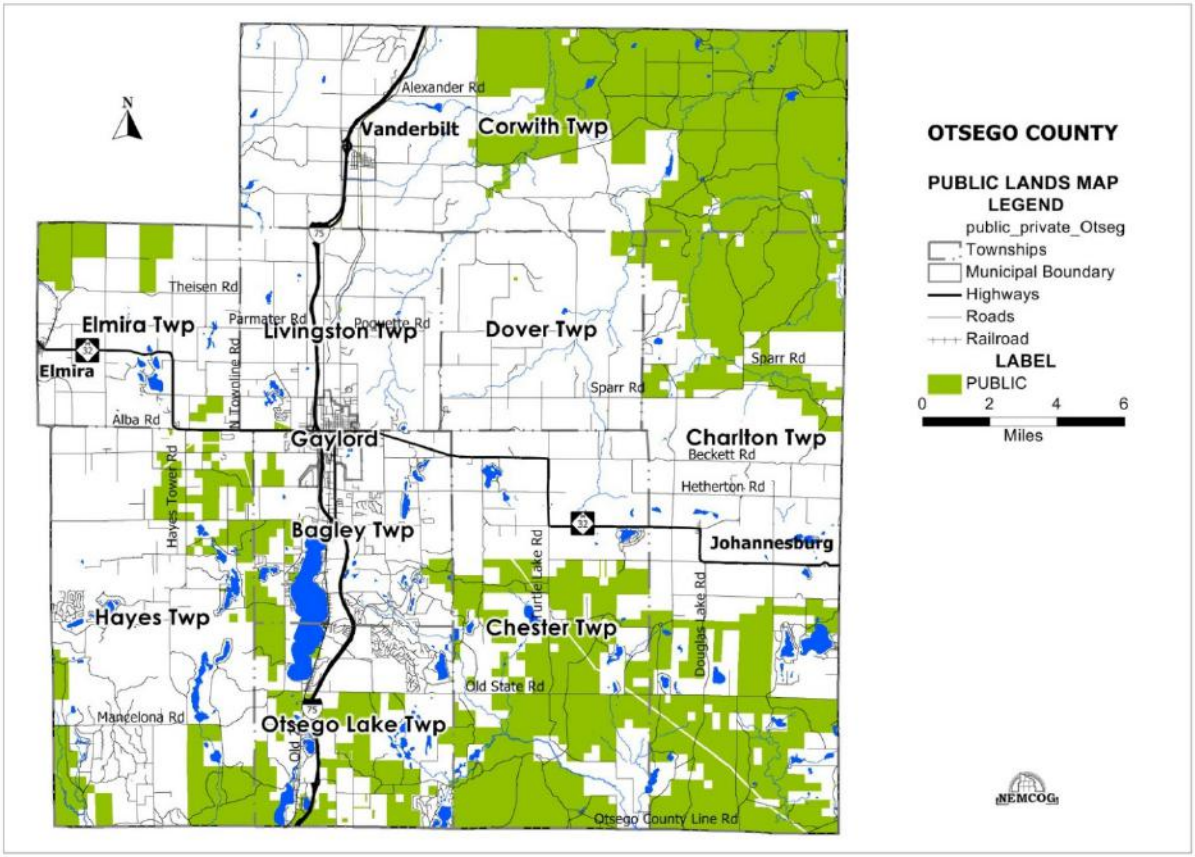

Figure 4-1 Otsego County Public Lands

In the early 1980's, the Michigan Department of Natural Resources compiled the Michigan Resource Information System (MIRIS) land cover/use data set from 1978 aerial photographs. In 1994, the land cover/use information was updated using 1987 aerial photography and field inspections (Figure 4-2). Urban/built-up categories were mapped to greater detail than during the 1978 land cover/use inventory to provide a better representation of various urban/built-up categories. Data from the 1994 update shows 68% of the county's 336,280 acres was forested, 7% was agriculture, 15% was non-forested, 2% was wetlands and 2% was water (Table 4-1). Nearly 6% was used for urban purposes, including commercial, industrial, institutional/recreational and residential.

Table 4-1 Otsego County Land Cover/Use		
Land Use Type	**Acres**	**Percent**
Forest	229,649	69.8%
Commercial	954	0.3%
Industrial	4,637	1.4%
Institutional/Recreational	3,504	1.1%
Wetlands	7,233	2.2%
Residential	10,396	3.2%
Agricultural	23,714.	7.2%
Non-Forest	49,106	14.9%
Source: 1994 data from Northeast Michigan Council of Governments.		

Land Cover/Use

Since 2014, there has been an expansion of urban development along M-32 and Old 27/I-75 Business Loop from the City of Gaylord.

Forest

Approximately 229,650 acres or 68 % of the County's land cover/use was classified in the forest and wetland category, making it the largest land use in Otsego County. The dominant upland forest species are aspen/white birch, oak (red and white), pine (jack, white and red) and northern hardwoods (sugar maple, American beech and basswood). Northern hardwood forests are concentrated within the farming areas. The aspen/birch, oak and pine forest lands are most prevalent in the northwestern and southern parts of the county. Upland forests are found in Corwith, Otsego Lake, Chester, Charlton, Elmira, Bagley, Hayes, Dover, and Livingston Townships. The Pigeon River Country Forest is found in the eastern portion of Corwith Township. Chester Township has large tracts of jack pine forests.

Wetlands

Approximately 7,233 acres or 2% of the county's land area was identified as wetlands. These wetland categories include shrub wetlands, fresh-water marshes, wet meadows, open bogs, emergent wetlands and aquatic bed wetlands. Nearly 8% of the county's land area was classified as lowland forest types and include lowland hardwoods (black ash, slippery elm and red maple) and lowland conifers (northern white cedar, black spruce and eastern tamarack). Lowland forests are found in Chester, Dover, and Charlton Townships. Forested and wetland information contained in the MIRIS data was not verified by field inspection when the data was compiled. Thus, areas shown as wetlands on the MIRIS system may not meet State and Federal criteria for legally regulated wetlands.

Agricultural Lands

Approximately 23,700 acres of land is classified as farmland in Otsego County. There is band of active farmlands that run easterly from Elmira between Vanderbilt and Gaylord and through the Johannesburg area (Charlton, Livingston, Chester, Hayes, Dover, and Elmira Townships). Predominant agricultural land uses are pastures, hay land and row cropping.

Non-Forested Uplands

Non-forested uplands, areas with grasses or shrubs, make up 15% of the county's land area (49,106 acres). Typical grass species include quack grass, Kentucky bluegrass, upland and lowland sedges, reed canary grass and clovers. Typical shrub species include blackberry and raspberry briars, dogwood, willow, sumac and tag alder. These areas were created from logging operations, abandoned or idle

farmlands, and wildfires. The majority of these areas are located in the active agricultural band that runs east-west through the central portion of the county. Non-forested Uplands are found in the Village of Vanderbilt, and Livingston, Chester, Corwith, Hayes, Bagley, and Otsego Lake Townships.

Residential

The majority of residential development in the county consists of single-family dwellings. However, single family duplexes, multi-family residential, condominiums, mobile homes and mobile home parks are also included in the residential category. Residential uses are concentrated in the community centers of Gaylord, Waters, Vanderbilt, Johannesburg and Elmira. Bagley and Corwith Townships have residential areas. Other concentrations of residential development can be found in resort/recreation developments, such as Michaywe (Otsego Lake Township) and Guthrie Lakes (Otsego Lake Township).

Residential/condominium developments are being proposed for several of the recreation/golf resorts. Many of the larger lakes (e.g., Otsego Lake (Bagley Township), Bear Lake (Charlton Township), Five Lakes (Livingston Township), Guthrie Lake (Otsego Lake Township) and Buhl Lake (Hayes Township)) have high concentrations of residential development along the lakeshores and in subdivisions adjacent to the lakes. These once seasonal/weekend residential developments are undergoing a transition to year-round residences. Residential development is also occurring along county roads as larger parcels are split into ten acre and smaller parcels.

Commercial

Commercial land uses include primary/central business districts, shopping centers/malls, and secondary/neighborhood business districts, including commercial strip development. The 1994 land use inventory identified 955 acres in commercial use. Commercial facilities are found primarily in the City of Gaylord along M-32 west and Old 27/I-75 Business Loop south to Otsego Lake. Waters, Vanderbilt, Johannesburg, and Elmira have some additional commercial facilities with limited services. Bagley Township has light commercial areas.

Industrial/Transportation

This land use category includes industrial and extractive development, transportation, oil and gas, communication and utility facilities. This category makes up 1% (4,638 acres) of the county's land use. The majority of the industrial development is located near the main community centers (City of Gaylord). However, oil and gas development (e.g., wells, major transmission lines and processing facilities) are located throughout the county. Bagley Township has industrial areas.

Institutional/Recreational

Land devoted to institutional and recreational purposes amounted to approximately 1% or about 3,505 acres of Otsego County. Land uses included in the institutional/recreational category are public parks and campgrounds, golf courses, schools, churches and public buildings. Golf courses are the largest land use in this category. Dover Township has small golf courses.

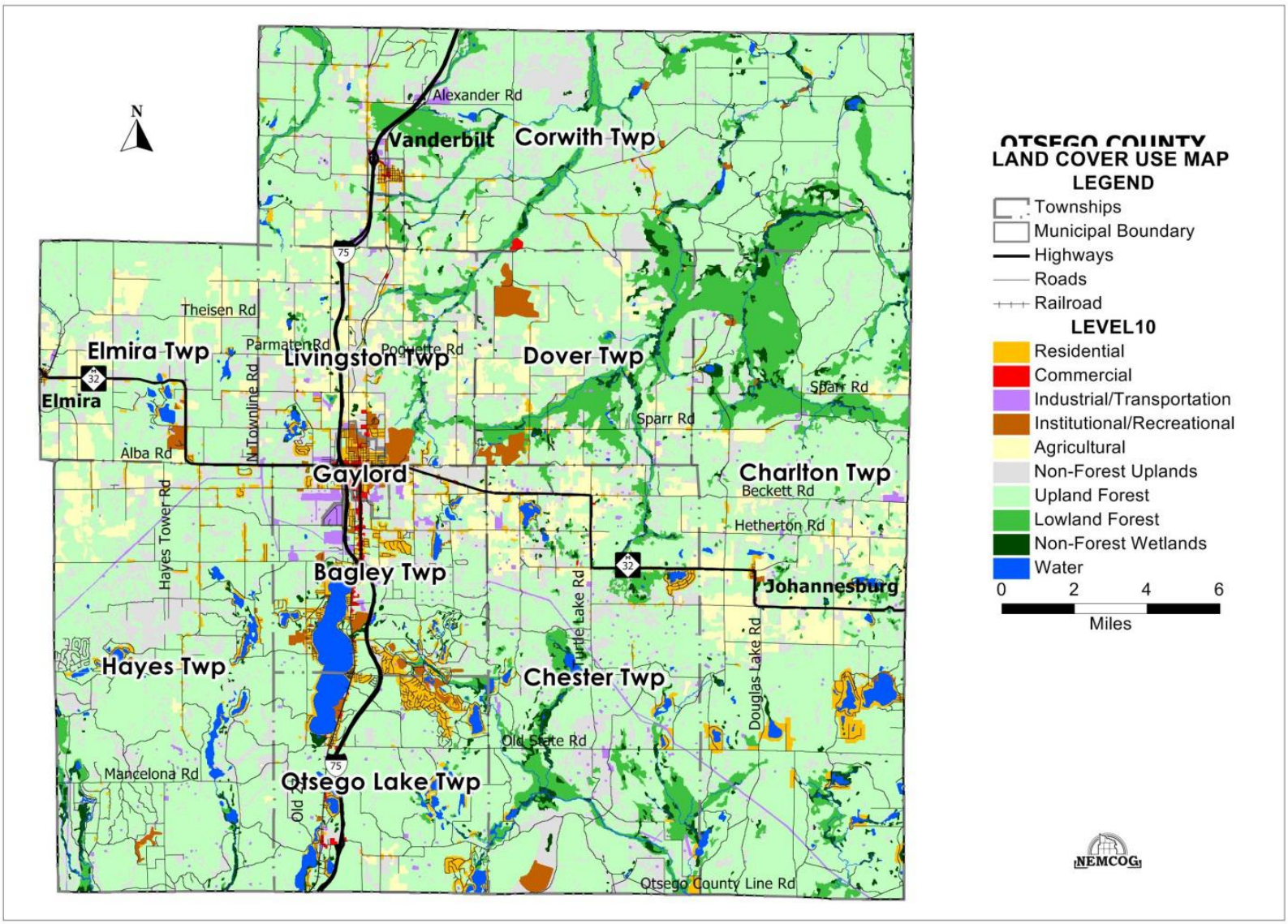

Figure 4-2 Otsego County Land Cover/Use

Chapter 5
Community Services and Facilities

Overview

Community services and facilities play an important role in maintaining and improving quality of life. The location and level of some services, such as public water, public wastewater, and fiber optic lines, determine the types and intensities of development within a community. These services may be sufficient for the needs of the current population; however, a hazard event may require the construction of new services and facilities. This construction is costly and is best avoided through prudent future planning. The majority of the population and infrastructure of Otsego County is located in and around the City of Gaylord and Bagley Township (Figure 5-1).

County Government

The Otsego County Board of Commissioners meets on the second and fourth Tuesday of each month, unless posted otherwise, at the Otsego County Building at 225 W. Main in Gaylord. The county is represented by nine commissioners. There are a number of county departments including clerk, register of deeds, administrator, treasurer, equalization, courts, building, land use services and bus systems.

Township Government

- Bagley Township located at 2946 Old 27, S. and P.O. Box 52, Gaylord
- Charlton Township located at 10900 E. M-32 Box 367, Johannesburg
- Chester Township located at 1737 Big Lake Rd., Gaylord
- Corwith Township located at 8170 Mill St., Vanderbilt
- Dover Township located at 2985 Marquardt Rd., Gaylord
- Elmira Township located at 2035 Mt. Jack Rd., Elmira
- Hayes Township located at M-32 and Hayes Tower Rd, Gaylord
- Livingston Township located at 3218 N. Old 27, Gaylord
- Otsego Lake Township located at S. Old-27, Waters

Village and City Governments

City of Gaylord, 305 Main St., Gaylord
Village of Vanderbilt, 606 Garfield St, Vanderbilt

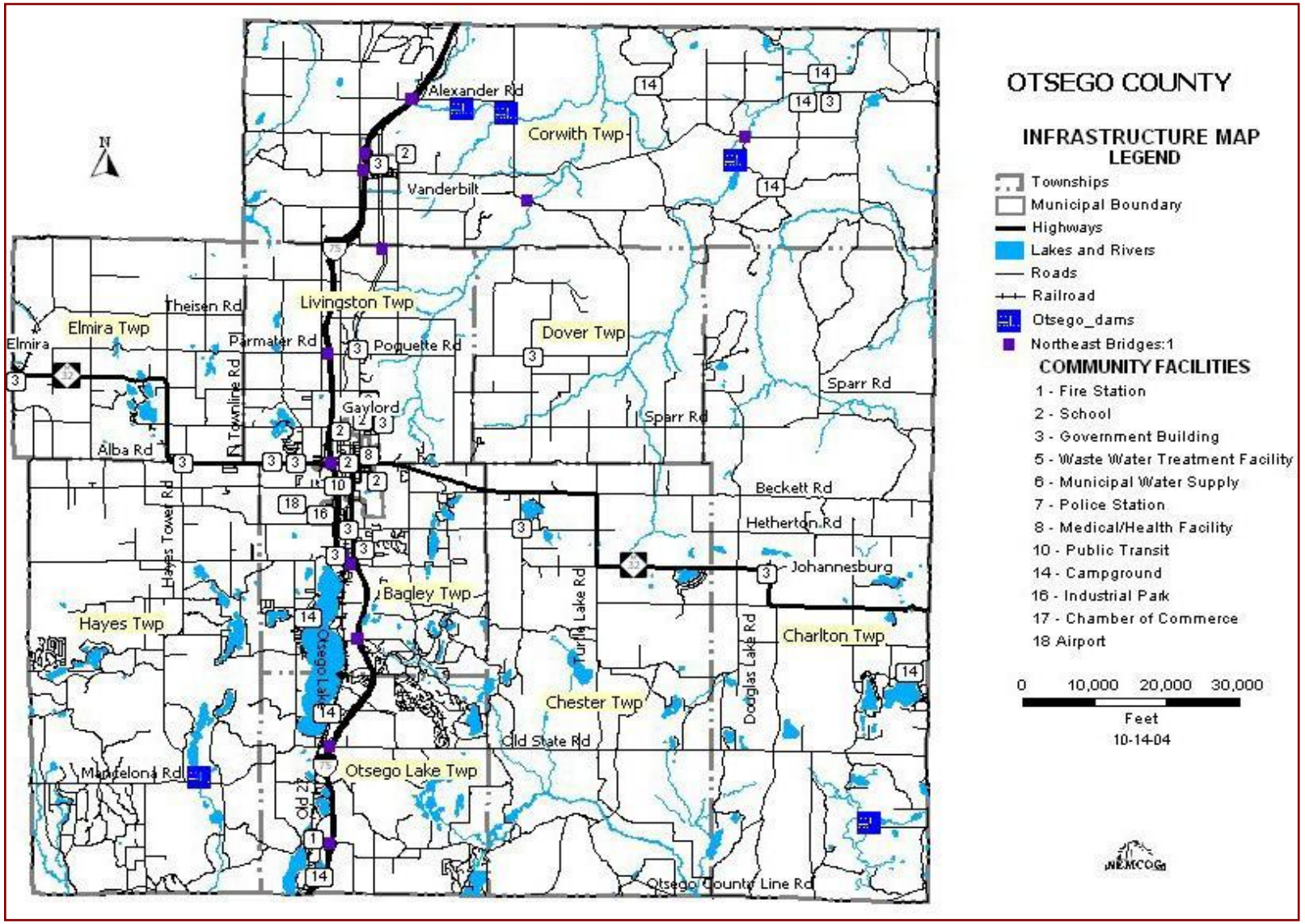

Figure 5-1 Otsego County Community Facilities

Public Safety

Law Enforcement

The Otsego County Sheriff's Department patrols all sections of the county outside of the City of Gaylord and is located at 124 S. Court St. in Gaylord. The Gaylord Police Department patrols within the City of Gaylord and is located at 305 E. Main St.in Gaylord. The Gaylord post of the Michigan State Police #73 works with the sheriff's department and Gaylord police department in patrolling I-75 and major county roads. The Gaylord Post is located at 563 S. Otsego in Gaylord and serves Otsego, Cheboygan, Antrim, and Charlevoix Counties. The county's 911 Emergency Service Department is located at 580 S. Otsego Ave. in Gaylord. The Otsego County Jail is located in Gaylord and provides jail/lock-up facilities for the sheriff's department, Gaylord police department, and Michigan State Police.

Emergency Medical Services

The Otsego County EMS/Rescue provides emergency medical services to the entire county and is located at 100 McLouth in Gaylord. Air Ambulance is provided by Aero-North Flight and can be activated by any medical authority (e.g., hospitals, physicians, EMS providers, etc.).

Fire Services:

Otsego County has six fire departments:

- **Charlton Township Fire Department**
  - Volunteer fire department
  - Covering 181 square miles
  - Provides fire protection for approximately 800 residents

- **Elmira-Warner Fire Department**
  - A partially paid fire department
  - Covering 72 square miles
  - Provides fire protection for approximately 1,900 residents

- **Otsego County Fire Department**
  - A partially paid fire department
  - Covering 265 square miles
  - Provides fire protection for approximately 10,564 residents

- **Vanderbilt-Corwith Fire Department**
  - A partially paid fire department
  - Covering 108 square miles
  - Provides fire protection for approximately 2,000 residents

- **Otsego Lake Township Fire Department**
  - A partially paid fire department
  - Covering 50 square miles
  - Provides fire protection for approximately 2,000 residents

- **Michigan DNR Gaylord Forest Area**

Early Warning Systems

In the event of an emergent situation, the county has established a Reverse 9-1-1 system to be used to contact people and businesses within the county. The county is determining where the warning system coverage gaps are located to promote the expansion of the warning system.

Medical Facilities & Human Services

Munson Medical Center-Otsego Memorial Hospital is located at 825 N. Center St. in Gaylord. It provides a wide range of medical services including emergency and extended care facilities, surgery and intensive care units, medical laboratory services, the Otsego Health Center and a walk-in clinic.

Additional health-related services are provided by Northwest Community Health, the County Family Independence Agency, and Northern Michigan Substance Abuse Services.

Region 7 Healthcare Coalition

Region 7 Healthcare Coalition covers Alpena, Crawford, Montmorency, Otsego, and Presque Isle Counties. Some of the coalition's responsibilities include functioning as the regional resource for hospitals and medical control authorities, coordinating efforts to develop a comprehensive all-hazards medical preparedness plan, and coordinating efforts to enhance the medical system and its services.

To activate the Region 7 Medical Coordination Center:

- Dial 1-989-732-5141
- During your call include your name and contact number, your agency or hospital, the reason for requesting the resource, the exact location where you need the resource delivered, and who will accept and sign for the resource.

Utility Services

The county's utility system includes the publicly owned and operated water and sewer systems in Gaylord and the private suppliers of electricity, natural gas, telephone service, solid waste disposal and television services. The private suppliers provide services to a relatively low density, dispersed population.

Electricity

Consumers Energy and Great Lakes Energy distribute electricity in the county. Over the past ten years, electrical service has rapidly expanded, and this expansion is expected to continue to grow as Otsego County's population and business community continue to increase. Currently, there are no known problems with expanding the service to new users and meeting future demands.

Telephone Service

Spectrum and Frontier provide telephone service throughout the county. Numerous providers provide cellular phone service. However, cellular phone service can be spotty in undeveloped parts of the county.

Natural Gas

DTE Energy provides natural gas to portions of the county. Gas is supplied to Waters, Gaylord, and Vanderbilt by a pipeline that generally follows I-75. Private suppliers provide bottled gas that is used for heating and cooling in areas of the county that do not have access to the natural gas line.

Water and Sewer System

Gaylord's water and sewer system serves the City of Gaylord and developed areas immediately adjacent to the city in the north and east. Residents and business owners in the remainder of the county must rely on on-site private wells for domestic drinking water and private on-site septic systems for wastewater disposal. Northwest Michigan Community Health Agency regulates and maintains a permitting system for private wells and septic systems and is located at 95 Livingston Blvd. in Gaylord.

Schools

Otsego County residents are served by three school districts and several private parochial schools (Table 5-1, Table 5-2). The Johannesburg-Lewiston School District includes the southeast section of the county along with portions of Montmorency County. The Vanderbilt District includes the northern portion of the county along with sections of Charlevoix and Cheboygan Counties. The Gaylord Community Schools District serves the remainder of the County, including Elmira and portions of Antrim County. St. Mary's School provides private parochial school facilities for students in kindergarten through twelfth grade. The Otsego Christian School provides parochial school facilities for students in preschool to eighth grade. Calvary Baptist Academy provides parochial school facilities for students in kindergarten to fourth grade and in twelfth grade. Grace Baptist Christian School provides parochial school facilities to students in preschool through twelfth grade. Information is not readily available for the number of students receiving home schooling.

Table 5-1 Otsego County Public Schools

School	Location	Grades	2018-2019 Enrollment
Gaylord High School/Voc. Building	90 Livingston Blvd., Gaylord	9-12	1025
Gaylord Middle School	600 E. 5th St., Gaylord	7-8	450
Gaylord Intermediate School	240 E. 4th St., Gaylord	4-6	697
North Ohio Elementary School	912 North Ohio Ave, Gaylord	K-3	418
South Maple Elementary School	650 E. 5th St., Gaylord	K-3	448
Gaylord Virtual Instruction Program	615 S. Elm St., Gaylord	Alt. Ed.	16
Johannesburg-Lewiston High School	10854 M-32, Johannesburg	9-12	359
Johannesburg –Lewiston Elementary Middle School	10854 M-32, Johannesburg	K-8	338
Vanderbilt Area School	947 Donovan St., Vanderbilt	K-12	80

Source: Michigan Educational Directory

Table 5-2 Otsego County Private Schools

School	Location	Grades	2018-2019 Enrollment
St. Mary Elementary School	321 N. Otsego Ave., Gaylord	K-6	217
St. Mary High School	310 W. Mitchell St., Gaylord	7-12	100
Calvary Baptist Academy	225 S. Wisconsin, Gaylord	K-4, 12	28
Grace Baptist Christian School	232 S Townline Gaylord	P-12	30
Otsego Christian School	1377 M-32 Gaylord	P-8	78

Source: Michigan Educational Directory

Transportation Network

The major roads that run north-south through Otsego County are Interstate 75 and Old 27. Interstate 75 provides easy access to the southern portion of the State and to the Upper Peninsula. There are four interchanges within the county that are located along Old 27 in Waters, at Old 27 north of Otsego Lake, at M-32 in Gaylord, and at Vanderbilt. I-75 travels through Corwith, Bagley, and Livingston Townships, the Village of Vanderbilt, and the City of Gaylord. Old 27 runs north south and serves as a scenic alternate route through the central portion of the county. It connects Gaylord, Vanderbilt, Bagley and Livingston Townships, and Cheboygan County to the north and Otsego Lake, Waters and Crawford County to the south.

The major road that runs east-west through the county is M-32. It provides access to the City of Gaylord, Johannesburg (Charlton Township), and Elmira Township within the county. M-32 also connects Otsego County with the shorelines of Lake Michigan and Lake Huron and the population centers in Alpena and Traverse City.

The County's secondary road system includes C-38 running east-west through the southern sections of the county, C-42 and C-44 through the center of the county, and C-48 connecting the northwest portion of the county with Charlevoix County. Several other counties maintained, paved roads link outlying sections of the county with the major road network. In addition, the county has an extensive system of dirt and gravel roads that provide access to the lakes and forestlands for recreational activities and oil and gas exploration.

Public Transit and Rail Service

Public transportation is provided by the Otsego County Bus System, which is located at 1254 Energy Drive in Gaylord. This is a dial-a-ride/demand response bus system that provides transportation services throughout the entire county. The bus system is supported by a combination of funds from the Michigan Department of Transportation, federal funding, a local 1/4 mil property tax levy and user fees.

The Lake State Railway moves aggregate, limestone, coal, grain, and chemical products on rail lines leased from the Detroit & Mackinac Railroad. The railway's line goes through Bay City, West Branch, Grayling, and ends in Gaylord. Connections can be made via other rail lines to any destination served by rail. Vanderbilt and areas north of Vanderbilt to the bridge do not have available rail service.

Gaylord Regional Airport

The County operates a general aviation airport located southwest of Gaylord at 1100 Aero Drive in Bagley Township. Currently, services at the airport support the needs of private and charter aircraft. These services include refueling, service and repairs, flight training, and rental cars. The airport has an Instrument Landing System (ILS), which is a ground-based instrument approach system that provides precision guidance to an aircraft approaching and landing on a runway.

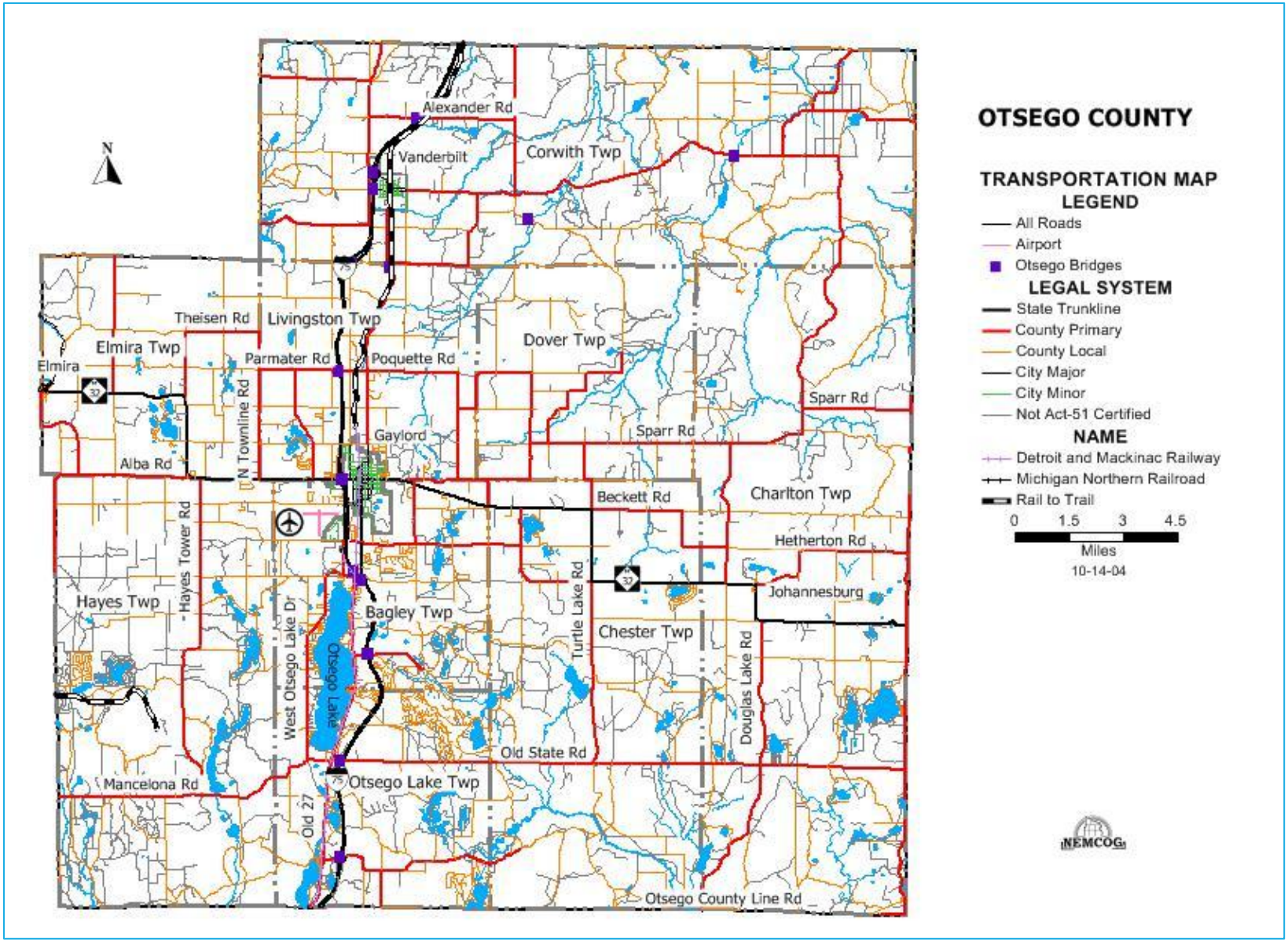

Figure 5-2 Otsego County Transportation Network

Community Capability

Overview

Currently, the communities in Otsego County have the capability to implement the hazard mitigation action and implementation strategies. The communities will 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. However, current budget constraints do not allow the communities to hire more staff.

Planning and Zoning

Planning and zoning is administered at the county level in Otsego County and covers all unincorporated communities. The county adopted a master plan in 2015 and the county's zoning ordinance was adopted in 1975 and was amended in 2019 to regulate the land use for all county townships. The City of Gaylord and the Village of Vanderbilt also administer their own planning and zoning. The county, city and village have a zoning administrator, a planning commission, and a zoning board of appeals. The planning commissions are responsible for overseeing the planning and zoning activities, such as the master plan, recreation plan, and zoning ordinance. Most of the townships have planning commissions and have developed their own master plans; however, the townships fall under county zoning. The county board, Township Boards and municipal councils are the governing bodies responsible for managing finances and making policy decisions. Otsego County has planning and zoning staff. The Townships rely on elected officials to conduct township business.

Planning and Zoning are the principal tools used by local communities to manage growth, preserve community character, direct development away from hazardous areas, protect property values, enhance economic viability, and provide developers with the flexibility to arrange structures on properties and incorporate Firewise development standards into their designs. Since planning and zoning are not retroactive, they have minimal effect on older developments. Additionally, they have the potential to create public controversy, variance requests, and zoning modifications. However, planning and zoning are used to establish and implement a community's goals and desired future. Building codes can work with and against planning and zoning since the codes provide guidance on how to build in both compatible and incompatible land use areas.

The master plan analyzes the existing conditions of a community, incorporates public input, and generates goals to establish the community's desired future. It includes a section on the future land use of the community, which is designed to guide land use decisions over time. The future land use section contains information about the future land use categories, important resource areas in need of protection, special issue areas (e.g., utility service areas, waterfront development, roads, etc.), compatible and incompatible land uses, and a map that depicts the development types and densities envisioned by the community. Zoning, capital improvement plans, and recreation plans implement the master plan.

Zoning ordinances and zoning maps are local laws that regulate how property can be developed and are primarily used by communities to implement their master plans through the regulation of development types, intensity and location. Communities can use zoning to implement hazard mitigation strategies for land use development, such as developing standards for private/public road construction, driveway standards, and creating development requirements.

Capital improvement plans guide communities' major public expenditures for the next five years. These expenditures include creating access roads and fire breaks, retrofitting existing public structures against wildfires, and reducing wildfire fuels. Capital improvement plans can be used to create a project timeline to implement hazard mitigation strategies.

Public Safety

Otsego County has an Emergency Management Office and Local Emergency Planning Committee. The County operates a countywide 911 system. The Sheriff's Department operates under the County Board of Commissioners. The City of Gaylord has both fire and police departments.

All townships provide fire and rescue services either on their own or under a cooperative agreement.

Infrastructure

Otsego County's elected drain commissioner works with communities and landowners regarding drainage and flooding issues. The City of Gaylord has a Public Works Department. The County Road Commission works in conjunction with the townships to manage the local road network outside of the incorporated communities, while the Michigan Department of Transportation is responsible for State and Federal highways.

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Chapter 6
Hazard Identification and Assessments

Overview

Otsego 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.

Otsego 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 to guide emergency management official(s) in setting annual priorities and goals for resource allocation, mitigation strategies, and preparedness techniques.

There have been 255 natural hazard events reported to the National Oceanic and Atmospheric Administration's National Centers for Environmental Information data center (NOAA) between October 1963 and April 2019 in Otsego County. Damages from these natural storm events are estimated to be approximately $3.3 million.

Natural Hazards

Ice and Sleet Storms

Description

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

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

Location
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 Otsego County is at risk to the occurrence and impacts from ice and sleet storms.

Previous Occurrences and Probability of Future Occurrences
According to NOAA, Otsego County has had three reported ice storm events between 2001 and 2019 (one in 2001, one in 2005, and one in 2008). The events did not have any deaths, injuries, or property and crop damages. Since three events have occurred in the past 19 years, approximately one event would occur every 6.3 years. However, this statistic does not accurately estimate the probability of occurrence since it does not take into account the events occurred at the beginning of the range. Additionally, 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 Otsego 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, loss of life, and infrastructure failure. Lake-effect snow occurs when the cold air from the high latitudes of North America move across the warm Great Lakes. The heat and moisture from the Great Lakes rises into the cold air where it cools and condenses into snow clouds. The prevailing wind direction and inland-moving snow clouds determine which areas will receive lake-effect snow.

According to the *2019 Michigan Hazard Analysis,* Michigan has 360 snowstorms with 0.1 average annual deaths, 0.1 average annual injuries, and $1.9 million in average annual property and crop damage. Michigan experiences large differences in snowfall over short distances due to the Great Lakes. The average annual snowfall accumulation ranges from 30 to 200 inches with the highest accumulations in the northern and western parts of the Upper Peninsula. In Lower Michigan, the highest snowfall accumulations occur near Lake Michigan and in the higher elevations of northern Lower Michigan. For example, the average snowfall ranges from 141 inches in the Gaylord area to 96 inches in the Atlanta area in the northeast region of the Lower Peninsula.

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 Otsego County is at risk for the occurrence and impacts from snowstorms. Otsego County experiences lake-effect snow with white out conditions dependent on the wind flow. The northwest section of Otsego County has the highest risk of lake-effect snow from west-northwest flow situations with the southern and central portions of the county at a high risk (Figure 6-1). The western edge of Otsego County is at highest risk of lake-effect snow from northwest flow situations with the central portion of the county at high risk (Figure 6-1). The northwest corner of Otsego County is at high risk for lake-effect snow from west flow situations (Figure 6-1).

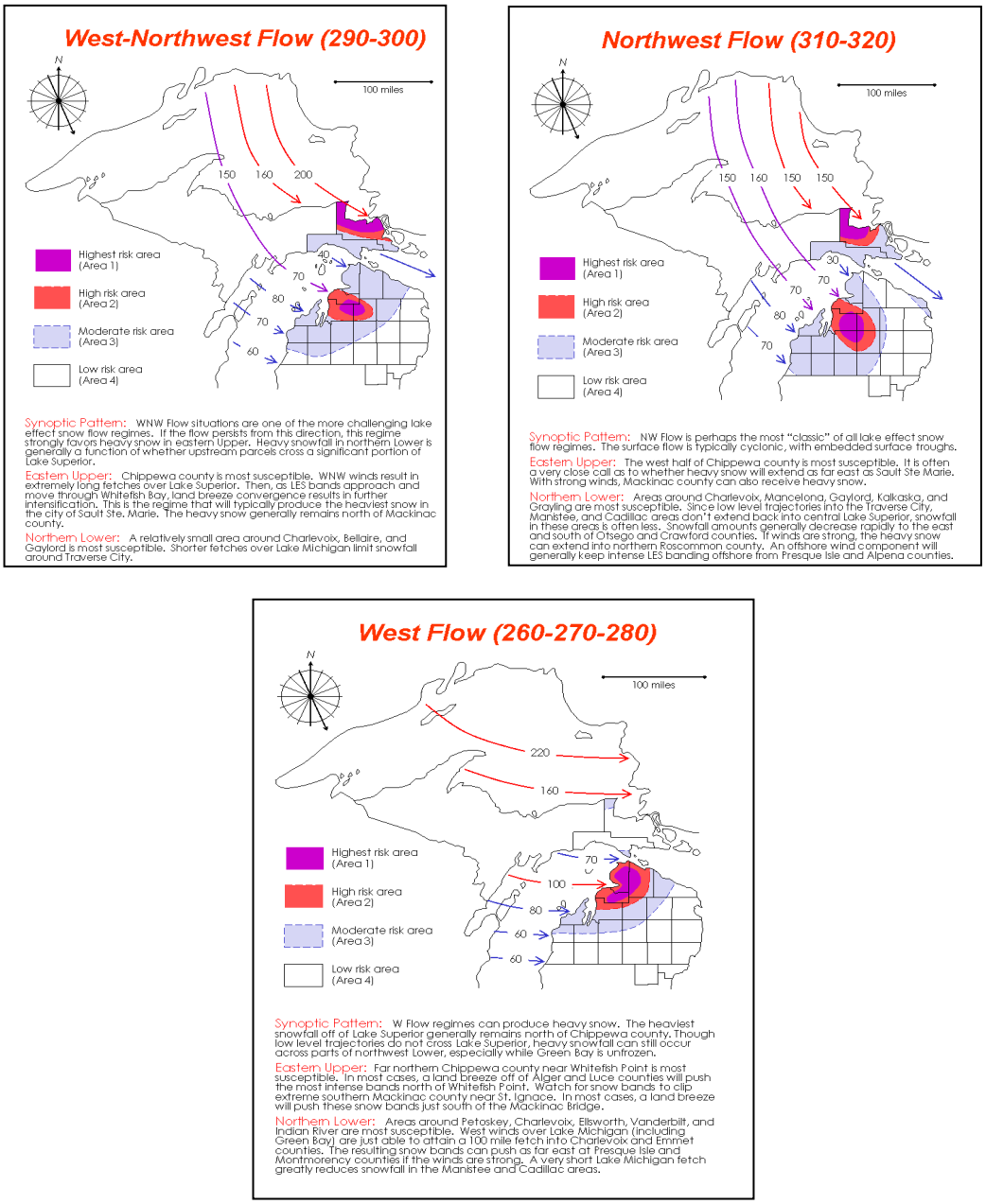

Figure 6-1 Lake-Effect Snow Vulnerability
Source: NOAA, Gaylord, Michigan

Previous Occurrences and Probability of Future Occurrences

Since 1996, there have been 120 winter storm events, including heavy snow, lake-effect snow, blizzards, winter weather, and winter storms reported in Otsego County. The events did not have any deaths, injuries, or crop damage. In January 1999, Otsego County received a Presidential Emergency Declaration for a snowstorm and blizzard. Property damage ranged between $2,000 to $215,000. This data shows approximately one event will occur every 0.2 years though it should be noted that winter weather hazards fluctuate between years and have a rapid onset in the county. Table 6-1 shows the frequency of severe winter weather events from 1993-2018.

Extent

Extent can be measured by the cost of property damages. The property damage caused by snowstorms in Otsego County ranged between $2,000 and $215,000. On November 13, 2003, a winter storm caused $15,000 in property damages. The winds from the storm downed many trees and power lines, which caused power outages that lasted up to four days in some areas. A utility company in northwest Lower Michigan described it as the worst windstorm in 20 years. On March 1, 2007, a winter storm event with heavy snowfall caused $20,000 in property damages. Trees were downed in the Gaylord area that damaged a home. Power lines were downed from the winds and heavy snow. Schools closed early on the first and remained closed through the second. On November 27, 2007, a winter storm event caused $2,000 in property damages. Trees and power lines were downed. On March 2, 2012, a heavy snow event caused $215,000 in property damages. The weight of the snow downed many trees and power lines, which caused power outages that lasted up to a week in some areas. Great Lakes Energy described it as the worst snowstorm in 30 years in regard to power outages. Many counties and communities opened shelters to aid those without power or heat. In Corwith Township, the weight of the snow caused the roof of the former township hall to collapse. On December 20, 2012, a winter storm with heavy snow caused $85,000 in property damages. Gaylord received the highest recorded snow accumulation between 18-20 inches. The storm downed trees and power lines that resulted in power outages that lasted up to five

Table 6-1 Frequency of Severe Winter Weather Events, 1993-2018

Year	Number of Events
1993	7
1994	4
1995	1
1996	1
1997	8
1998	6
1999	4
2000	2
2001	3
2002	4
2003	7
2004	9
2005	6
2006	8
2007	7
2008	9
2009	4
2010	4
2011	5
2012	4
2013	5
2014	5
2015	1
2016	5
2017	1
2018	4

Source: National Centers for Environmental Information

Green: 1, 2, or 3 events
Yellow: 4, 5, or 6 events
Red: 7, 8, or 9 events

days in some areas. People were unable to travel due to blowing and drifting snow. Extent can also be measured based on snowfall accumulations. The average annual snowfall in Otsego County is 143.3 inches with the highest recorded snowfall at 207 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 attributed to extreme heat according to the *2019 Michigan Hazard Analysis.* 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 disease 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 1 death, 9.4 average annual injuries, and $6.4 million in average annual property and crop damage. Extreme cold affects transportation modes and power utilities, resulting in dead vehicle batteries and loss of power/heat.

Measuring Extreme Temperatures (Extreme Heat and Extreme Cold)
Extreme heat is measured with the National Weather Service's Heat Index Chart (Figure 6-2). 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 Wind Chill Index, which is a measure of the rate of heat loss from exposed skin caused by the combined effects of wind and cold. As the wind increases, heat is carried away from the body and reduces the external and internal body temperatures. Figure 6-3 shows the NOAA Wind Chill Chart as it corresponds to various temperatures and wind speeds.

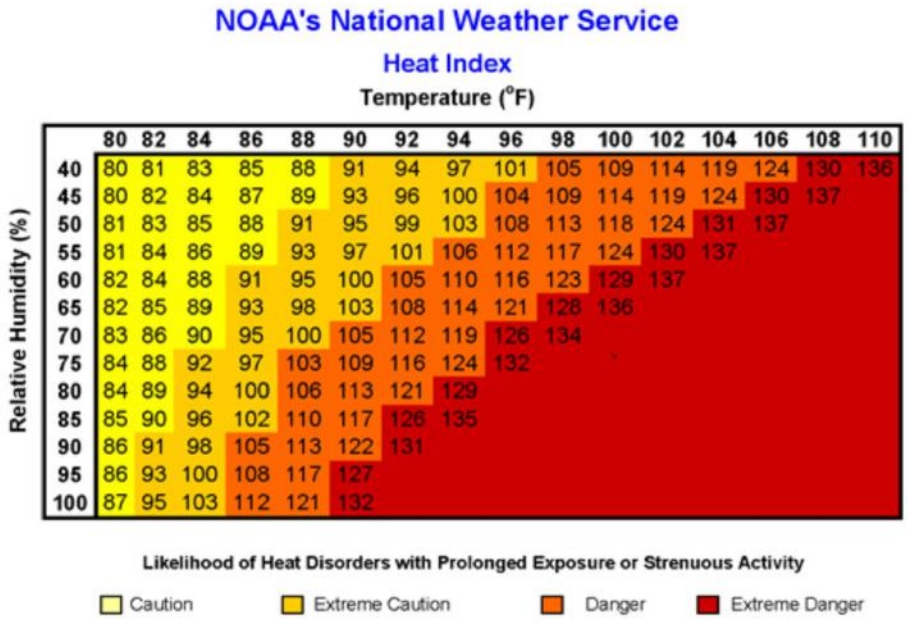

Figure 6-2 National Weather Service Heat Index

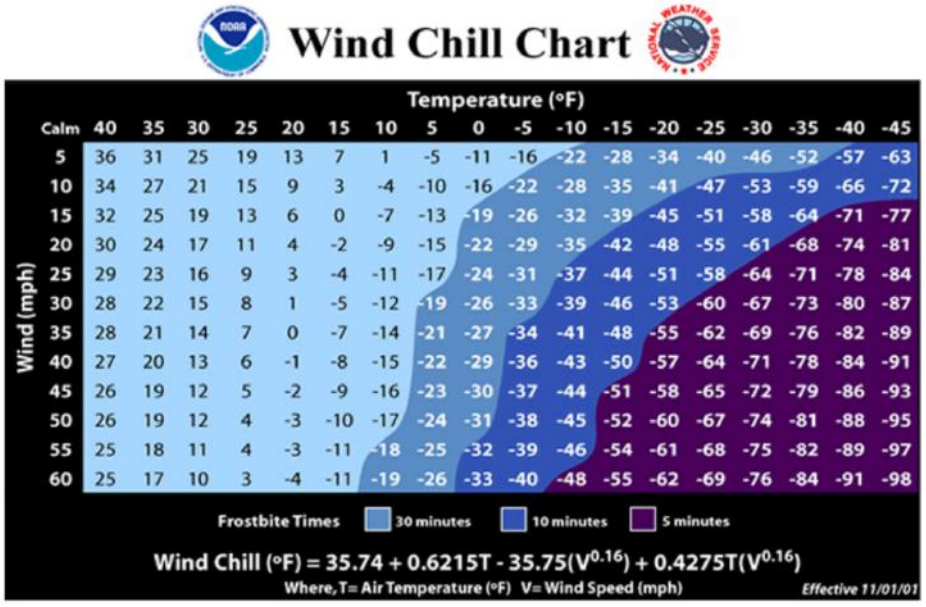

Figure 6-3 Wind Chill Chart

Location
Extreme temperatures are a regional event that are not confined to geographic boundaries and range in severity across the affected areas. All of Otsego 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 6-4 shows the average maximum temperatures and extreme maximum temperatures in Otsego County between 1893 and 2020 from the Western Regional Climate Center, Gaylord, MI Station (203096). Figure 6-5 shows the average minimum temperatures and extreme minimum temperatures in Otsego County between 1893 and 2020 from the Western Regional Climate Center, Gaylord, MI Station (203096).

Otsego 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 and attendance at outdoor events to be lower than normal. County fairs sent animals home, yet there were livestock losses at fairs in Otsego and Alcona Counties. Since there have been two extreme heat events in Otsego County in the last 18 years, approximately one extreme heat event would occur every 9 years.

Between 2007 and 2019, there have been three extreme cold/windchill events reported in Otsego County. The events did not have any deaths, injuries, or property/crop damages. The low temperatures caused schools to close. However, since cold temperatures typically occur during winter months 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 Otsego County in the last 13 years, approximately one extreme cold event would occur every 4.3 years.

Extent
Extreme heat temperatures can be defined by record highs and the National Weather Service Heat Index. On July 30, 1916, the highest recorded temperature was 101 degrees Fahrenheit in Gaylord, Michigan. This temperature correlates to danger and extreme danger of having a heat disorder from prolonged exposure or strenuous activity (Figure 6-2). However, it should be noted that hotter events are possible. In Otsego County, the City of Gaylord has the potential to produce a heat island effect since the city 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 January 6, 1912, the lowest recorded temperature was -39 degrees Fahrenheit in Gaylord, Michigan. This temperature correlates to frostbite exposure of 5-30 minutes (Figure 6-3). However, it should be noted that colder events are possible.

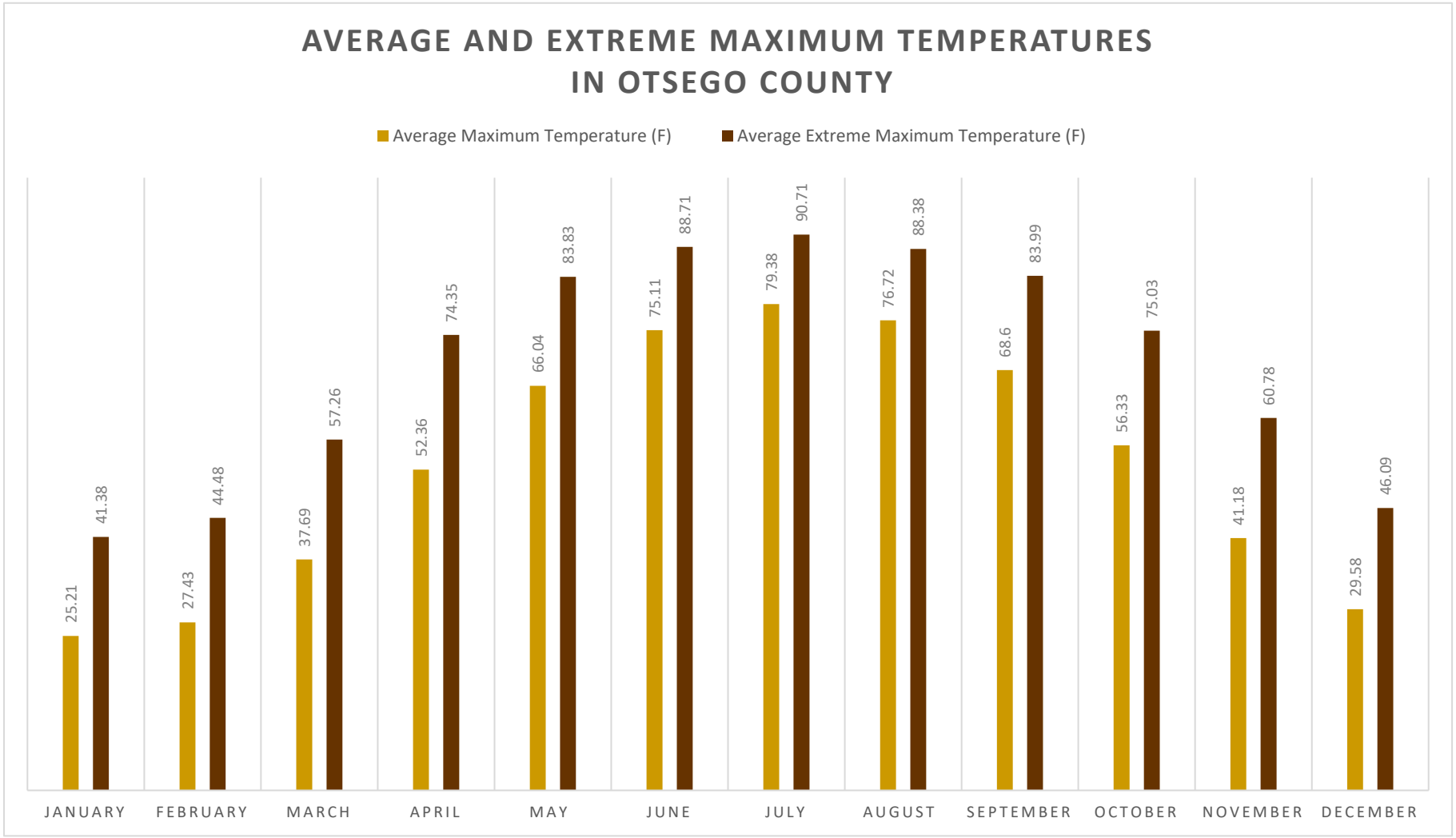

Figure 6-4 Average and Extreme Maximum Temperatures

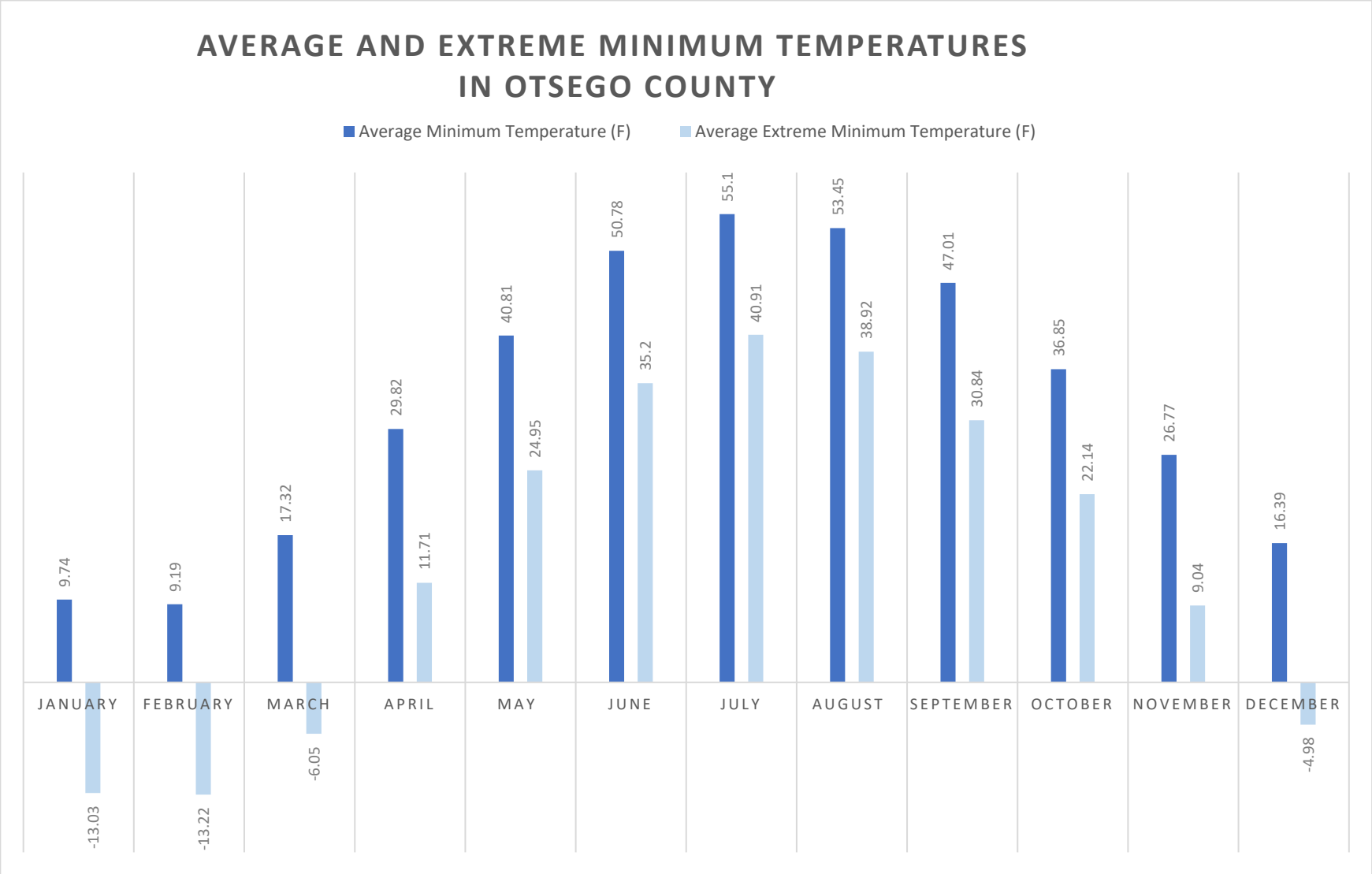

Figure 6-5 Average and Extreme Minimum Temperatures

Vulnerability Assessment
All of Otsego 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.

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 forests have a high risk for wildfires, while oak and white pine forests have a moderate risk. The primary cause of wildfires is from human activities, specifically burning outdoor debris. Wildfires destroy property and timber resources, and cause injuries or loss of life to both wildlife and people. Long-term effects include scorched and barren land, soil erosion, landslides/mudflows, water sedimentation, and loss of recreational opportunities.

Firewise is a cooperative effort between federal, state, and private agencies and organizations to promote fire safety in the wildland/urban interface. The program addresses the wildfire risk homes have in the wildland/urban interface and encourages landowners to prepare for wildfires with Firewise approved housing locations, design, building, and renovation guidelines, and landscaping and maintenance procedures

Historically, Michigan's landscape has been shaped by wildfire; however, over the last several decades, the landscape has transformed from wildland to residential development. With the increase in

residential development in wildfire prone areas, there is an increase in the potential for loss of life and property damage. Unfortunately, rural areas are not equipped with enough fire suppression forces to protect every structure from wildfires.

In Michigan, approximately 600 wildfires are reported each year with the majority occurring in April, May and June. The Michigan DNR is primarily responsible for wildfire suppression and prevention; however, the U.S. Forest Service and local fire departments assist them. In 2018, the Michigan DNR reported there were 301 fires in Michigan. In northeastern Michigan, the large number of homes and the increase in tourists during the driest (most vulnerable) times of the year greatly increase wildfire risks.

Location

According to the U.S. Forest Service, approximately 80% of Otsego County's land area is varying forest types depending on the soils, moisture, and past land use activities (e.g., logging, land clearing, previous wildfires, etc.). The most prevalent forest types are Aspen and Maple/Beech. Approximately 19 % of the county's forested land is a combination of jack pine and oak/hickory forests that are perpetuated by wildfires (Figure 6-6). A review of the pre-settlement vegetation for Otsego County shows that wildfire prone areas are located in the southeast portion of the county with the most vulnerable areas being located in the state forests in Charlton and Chester Townships. The townships have a combined acreage of 115,200 acres that include residential development around lakes. These townships have a year-round population of 2,646 (approximately 15 persons/square mile) and about 1,168 seasonal housing units. Also, many high-use recreational areas are located within wildfire prone areas. Additionally, wildfires can cross geographic and political boundaries, which means fires can spread to Crawford, Cheboygan, Montmorency, Oscoda, Charlevoix, and Antrim Counties.

Previous Occurrences and Probability of Future Occurrences

From 2001 to 2012, the Michigan DNR reported there were 231 wildfires in Otsego County that burned 329 acres (not including wildfires suppressed by the U.S. Forest Service or local fire departments) (Figure 6-7). According to the Michigan DNR Wildland Fire Interactive Map, Otsego County has had 85 wildland fire incidents between 2013 and 2018 that burned 73.6 acres. Since Otsego County has had 316 fires in the past 18 years, the data shows approximately one event will occur every 0.05 years.

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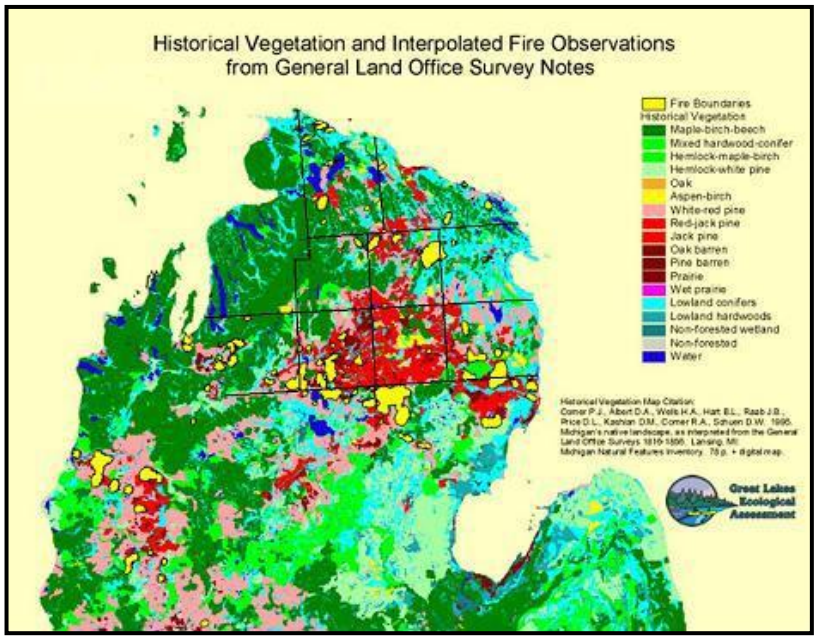

Figure 6-6 Historic Vegetation and Fire Observations

Extent
Extent can be measured by the number of acres burned and the cost of property damage. Wildfires in Otsego County tend to be caused by debris burns, equipment, and campfires. These fires range from 0.1 to 11.3 acres burned.

Vulnerability Assessment
All of the county's existing and future buildings and populations are at-risk to wildfires. Additionally, neighboring counties are also at-risk since wildfires can spread across political boundaries. About 19% of the county is composed of jack pine (pyrophytic plants) and oak/hickory forest types. 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.).

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 miles per hour are considered to be a derecho. Severe windstorms can cause damage to homes and businesses, power lines, trees and agricultural crops, and may require temporary sheltering of individuals without power for extended periods of time. Generally, the more densely populated an urbanized area is, the greater the human and property risks are.

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 lakeshores 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 miles per hour when in conjunction with a storm front according to the Michigan Department of State Police's *Local Hazard Mitigation Planning Workbook*.

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 Otsego County, specifically the City of Gaylord, the storm had wind speeds up to 80-100 miles per hour, rain, 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 Emergency Declaration was granted to the county, to provide state assistance in the debris cleanup effort.

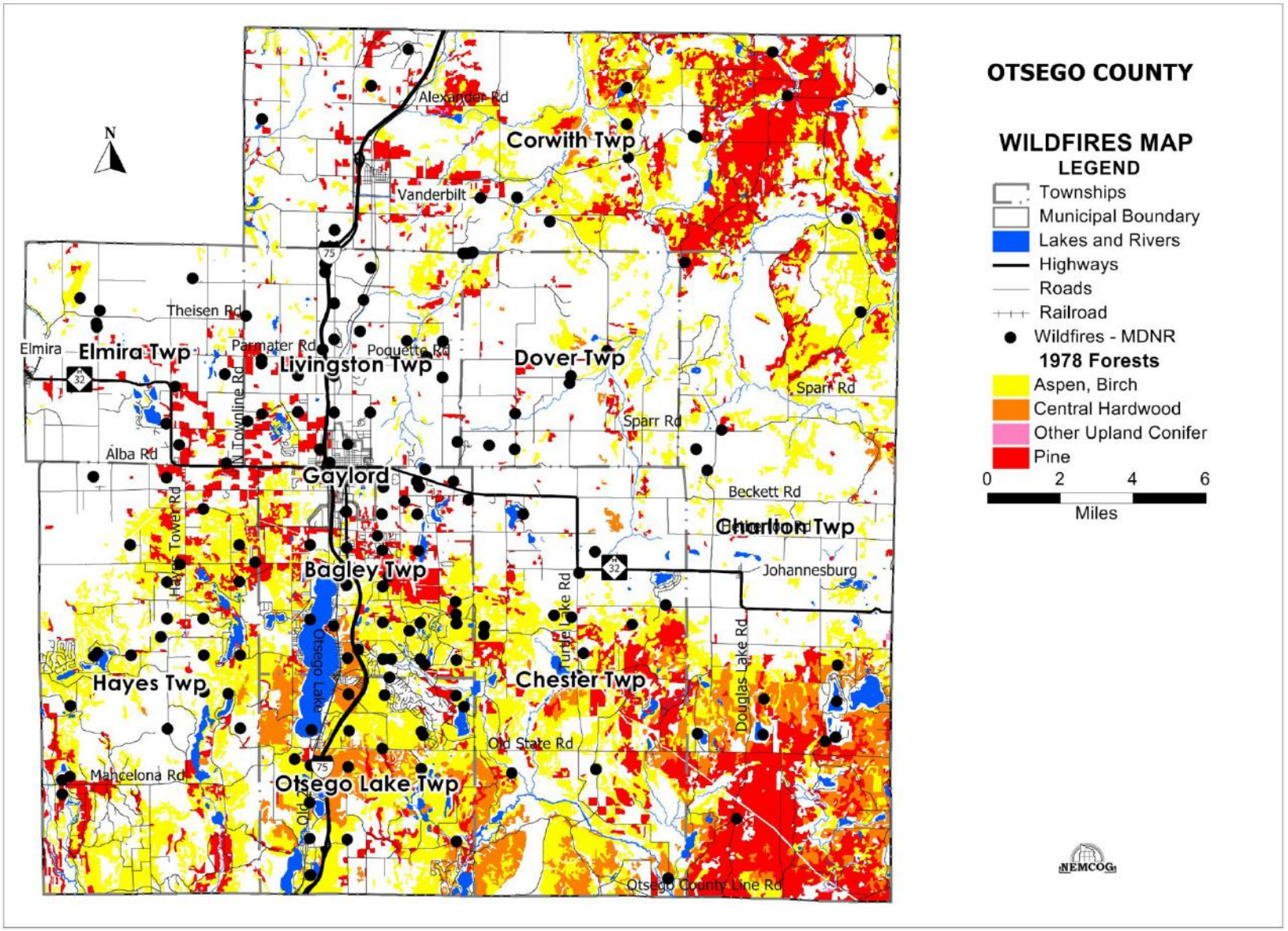

Figure 6-7 Otsego County Wildfires

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 1 death, several injuries, and over 500,000 people 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. It 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 one-half of Saginaw Bay's bed was dried up. As the wind died down, the water level rose in the Saginaw Bay.

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 Otsego 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 Otsego County, Michigan,* thunderstorms occur about 35 days each year. Since 1963, there have been 71 high wind and thunderstorm wind events reported to NOAA in the county, with the majority of events occurring in the summer. The events did not have any deaths or crop damage. Property damages ranged between $500 and $1.2 million. The costliest windstorm

occurred on August 28, 2018 when thunderstorm winds reached 70 mph and caused one injury, $1.2 million in property damages, and power outages. One person was taken to the hospital after a tree landed on their home. The damage extended west-southwest to east of Gaylord and was concentrated along Van Tyle Road between Hayes Tower Road and Dickerson Road. Trees were snapped off or uprooted, several buildings and vehicles were damaged by falling trees, two homes were destroyed, and the roof of a small business on the west side of Gaylord was partially removed. On September 4, 2014, a severe windstorm reached wind speeds of 78 mph in Otsego County that caused $295,000 in property damages. Widespread tree damage (trees falling on vehicles and homes) and spotty structural damage occurred in southern Otsego County east of Waters with some residential areas becoming inaccessible for many hours after the event until the downed trees were cleared off the roads. A carport in Waters was blown a considerable distance. Since there have been 71 high wind and thunderstorm wind events reported in the last 57 years, the data shows approximately one event would occur every 0.8 years.

Extent
Winds are measured by wind speed and the amount of damage. The most severe windstorm in Otsego County occurred on September 4, 2014 with windspeeds up to 78 mph. The event did not have any deaths, injuries, or crop damage. It had $295,000 in property damages. An event on August 28, 2018 had 70 mph hour winds that caused $1.2 million in property damages. 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. 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.

Lightning

Description
Lightning is a discharge of electricity 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. Lightning that occurs without nearby rain is most likely to cause forest fires.

The *2019 Michigan Hazard Analysis* compiled the following statistics from the National Oceanic and Atmospheric Administration (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 the annual lightning damage to property exceeds $4.5 billion in the United States.

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 on average, lightning damages more structures, and kills and injures more people in the U.S. per year than tornadoes or hurricanes.

Michigan's lightning deaths and injuries are fairly consistent with the national trends in terms of location of deadly or injury-causing strikes (Table 6-3, Table 6-4). According to the National Weather Service's 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 6-3 Michigan Lightning Related Deaths, 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 6-4 Michigan Lightning Related Injuries, 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 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 Otsego County is at risk to the occurrence and impacts from lightning.

Previous Occurrences and Probability of Future Occurrences

According to NOAA, Otsego County has had four lightning events between 1998 and 2019. The events did not have any deaths, injuries, or crop damage. On June 10, 1999, a lightning event caused $3,000 in

property damages when three horses and one pony were killed when lightning struck the tree they were standing under. On July 22, 2009, a lightning event caused $500,000 in property damages when a lightning strike ignited a rapidly spreading fire that destroyed the Alpine Haus apartment complex. All residents were safely evacuated, but 52 people were left homeless. Based on this data, the county would have approximately one event would occur every 5.5 years. However, this statistic does not accurately estimate the probability of occurrence since it does not take into account that the events occurred at the beginning of the range. Additionally, it should be noted that 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 Otsego 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. The event on June 10, 1999, had $3,000 in property damages, and no deaths or injuries. The event on July 22, 2009, had $500,000 in property damages, and no injuries or deaths.

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.

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 and 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, tornados are most likely to occur in 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 6-5). 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 6-5).

Table 6-5 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 Otsego 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 1969 and 2014, Otsego County has had four reported tornadoes, which caused $501,000 in property damages (Table 6-6). No deaths, injuries, or crop damage occurred as a result of these tornadoes. The most destructive tornado touched down on July 3, 1974 and caused $250,000 in property damages. Since four events have occurred in the last 51 years, approximately one event would occur every 12.75 years. The data shows that Otsego Lake Township is most at risk for a tornado.

Table 6-6 Tornado Event

Date	Time	Jurisdiction	F-Scale (Fujita and Enhanced Fujita Scales)	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
7/11/1969	2330 CST	Otsego Lake Township	-	0	0	$25,000	$0
7/3/1974	2030 CST	Elmira Township	F3	0	0	$250,000	$0
11/17/2013	1627 EST-5	Otsego Lake Township	EF0	0	0	$11,000	$0
9/1/2014	1342 EST-5	Charlton Township	EF1	0	0	$215,000	$0

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

Extent

Based on the Fujita Scale, Otsego County's most intense tornado occurred in Elmira Township with winds ranging from 158-206 mph. The tornado did not have any deaths, injuries, or crop damage. It had $250,000 in property damages. Based on the Enhanced Fujita Scale, Otsego County's most intense tornado occurred in Charlton Township with wind speeds between 86-110 mph (peak winds were

estimated at 110 mph). This tornado did not have any deaths, injuries, or crop damage. It caused $215,000 in property damages when the tornado carved a path across southeast Otsego County. A large number of hardwood and softwood trees were downed with several falling on area residences. Future tornadoes may have greater wind speeds.

Vulnerability Assessment
All of Otsego 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.

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 that tornadoes are most likely to form.

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

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

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

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

Previous Occurrences and Probability of Future Occurrences
Between April 1993 and April 2019, Otsego County had 46 hailstorms reported to NOAA, with the largest size of hail recorded at two inches. These events did not have any deaths, injuries, or crop damage. The most destructive hailstorm occurred on May 26, 2018 and caused $5,000 in damages. The storm had hail recorded at 1.25 inches. On April 24, 1993, Otsego County experienced two-inch hail with no deaths, injuries, or property/crop damages. Since Otsego County has had 46 events in the past 27 years, approximately one event will occur every 0.6 years. It should be noted that hailstorm events and damages may not have been reported to NOAA, which means the number of events and damages may be higher.

Extent
The greatest extent of hail reported in Otsego County was two 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 tennis ball and can cause roof damage, serious injuries, pitting of brick walls, and denting of the bodywork on grounded aircraft.

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.

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 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 economic-related 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 USDA 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. Otsego County has one atlas station that maintains PDSI information. The station shows Otsego County's coastal and inland areas are currently experiencing a moderate wet period (Figure 6-8).

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.

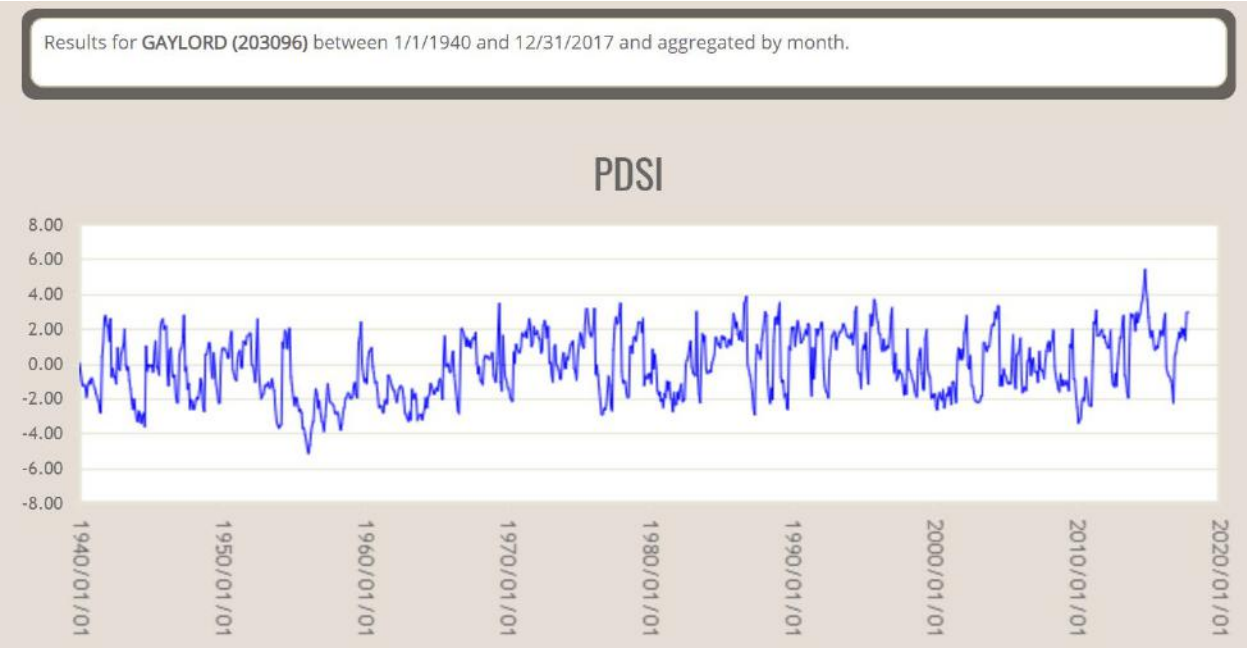

Figure 6-8 Palmer Drought Severity Index for Gaylord
Source: The National Drought Mitigation Center's Drought Risk Atlas

Location

A drought is a regional event that is not confined to geographic boundaries and can affect several areas at one time. Also, the severity of the drought may range across the affected areas. All of Otsego County is at risk to drought occurrence and impacts. There are active farms that are located in Charlton, Livingston, Chester, Hayes, Dover, and Elmira 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. Otsego County's average annual precipitation is 19.18 inches, and its average annual snowfall is 143.3 inches.

In Michigan, droughts are monitored and analyzed through its ten climate divisions. According to the *2019 Michigan Hazard Analysis,* Otsego County is part of Climate Division 4, along with Alcona, Alpena, Cheboygan, Crawford, Iosco, Montmorency, Ogemaw, Oscoda, 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).

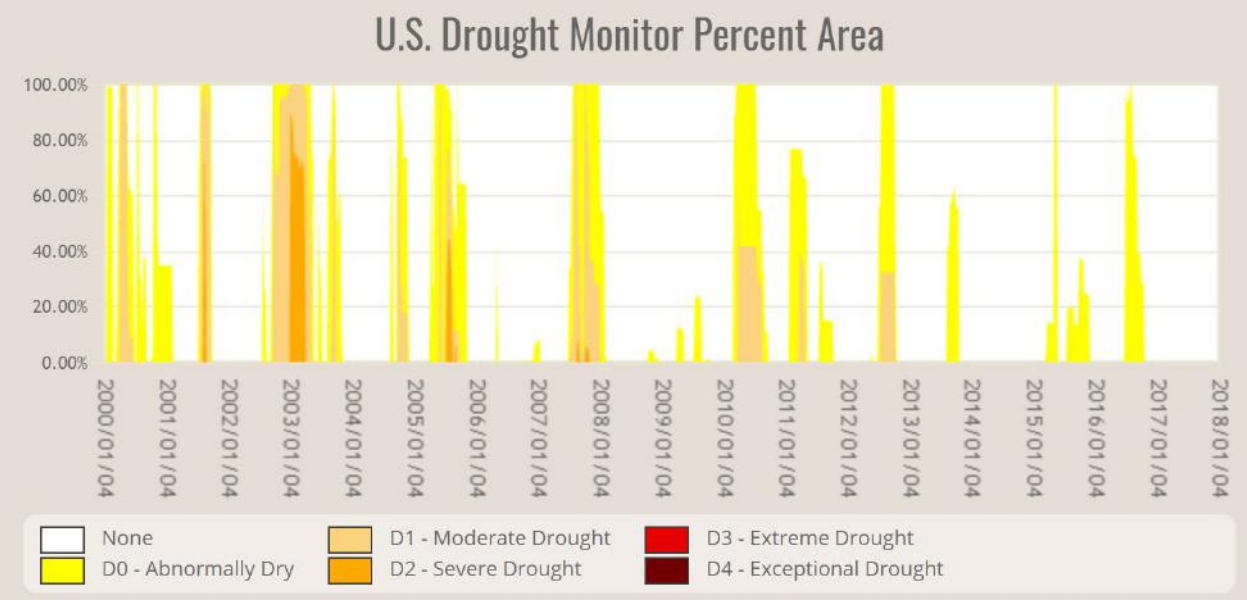

Figure 6-9 U.S. Drought Monitor Percent Area for Climate Division
Source: The National Drought Mitigation Center's Drought Risk Atlas

On March 2, 1977, Otsego 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, Otsego 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.

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 Otsego County, potential impacts from extended drought are an increase in wildfires, a reduction in timber production, decreased watercraft access to large inland lakes, and the loss of tourism. Drought conditions that increase the risk for wildfires may 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 7.2% of the county's land. Farms may see an increase in production expenses.

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 can occur year-round. 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 it does not have a place to go. This flooding occurs from a combination of excessive rainfall, snowmelt, saturated ground, and inadequate drainage, and is becoming more common in Michigan. Since development is occurring in floodplains, the natural landscape is unable to properly disperse the water. Urban flooding also has the potential to overflow onto docks or other structures with electricity running to them, which increases the risk for an electric shock drowning. Additionally, storm and sanitary sewers are unable to handle the water flows associated with storm events. For example, during 2019 in Bagley Township, Irma Avenue was flooded from water flowing from the Otsego Lake inlet and seasonal rains due to a failed drain tile that was installed during the 1950s.

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 has not developed flood insurance maps for Otsego County. Riverine and urban flooding events have not been documented in Otsego County. Figure 6-11 shows the location of the county's water resources and wetlands. Generally, the wetlands show where the floodplains are located and the wetlands function to prevent flooding by storing water. County soil maps show small areas of flood prone soils within the county (Figure 2-3).

Previous Occurrences and Probability of Future Occurrences

According to NOAA, Otsego County has had one flash flood reported between 1950 and 2019. The flash flood occurred on July 21, 2003 at 12:32 pm. The National Weather Service office in Gaylord picked up 2.63 inches of rain in about 45 minutes, which caused basement flooding in the Lakes of the North area, and significant shoulder damage to Mancelona Road between Passeheim Road and West Otsego Lake Drive. This event did not have any deaths, injuries, or crop damage, but it had $3,000 in property damages. According to the *2019 Michigan Hazard Analysis,* Otsego County has had one flood event with $203,000 in property damages. Based on NOAA's data, approximately one flooding event would occur every 17 years. The probability for a future event cannot be determined based on the *2019 Michigan Hazard Analysis* since the date of the event is not included in the document. It should be noted that there may be a lack of reporting on flooding events, which means the number of flood events may be higher. Additionally, the number of events may increase due to the changing climate conditions.

Extent

Flood extent can be measured by the amount of property damage. The *2019 Michigan Hazard Analysis* reports one event in the county with $203,000 of property damages. Unfortunately, specific information is unavailable (date, description of event, etc.). A flash flood in July 2003 caused $3,000 in property damages. 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 lack of flood events in the county may also be attributable to the county's wetlands assisting in flood prevention 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. These buildings 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. Otsego County is researching and evaluating strategies to address floodplain management in its Zoning Ordinance.

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.

According to the FEMA Community Status Book Report for Michigan, Otsego County does not participate in the National Flood Insurance Program and floodplain maps have not been developed for the county. After researching the program, the county decided not to participate. Otsego County does not have any participating communities in the NFIP program, which means the county does not have any FEMA repetitive loss structures.

Earthquake

Description
An earthquake usually occurs without warning when the earth suddenly starts shaking from the breaking and shifting of underground rock. Earthquakes range in intensity from slight tremors to great shocks and can last from a few seconds to several days. As of yet, scientists are not able to predict exactly when or where an earthquake will occur. However, earthquakes generally occur along faults. Casualties usually result from falling objects and debris. Earthquakes have the potential to contaminate water supplies, damage transportation systems, cause other hazards, and disrupt communication systems, electric power lines, and gas, sewer and water mains.

According to the USGS, Michigan has felt several mildly damaging earthquakes from the New Madrid Seismic Zone and upstate New York since the late 1700s. Unfortunately, the exact number is difficult to determine due to varying scientific opinion. Based on scientific studies, portions of southern Michigan could receive minor damage, such as damage to natural gas and petroleum pipelines, were such an earthquake to occur in the New Madrid Seismic Zone. If the earthquake occurs in the winter, many areas of the state could be severely impacted by fuel shortages. Damage would probably be negligible in well-designed and constructed buildings. However, poorly designed and constructed buildings could suffer considerable damage under the right circumstances.

Measuring Earthquakes
Earthquakes are measured by their magnitude (size of the earthquake) and intensity (effect of an earthquake on the Earth's surface). The U.S. Geological Survey (USGS) no longer uses the Richter scale to measure the magnitude of an earthquake. Instead, the USGS uses the Moment Magnitude scale since it provides more accurate estimates for a wider range of earthquakes than the Richter scale. In the United States, the Modified Mercalli Intensity scale is used to determine the intensity of an earthquake, which ranks observed effects on a scale ranging from I (not felt) to X (extreme).

Location
Michigan is not located in an area subject to major earthquake activity and has not had a severely destructive earthquake documented. Although there are fault lines in the bedrock in Michigan, such as the one running through Otsego County into Montmorency County and the one running through Otsego County into Crawford County, the fault lines are considered to be inactive. Unfortunately, these fault lines are poorly mapped according to the U.S. Geological Survey (USGS).

Previous Occurrences and Probability of Future Occurrences
In 2014, the USGS linked hydraulic gas fracturing with an increase in earthquakes in areas that did not previously have them. According to EGLE, there are over 12,000 wells that do hydraulic fracturing in Michigan, with the majority located in Otsego, Montmorency, Alpena, and Alcona Counties. Since the injections for wastewater drilling impact the risk of an earthquake, EGLE has procedures to locate injection wells away from faults. Otsego County is located in an area with less than 2%g (peak acceleration) and has a relatively low seismic risk. Since Otsego County has not had a previous occurrence of an earthquake, no further analysis will occur at this time.

Extent
Otsego County has not had previous occurrences of an earthquake. However, there is a potential of an earthquake due to hydraulic gas fracturing. To prevent this type of earthquakes, EGLE has established procedures to locate injection wells away from fault lines.

Vulnerability Assessment
If an earthquake occurs in the winter, many areas in the state could be severely impacted by fuel shortages. Damage would probably be negligible in well-designed and constructed buildings. However, poorly designed and constructed buildings could suffer considerable damage under the right circumstances.

Karst Sinkholes (subsidence)

Description
Depressions, cracks, and sinkholes in the ground surface pose an immediate threat to people and property. The sudden collapse of the ground surface to form depressions and sinkholes can take many days to a few years to develop and range from several days to years until the ground movements stabilize. Subsidence depressions may damage structures with low strain tolerances, such as dams, nuclear reactors, and utility infrastructure. The populations that are most at risk from this hazard would be located in industrial areas, residential areas that have been constructed overactive or abandoned mines that have underground cavities near the surface, and areas where extensive amounts of groundwater have been withdrawn.

In Northern Michigan, the most prevalent subsidence features are the Karst sinkholes. These sinkholes occur when the bedrock dissolves and the surface rock collapses into the cavity, which can cause tremors that may be reported as earthquakes. It takes several decades for new sinkholes to appear on the surface. Due to the moist terrain within the bedrock and the partially subterranean shaded location, the sinkholes host plant communities that are not found in the surrounding surface areas. The collapse of a sinkhole is a localized natural hazard and has the potential to expose groundwater to contamination across an extensive area

Location
Small, sinkhole lakes between 400 and 500 feet in diameter with a depth up to 100 feet are located in the northeastern portion of Otsego County.

Previous Occurrences and Probability of Future Occurrences
Sinkhole lakes were formed in the northeastern portion of the county in the past, but there has not been a recent karst sinkhole event reported in the last 15 years. It is difficult to determine an exact probability or predict the future occurrence of Karst sinkholes in the county since multiple factors, such as bedrock composition, precipitation, snowfall, and drainage rates, influence when a sinkhole occurs.

Extent
The collapse of a sinkhole is a localized natural hazard that takes several decades to appear. In Otsego County, sinkholes range in size up to 100 feet deep. The extent can be measured by the amount of damage caused by the collapse of ground. Unfortunately, data is not available to quantify damages.

Vulnerability Assessment
Historically, the karst sinkholes were used as dump sites and may still be used in that manner today, which can expose groundwater to rapid contamination. Groundwater contamination from agricultural byproducts, nitrates, infectious disease, septic systems, and sediments have been documented in karst sinkholes. Additionally, agricultural drainage from pastures, feedlots, bean, potato, corn, and small grain fields can enter the aquifers through karst produced swallow holes, sinkholes, and fractures. The populations most at risk from this hazard are located in the industrial areas, residential areas that have been constructed overactive or abandoned mines with underground cavities near the surface, and areas where extensive amounts of groundwater have been withdrawn.

Technological Hazards

Transportation Accidents (land/air/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 running through them, communities with commercial intercity passenger bus or local transit bus services, communities with school bus service, and communities with commercial marine passenger service 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, serving 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 Gaylord Regional Airport (Bagley Township). Land transportation accidents have a greater chance of occurring in the City of Gaylord, and Livingston, Bagley, and Otsego Lake Townships since M-32 and I-75 experience high traffic volumes because they provide routes to local businesses and tourist activities. Additionally, Old 27 bisects the county and has industrial and commercial development located along it.

Previous Occurrences and Probability of Future Occurrences

Otsego 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 airport. Land transportation accidents would primarily occur along the roadways and trail systems. Water transportation accidents would primarily occur on the headwaters of the Au Sable River (Chester Township), Black River (Corwith Township), Manistee River (Hayes Township), Otsego Lake (Bagley Township), Big Bear Lake, Pigeon River (Corwith and Dover Townships), Sturgeon River (Livingston and Corwith Townships), and Boyne River.

Extent

All of Otsego 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*, Otsego County has had seven fatal traffic crashes, 44 with serious injuries, and property damage only for 1,031 out of 1,300 traffic crashes. The average cost of a traffic crash casualty was $81,974 with the total traffic crash cost for all 1,300 accidents equaling $106,566,120. Unfortunately, data is unavailable to quantify the extent of air and water transportation accidents. The extent can also be measured by the number of vehicles travelling on the roads and the destinations that generate traffic. There are between 12,877 and14,942 vehicles on I-75, between 3,305-29,323 vehicles on M-32, and between 8,226 and 15,902 vehicles on business loop I-75 according to the 2017 Annual Average Daily Traffic. Areas that generate this traffic include an industrial/commercial development off Dickerson Road, an industrial/commercial development at the I-75 interchange near Waters, the City of Gaylord, Vanderbilt, the University Center of Gaylord, and commercial development along M-32 west, and Old 27/I-75 Business Loop north and south. Traffic is also generated from residential developments.

Vulnerability Assessment

Otsego County does not have passenger rail service or commercial marine passenger service. However, the county has a commercial airport, an intercity bus service, school bus transportation, and a

specialized public transit service 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 existing and future buildings, infrastructure, or population. In the past few decades, Otsego County has experienced an increase in residential, commercial, and industrial areas, specifically around the City of Gaylord. 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 could reduce emergency response times.

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 by-product hydrogen sulfide from production wells or from a pipeline that causes property damage, environmental contamination, injuries, and 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 exist. 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 the soil and water.

In addition, 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 between .03 ppm and 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 cause death. 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 to sour gas well response.

Location

Oil and gas wells are located throughout the entire county (Figure 6-10).

Previous Occurrences and Probability of Future Occurrences

On June 7, 1994, a maintenance crew at a site of a West Bay Exploration Company gas well intentionally released hydrogen sulfide in Otsego County. The gas filled a nearby home and injured a husband and wife. They suffered from severe burning of the eyes, difficulty breathing, and disorientation. The wife was unable to continue working after the incident. There may be other incidents that have occurred but have not been reported dependent on less severe injuries or harm.

Extent
Oil and gas wells and pipelines are located throughout Otsego County. According to the EGLE, Otsego County had 4,640 oil and gas wells with 191 active, 999 plugging approved, 3,294 producing and 156 temporarily abandoned in 2017. There are buried pipelines that connect each well to processing facilities in the county and many of these wells are located in wildfire prone areas.

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.

Structural Fire

Description
Structural 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 being 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 structural 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. In 2017, the U.S. Fire Administration reported that Michigan reported 3.7 deaths and 15.6 injuries per 1,000 fires through the National Fire Incident Reporting System (NFIRS).

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

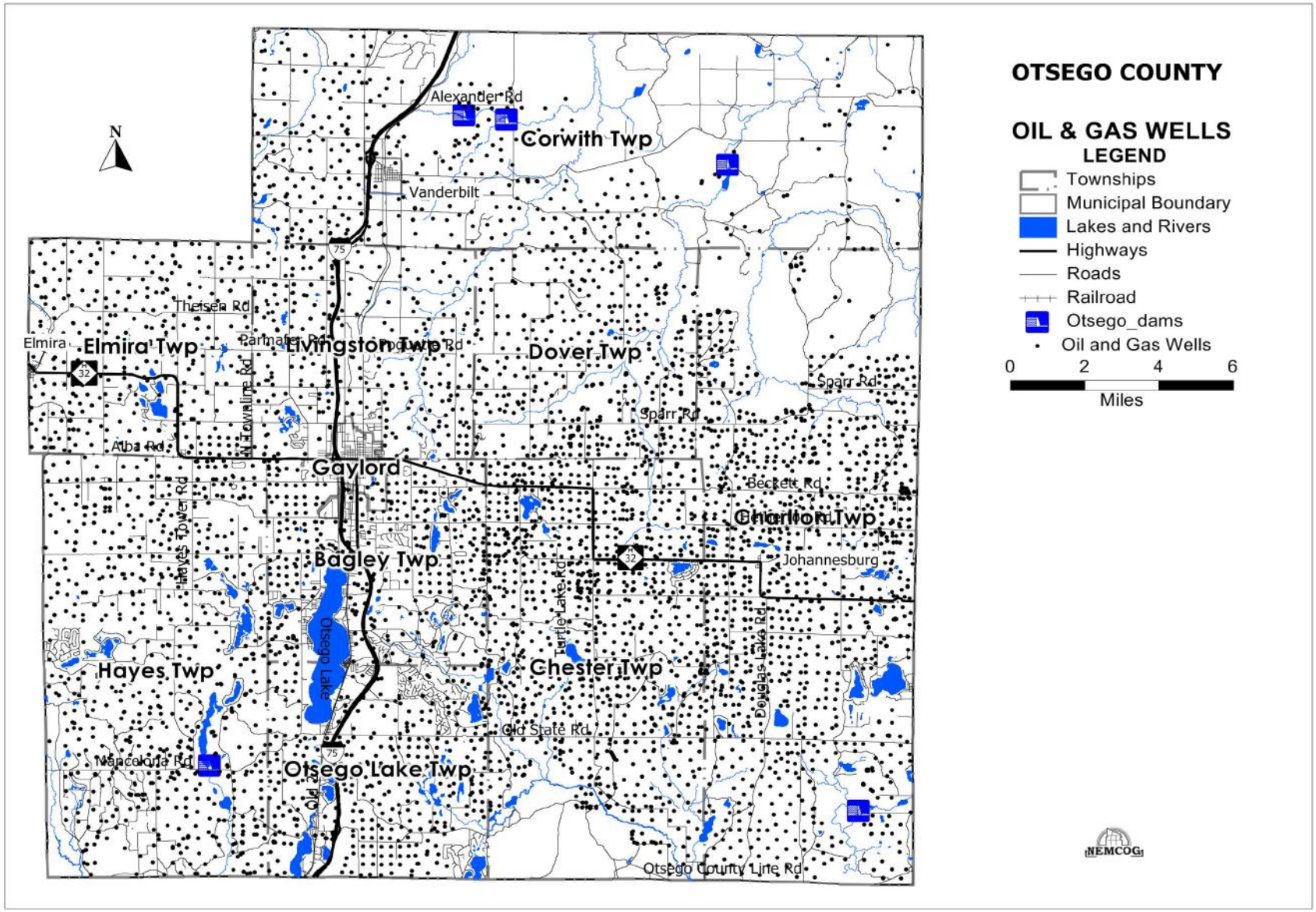

Figure 6-10 Otsego County Oil and Gas Wells

Previous Occurrences and Probability of Future Occurrences
In 2003, there were 79 fires reported in Otsego County with a total property damage amount of $926,300. In 2018, Otsego County received 80 fire calls that include 48 structural fire calls, 15 vehicle fire calls, and 17 other fire calls according to NFIRS. The fire service did not have any fire related deaths or injuries, and the total fire loss amount was $3,240,500. 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 $3,240,500 in 2018.

Vulnerability Assessment
All of the existing and future buildings, populations, and infrastructure in Otsego County are at-risk for 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.

Communities in Otsego County rely on a network of partially paid 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 these communities are directed at maintaining sustainable fire prevention and inspection programs.

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 pipeline) 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; however, southern Michigan is more vulnerable due to its highly concentrated populations. The State has experienced numerous small-scale incidents that local fire departments and hazardous material teams have handled. Fortunately, Michigan has not experienced any large-scale incidents.

Location
I-75 travels through Corwith, Bagley, and Livingston Townships, the Village of Vanderbilt, and the City of Gaylord. Old 27 runs north south and serves as a scenic alternate route through the central portion of the county. It connects Gaylord, Vanderbilt, Bagley and Livingston Townships, and Cheboygan County to the north and Otsego Lake, Waters and Crawford County to the south. Lake State Railway travels

through Otsego County to Gaylord. The major road that runs east-west through the county is M-32. It provides access to the City of Gaylord, Johannesburg (Charlton Township), and Elmira Township within the county. The population centers at greatest risk for this hazard are Vanderbilt and Waters.

Previous Occurrences and Probability of Future Occurrences
Otsego County has not had any significant accidents reported but may have had minor accidents that were not reported. However, there is the potential for an accident to occur on I-75, M-32, Old 27, and the Lake State Railway.

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. I-75, M-32, Old 27, and the Lake State Railway traverse Otsego County and intersect in Gaylord. These routes travel through the population centers of Vanderbilt and Waters, which make these centers at greater risk for this hazard.

Vulnerability Assessment
Existing and future buildings, infrastructure, and populations located near I-75, M-32, Old 27, and the Lake State Railway 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. An accident would also cause a delay in distribution.

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 industries, 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 of hazardous materials.

Location
According to the Tier II Manager, there are nine SARA Title III Sites in Otsego County that have plans on file with the Otsego County Emergency Management Office:

- Albie's Foods at 1534 O'Rourke Boulevard in Gaylord
- Alpine Power Plant at 7432 M-32 in Elmira
- Cooper Standard Automotive at 594 Alpine Road in Gaylord

- Airgas Great Lakes at1886 Engel Avenue in Gaylord
- A & L Iron and Metal Company, Inc. at 2000 Milbocker Road in Gaylord
- H & H Tube at 579 Garfield St. in Vanderbilt
- Hayes 22 Central Facility at 9375 Mt. Frederic Road in Gaylord
- METC Livingston Substation at 155 Townline Road in Gaylord
- Frontier Communications at 120 W. Main Street in Gaylord

Previous Occurrences and Probability of Future Occurrences
A particle board plant in Bagley Township exploded on May 25, 2001. On May 26, the fire spread to an adjacent silo that exploded when the silo was opened. The incident injured seven firefighters, nine plant workers, and caused damage to the building. Emergency Plans are on file with the Otsego County Emergency Management Office.

Extent
The extent can be measured by the amount of damage incurred from a fixed site hazardous material accident. However, the information is unavailable.

Vulnerability Assessment
The county's infrastructure, existing and future buildings, and populations near the fixed sites 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.

Infrastructure Failure

Description
Infrastructure provides essential services, such as electricity, 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 during cold weather.

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 create public safety and public health emergencies since people may die in their homes and water or wastewater treatment systems may become inoperable. Northern Michigan has fewer infrastructure networks than urban areas; however, a failure will affect a larger geographical area since residences and businesses are spread out.

Since Michigan's infrastructure is aging, it 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 structural integrity and operational performance, which is not adequate to protect infrastructure during a disaster. In 2018, the State of Michigan 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 Michigan Infrastructure Council's 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, 51% of the population is located in the City of Gaylord, and Bagley and Otsego Lake Townships (15%, 24%, and 11%, respectively). According to the U.S. Census Bureau, people are moving to Bagley, Chester, Elmira, Hayes, Livingston, and Otsego Lake Townships.

Previous Occurrences and Probability of Future Occurrences
Otsego County has not had a major infrastructure failure reported. However, the possibility for an event does exist depending on the age of the county's infrastructure and the availability of maintenance funding.

Extent
Since Otsego 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 the City of Gaylord, and Bagley and Otsego Lake Township, 51% of the population would be affected.

Vulnerability Assessment
In Otsego 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 Gaylord and the developed areas immediately adjacent to the city. 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.

Scrap Tire Fire

Description
Scrap tires end up in 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. The Rubber Manufacturers Association reports that a fire can convert a standard passenger vehicle tire into about two gallons of oily residue. 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. 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 that affects 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, local governments are unable to absorb the costs of fire management, and the environmental consequences are significant.

According to the EPA and the Rubber Manufacturers Association, approximately 290 million tires are discarded in the United States 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 Otsego County. Currently, there are no known tire collection sites in Otsego County.

Previous Occurrences and Probability of Future Occurrences
According to EGLE, Arthurs Auto Parts & Sales had a collection site application that lapsed in 1992, A & L Iron & Metal Company had a collection site application that lapsed in 1992, Johnson Oil Co of Gaylord had a collection site application that lapsed in 1993, and TJ's Tire Recycling had a collection site application that was incomplete and terminated in 2002.

There are no recorded occurrences of scrap tire fires in Otsego County. Based on this data, Otsego County will not have scrap tire fires in the future. However, there may be scrap tire collection sites in the county that few people know about or old tires at the previous collection sites. Therefore, there is a possibility for a scrap tire fire in the county.

Extent
Extent can be measured by the number of acres burned and the cost of property damages. Since Otsego 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.

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.

Dam Failures

Description
A dam 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, resulting in flash flooding downstream or water pouring over the top of the dam. This failure may be due to poor operation, lack of maintenance, or vandalism. 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. 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
Otsego County has low hazard potential dams located in Corwith and Charlton Townships (Figure 6-11). These dams are located in remote areas away from residential areas.

Previous Occurrences and Probability of Future Occurrences
Otsego County has not had any previous reported dam failures. According to the National Inventory of Dams, Otsego County has seven dams with an average age of 77 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. Since all of the dams have a low hazard potential and are not required to have an emergency action plan, dam failure will not be further analyzed at this time.

Extent and Vulnerability Assessment
The extent of a dam failure can be measured by the amount of damage that occurs and the number of deaths and injuries. Since Otsego County has not had any reported dam failures, data is unavailable to quantify the extent. If a dam failure occurred, there would be environmental impacts from the release of sediments from behind the dam.

Human-Related Hazards

Public Health Emergency

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

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 virus 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 events, 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. 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.

Table 6-7 Otsego County Dams									
	Name	Height (ft)	Storage (acre-feet)	Location	Regulatory Agency	Dam Type	Year Completed	Dam Purpose	Hazard Potential
1	7th Spectacle Lake Dam/Bigger Lake Dam	12	300	Tributary- West Branch Big Creek	State	Private	1939	Recreation	Low
2	Golden Lotus Dam/Lansing Club Dam	22	565	Pigeon River	-	Private	1955	Hydroelectric	Low
3	Woodin Lake Dam	9	100	West Branch Sturgeon River	State	Private	1940	Recreation	Low
4	Fontinalis Club Home Dam/Home Dam	14	50	Club Stream	-	Private	1960	Recreation	Low
5	Fontinalis Club Middle Dam/Middle Dam	12.8	70	Club Stream	State	Private	1960	Recreation	Low
6	Fontinalis Club Upper Dam/Upper Dam	8.2	75	Club Stream	State	Private	1870	Recreation	Low
7	Quigley Dam	23	120	Tributary- Club Stream	State	Private	1965	Recreation	Low
Source: National Inventory of Dams, Retrieved August 2019									

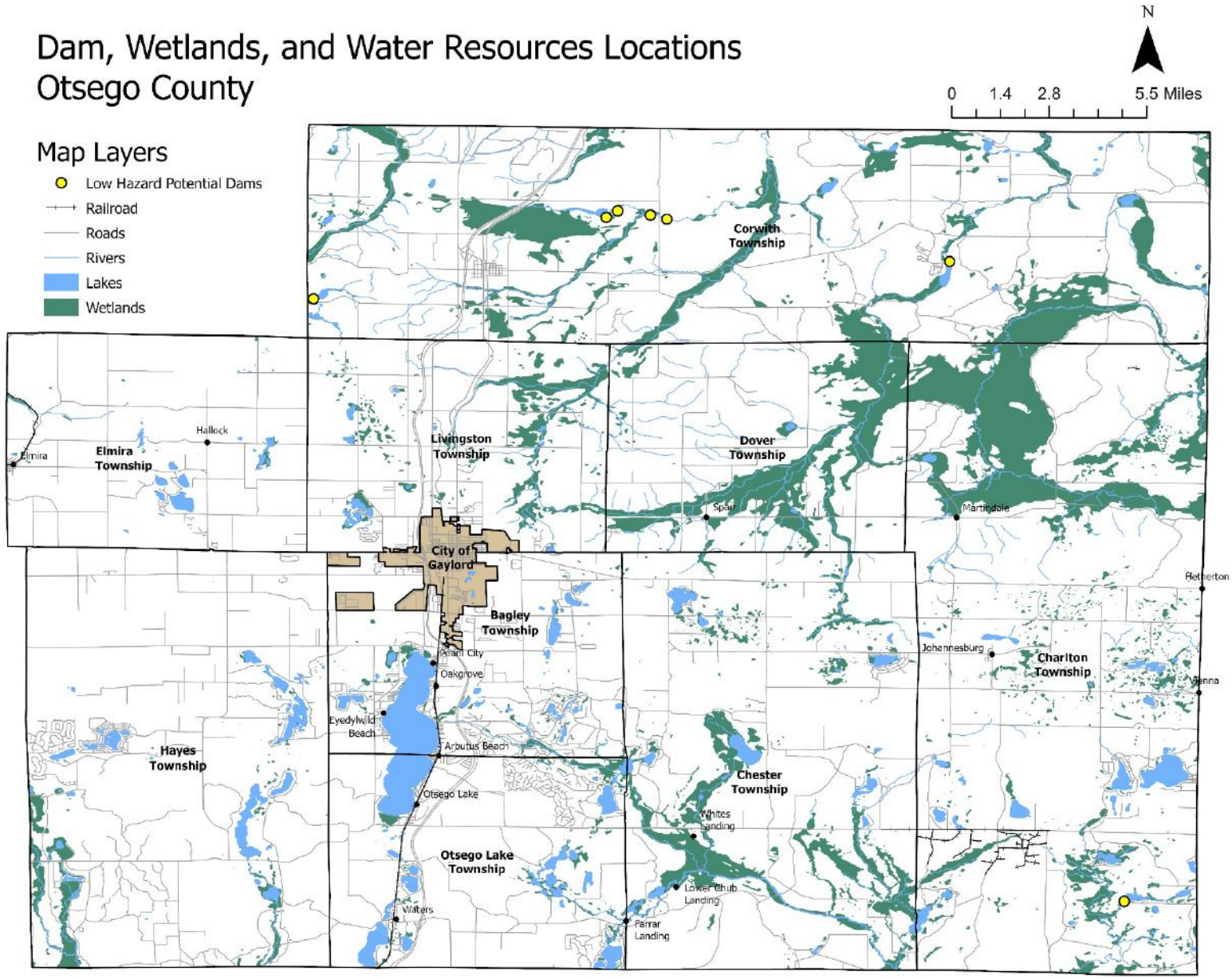

Figure 6-11 Dam, Wetland, and Water Resources Locations

Additionally, Bovine Tuberculosis has impacted the personal, social, and economic health of the residents and visitors of Otsego County. Government regulations and enforcement actions have affected the county's agriculture and tourism (e.g., hunting) industries.

Location
Public health emergencies do not have geographic boundaries and affect all of Otsego County.

Previous Occurrences and Probability of Future Occurrences
As of December 19, 2020, there have been 458,852 confirmed COVID-19 cases and 11,461 deaths in Michigan, and 837 confirmed cases and 18 deaths in Otsego 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 Otsego County, the Health Department of Northwest Michigan works with local, state, and federal agencies to prepare for and respond to public health threats. It has developed emergency protocols, policies, and plans for the counties it serves and educates the county residents about emergency preparedness. Additionally, District Health Department #4 is a member of the Region 7 Healthcare Coalition, which coordinates efforts to develop a comprehensive all-hazards medical preparedness plan. Between March 10, 2020 and December 18, 2020, Otsego County administered 11,916 tests for COVID-19 with 805 positive tests.

Vulnerability Assessment
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, large 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 airport in Bagley Township is most at risk for sabotage/terrorism/nuclear attack in Otsego County. However, it is not likely a sabotage/terrorism/nuclear attack at the county's airport would create high profile media coverage.

Previous Occurrences and the Probability of Future Occurrences
In the last 15 years, Otsego County has not had any recorded incidents of sabotage/terrorism/nuclear attack. Based on this information, Otsego County would not have any sabotage/terrorism/nuclear attacks in the future. However, an event does have the potential to occur dependent on furthering 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 event 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
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. An attack at the airport would cause delays in distribution, re-routing flights, and the county spending money to rebuild the airport depending on the severity of the event. An event at the airport would impact about 39% of the county's population that is located in Bagley Township and the City of Gaylord.

Civil Disturbances

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. 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. Otsego County has not had any recorded incidents of civil disturbances.

Location
Bagley Township and the City of Gaylord would be at-risk for civil disturbances since the majority of the population lives in these jurisdictions (24%, and 15% respectively). 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
Otsego 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.

Otsego County and its Jurisdictions

The Otsego County hazard map shows infrastructure, oil and gas wells, dams, contaminated sites, and areas of high wildfire risk in red (pine forests) and yellow (oak-pine forests and aspen-birch forests) (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 springtime flooding in dark green (wetlands from the Natural Wetlands Inventory data) (Figure 6-13 to Figure 6-34). The critical infrastructure legend corresponds to the numbers on the base and hazard maps.

Critical Infrastructure	**(see base map on following page)**		
Fire Stations	1	Bus Stations	10
Schools	2	Ports/Harbors	11
Government Buildings	3	Colleges/Universities	12
Solid Waste Facilities	4	DNR Offices	13
WWTP	5	Campgrounds	14
Mun.. Water Supplies	6	Traffic Counts	15
Police Stations	7	Industrial Parks	16
Medical Facilities	8	Chambers of Comm.	17
Health Dept Buildings	9		

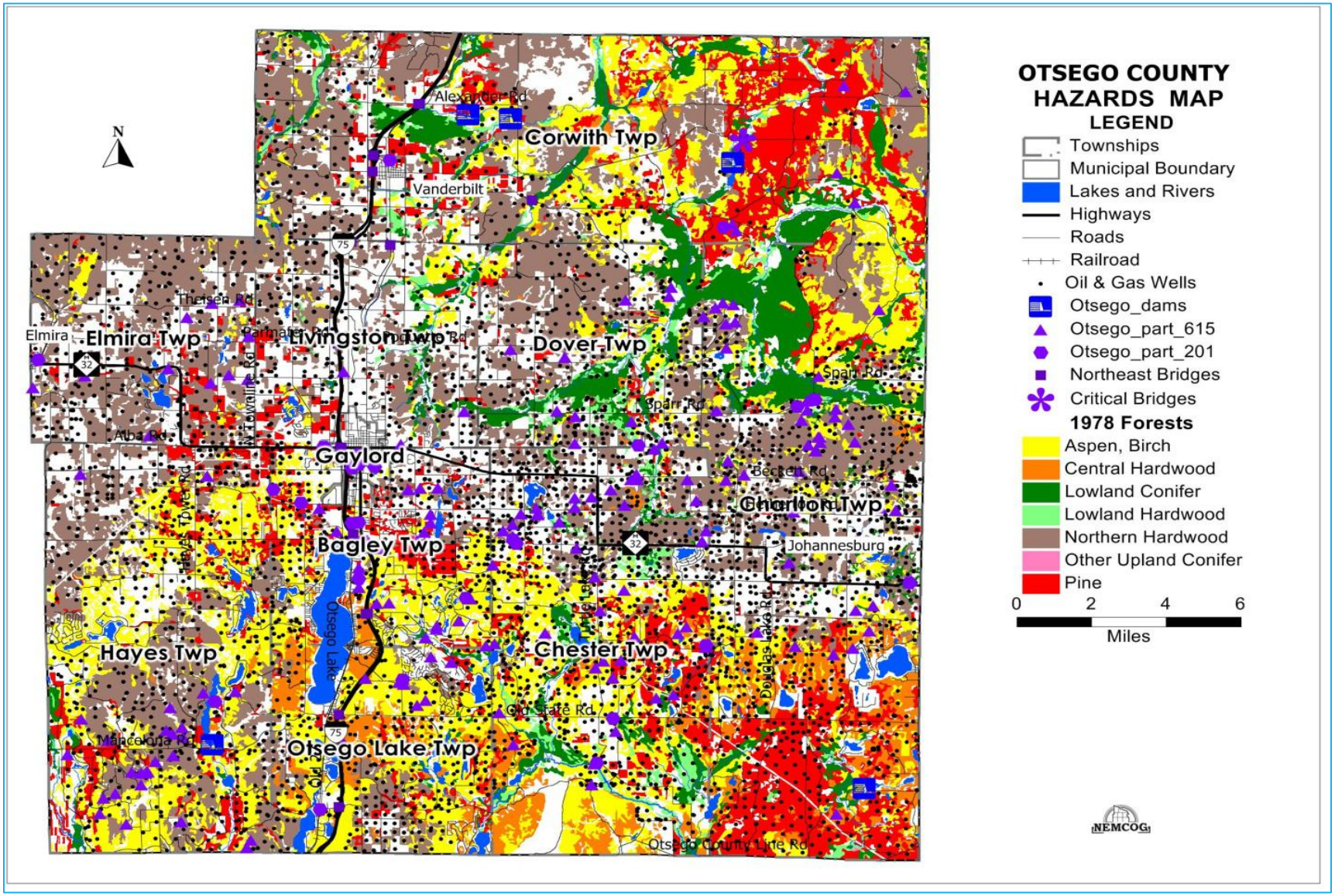

Figure 6-12 Otsego County Hazards Map

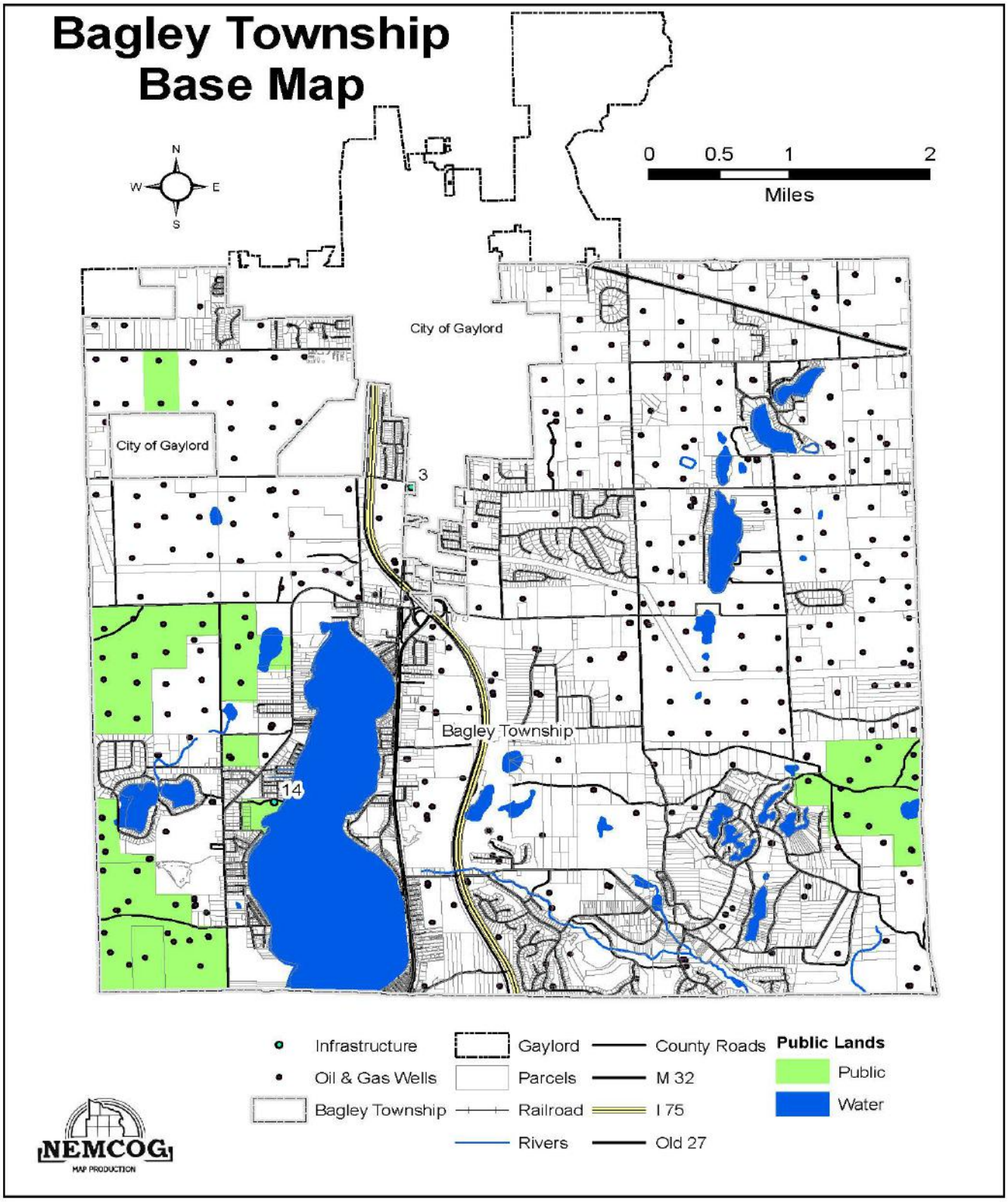

Figure 6-13 Bagley Township Base Map

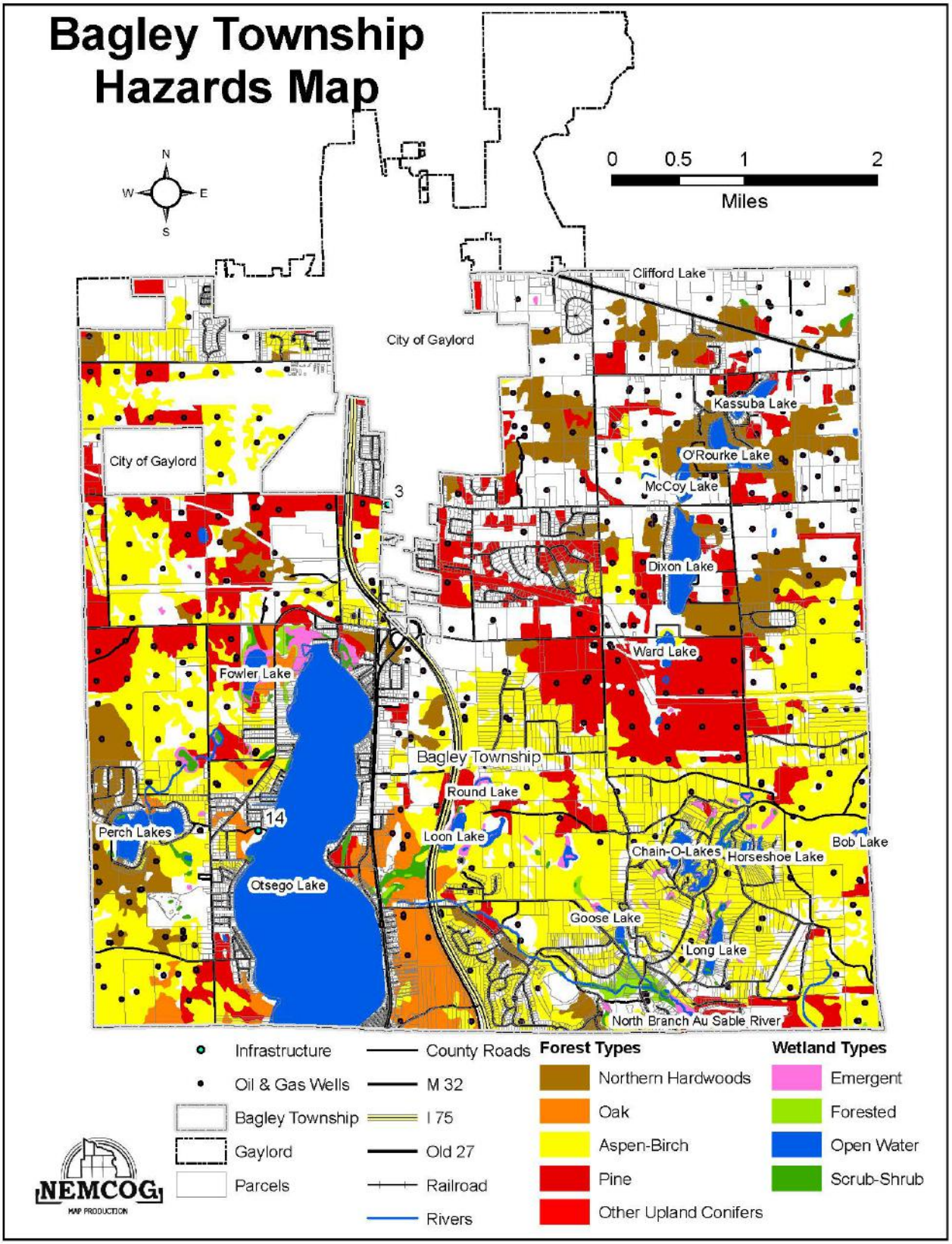

Figure 6-14 Bagley Township Hazards Map

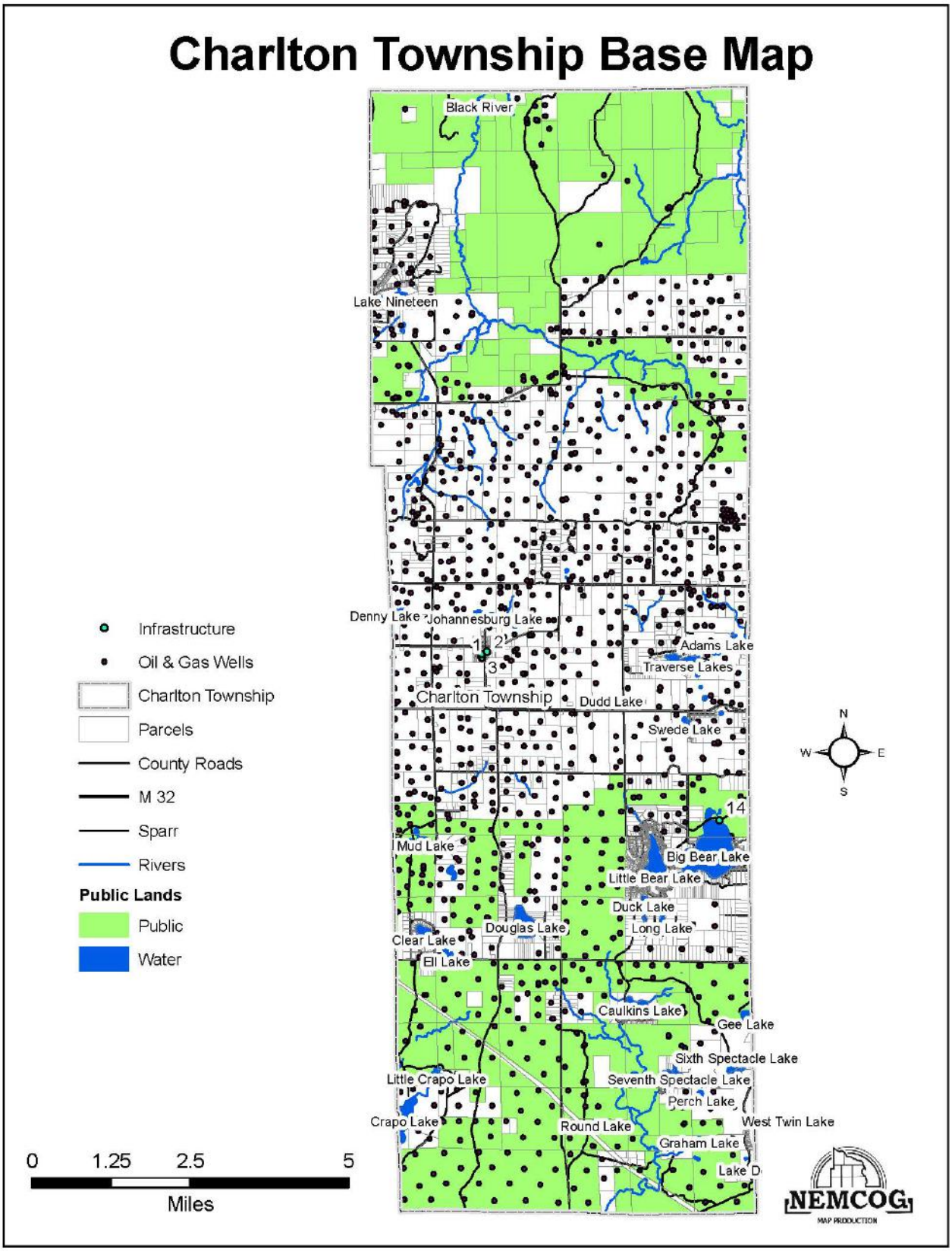

Figure 6-15 Charlton Township Base Map

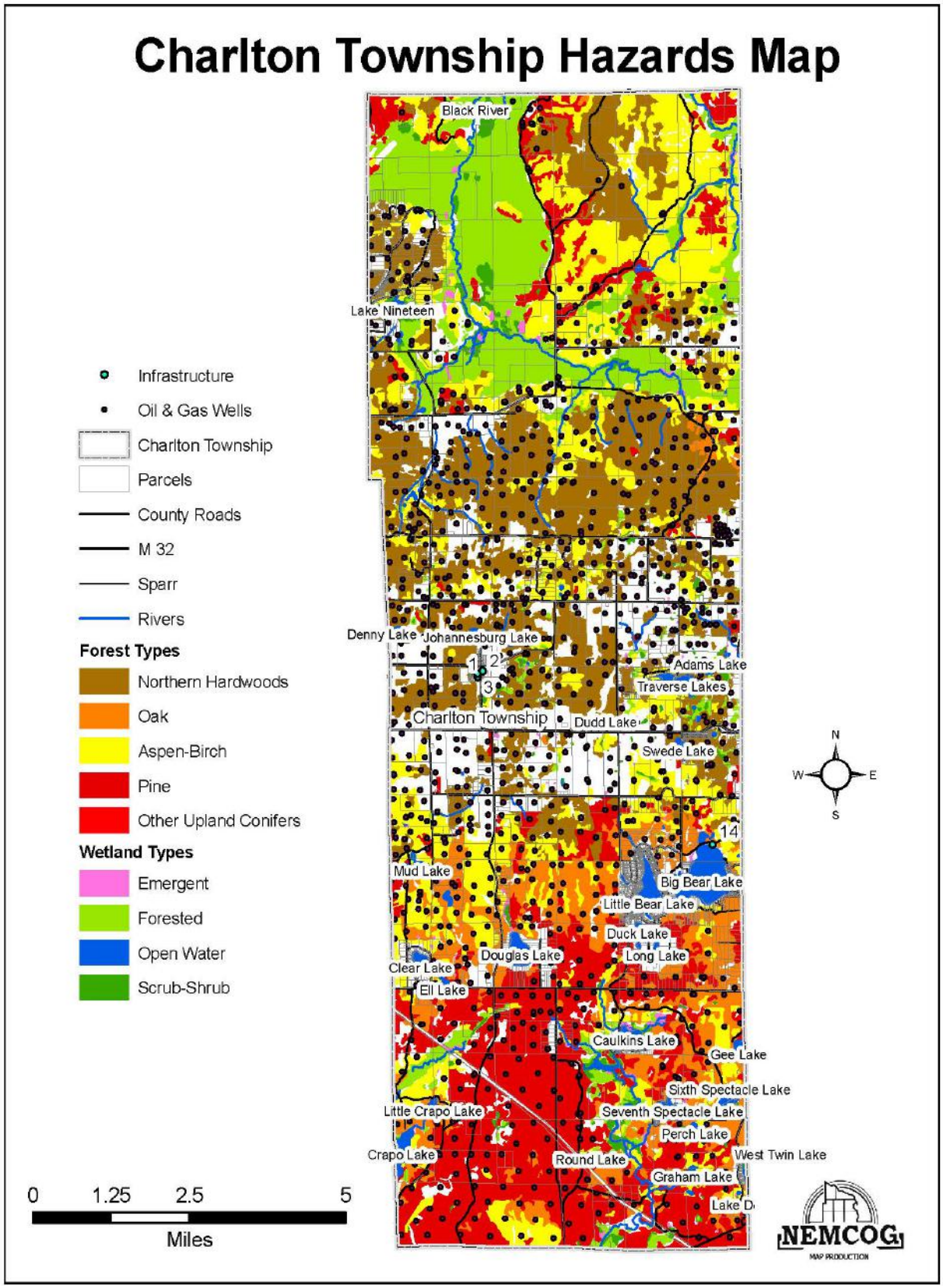

Figure 6-16 Charlton Township Hazards Map

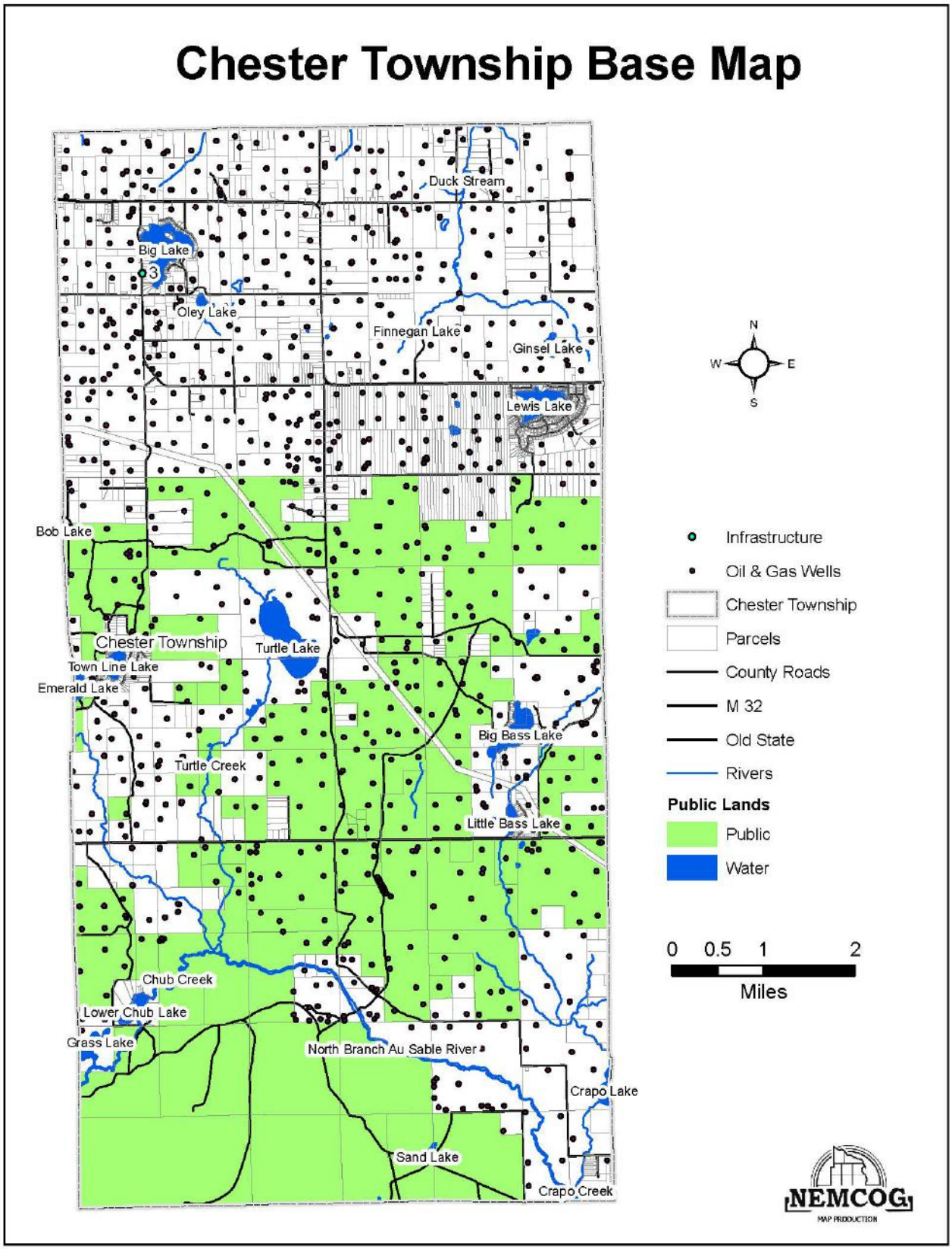

Figure 6-17 Chester Township Base Map

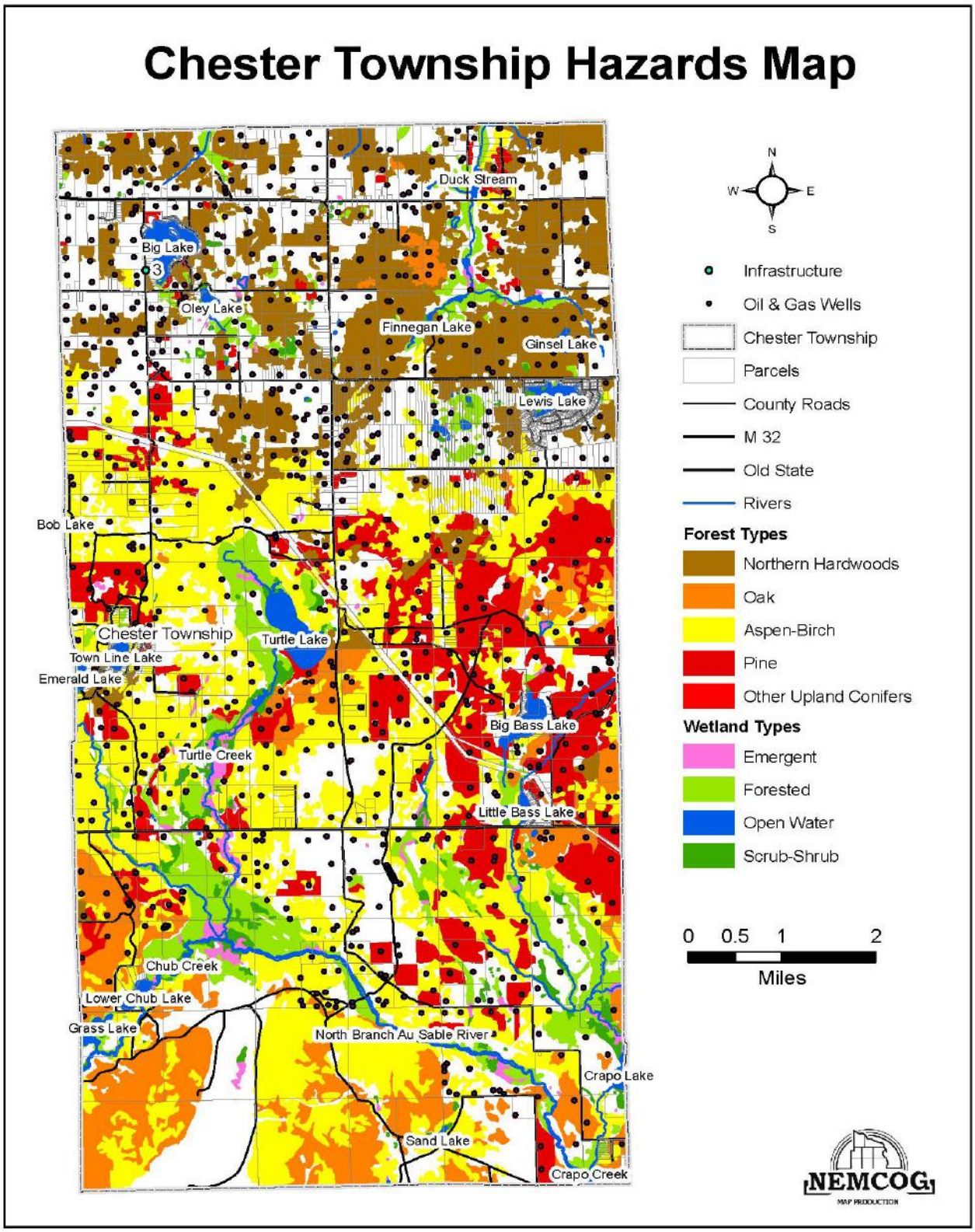

Figure 6-18 Chester Township Hazards Map

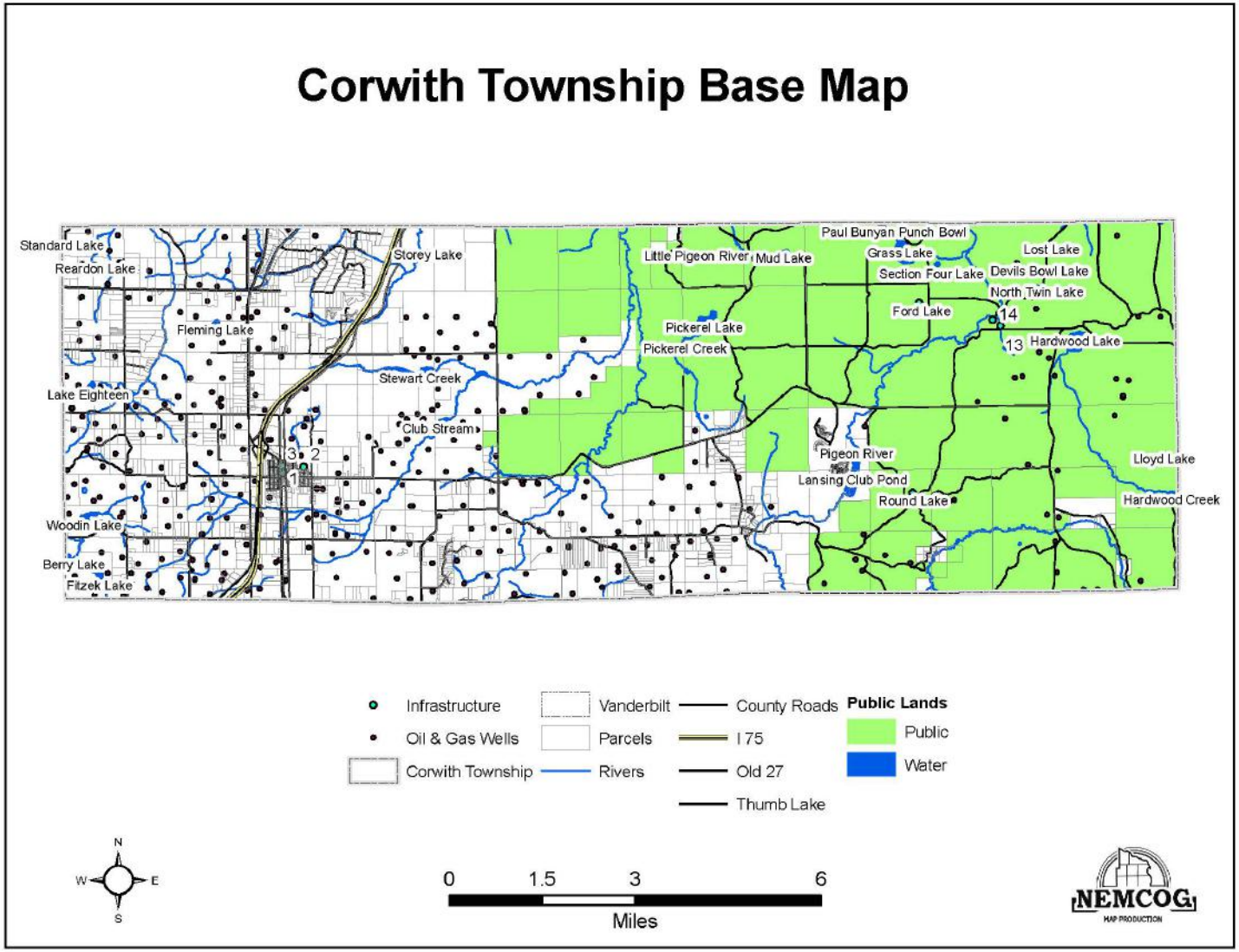

Figure 6-19 Corwith Township Base Map

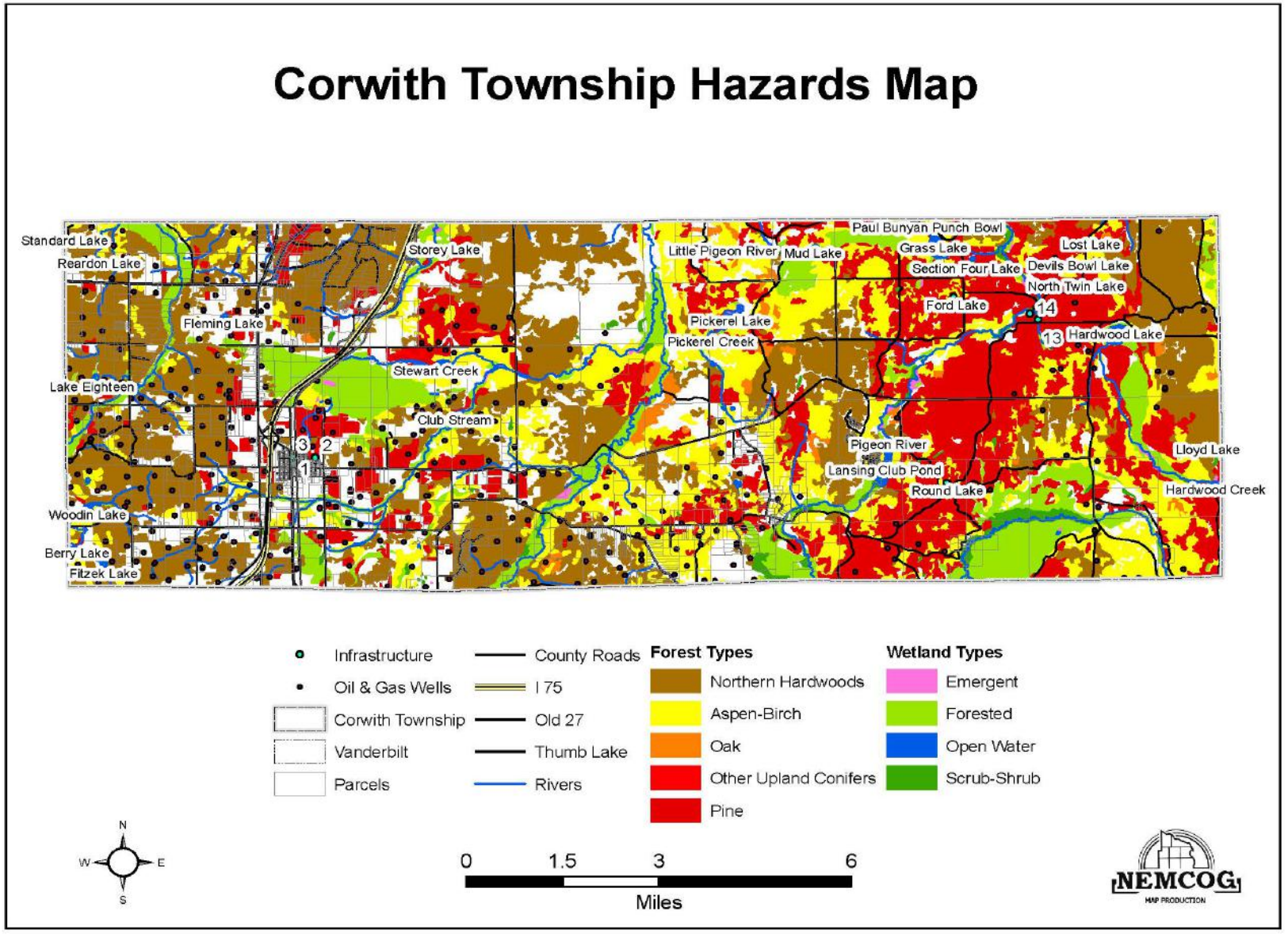

Figure 6-20 Corwith Township Hazards Map

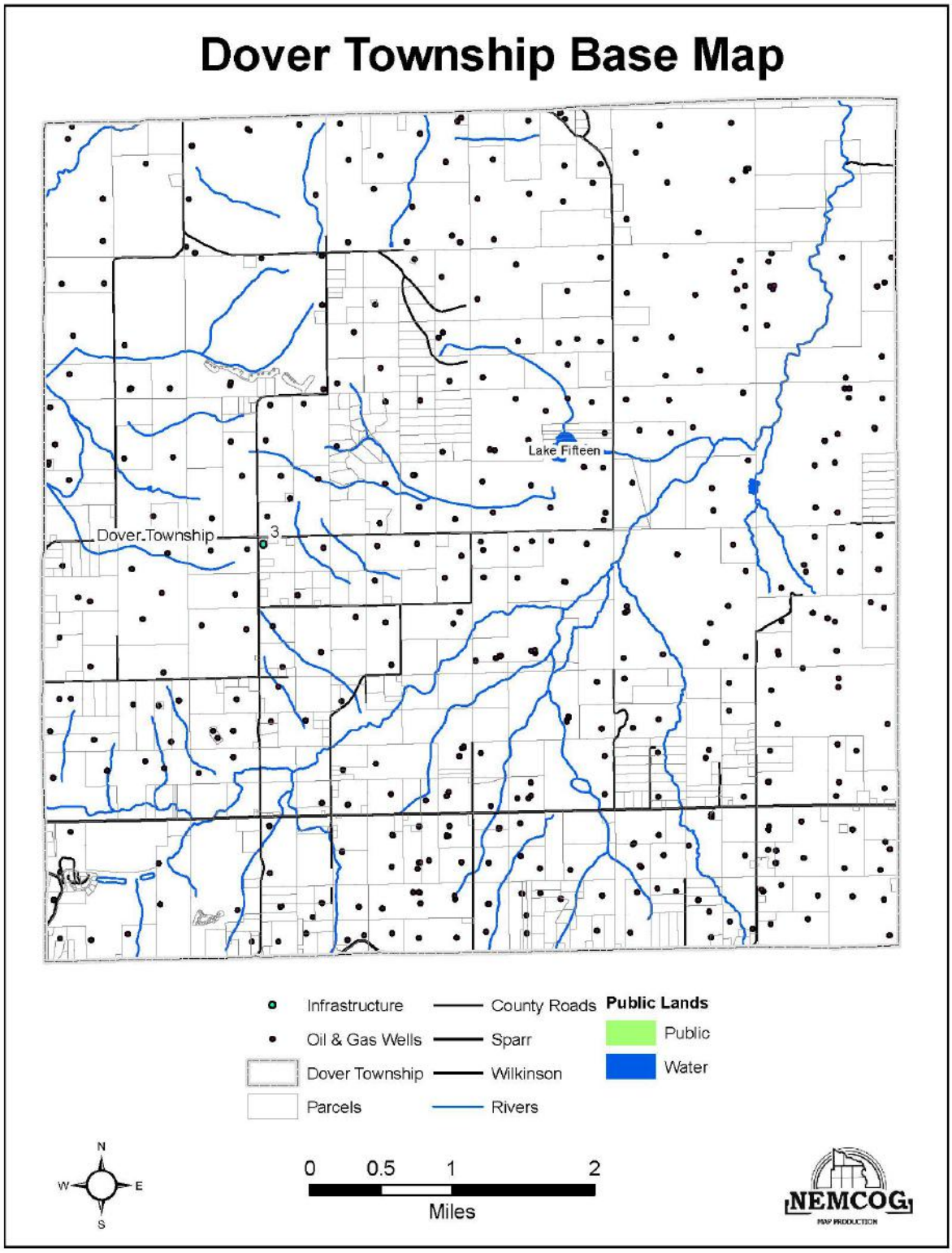

Figure 6-21 Dover Township Base Map

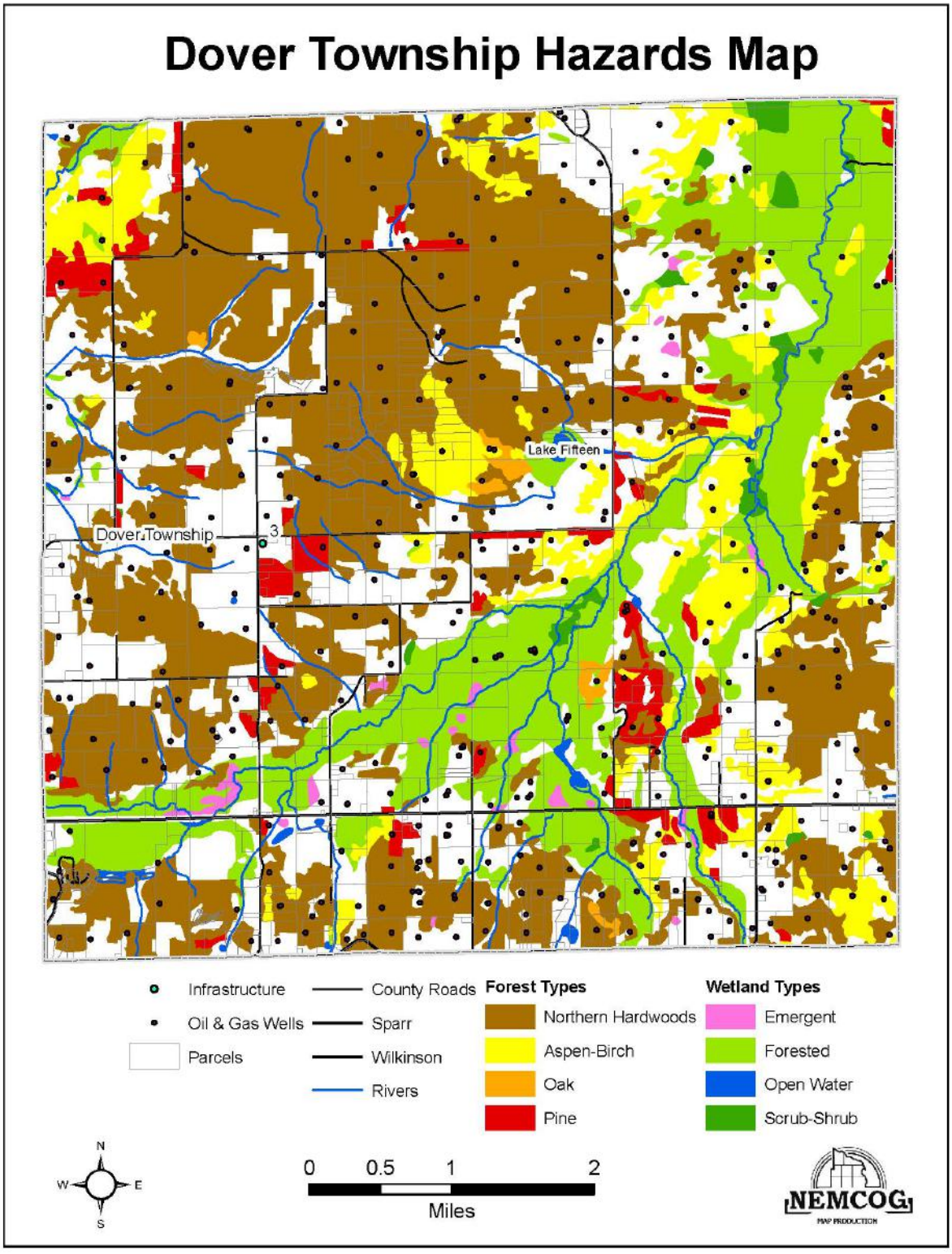

Figure 6-22 Dover Township Hazards Map

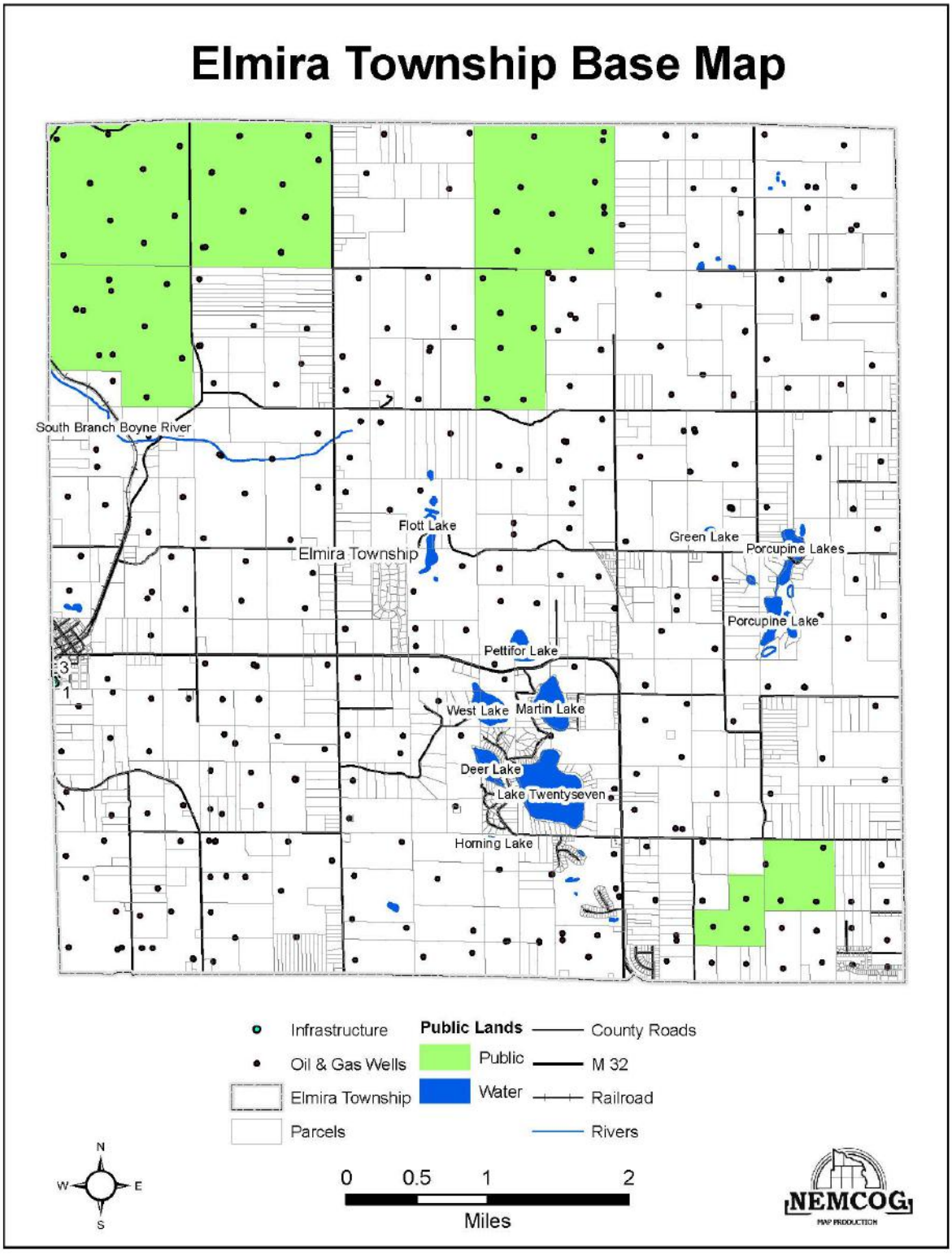

Figure 6-23 Elmira Township Base Map

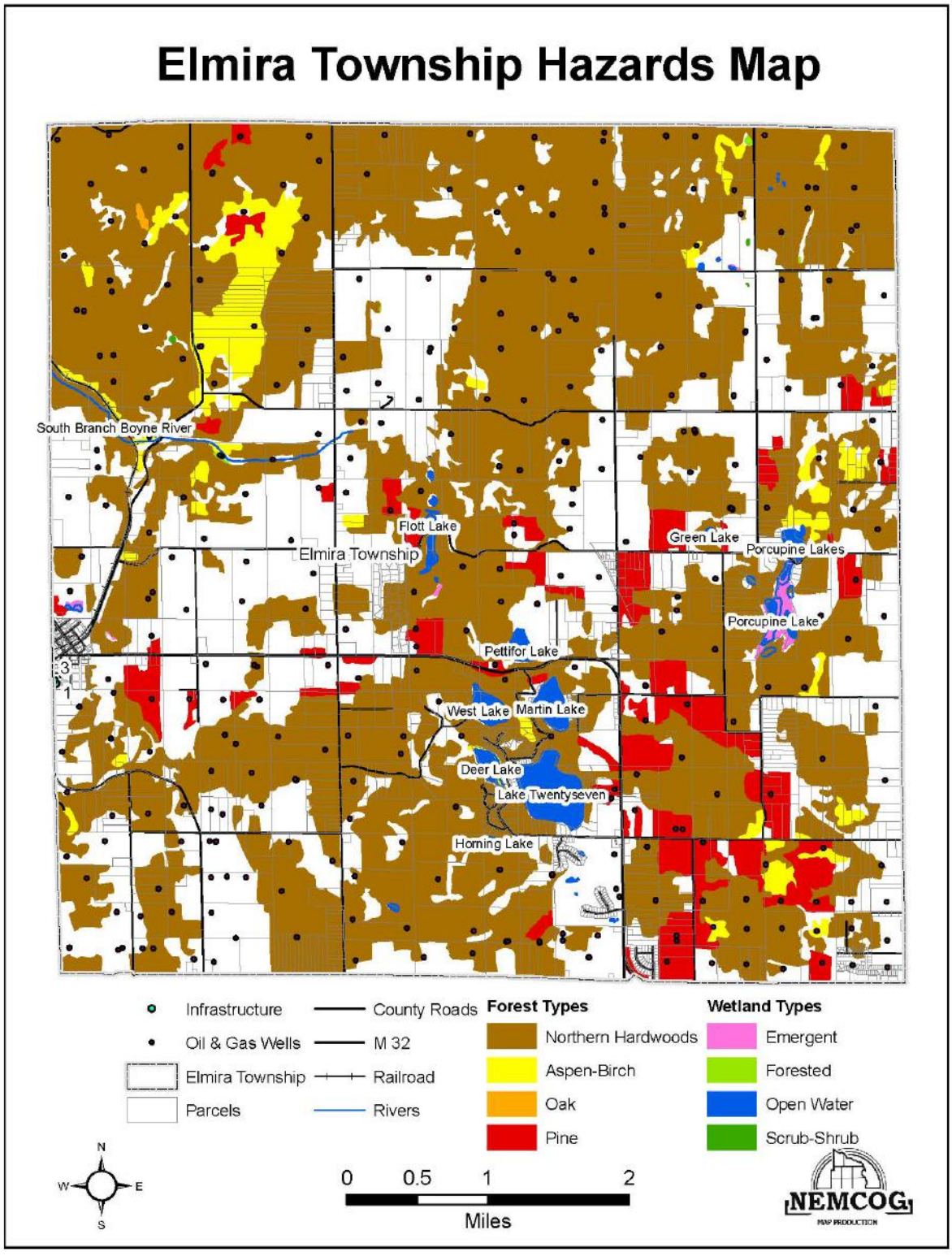

Figure 6-24 Elmira Township Hazards Map

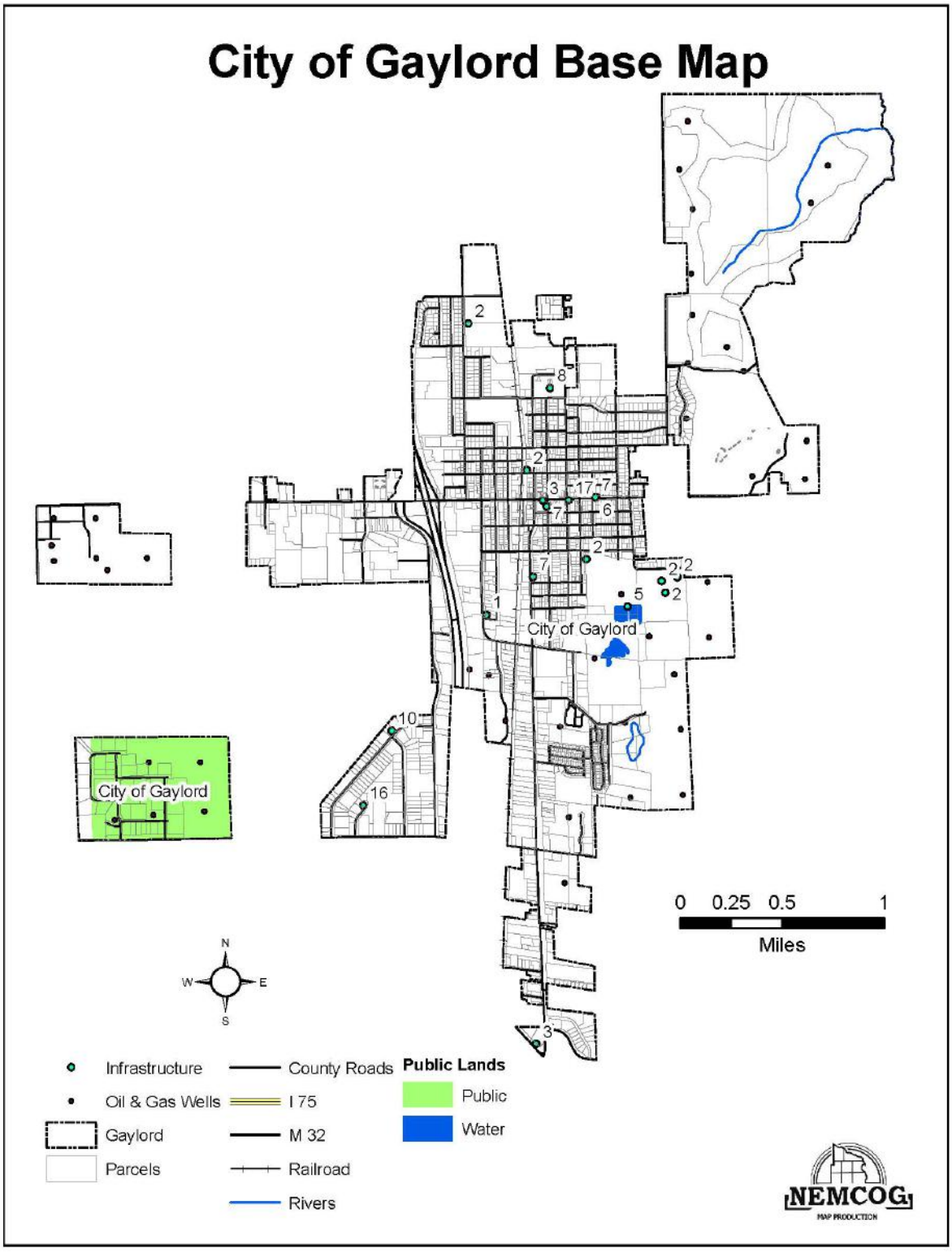

Figure 6-25 City of Gaylord Base Map

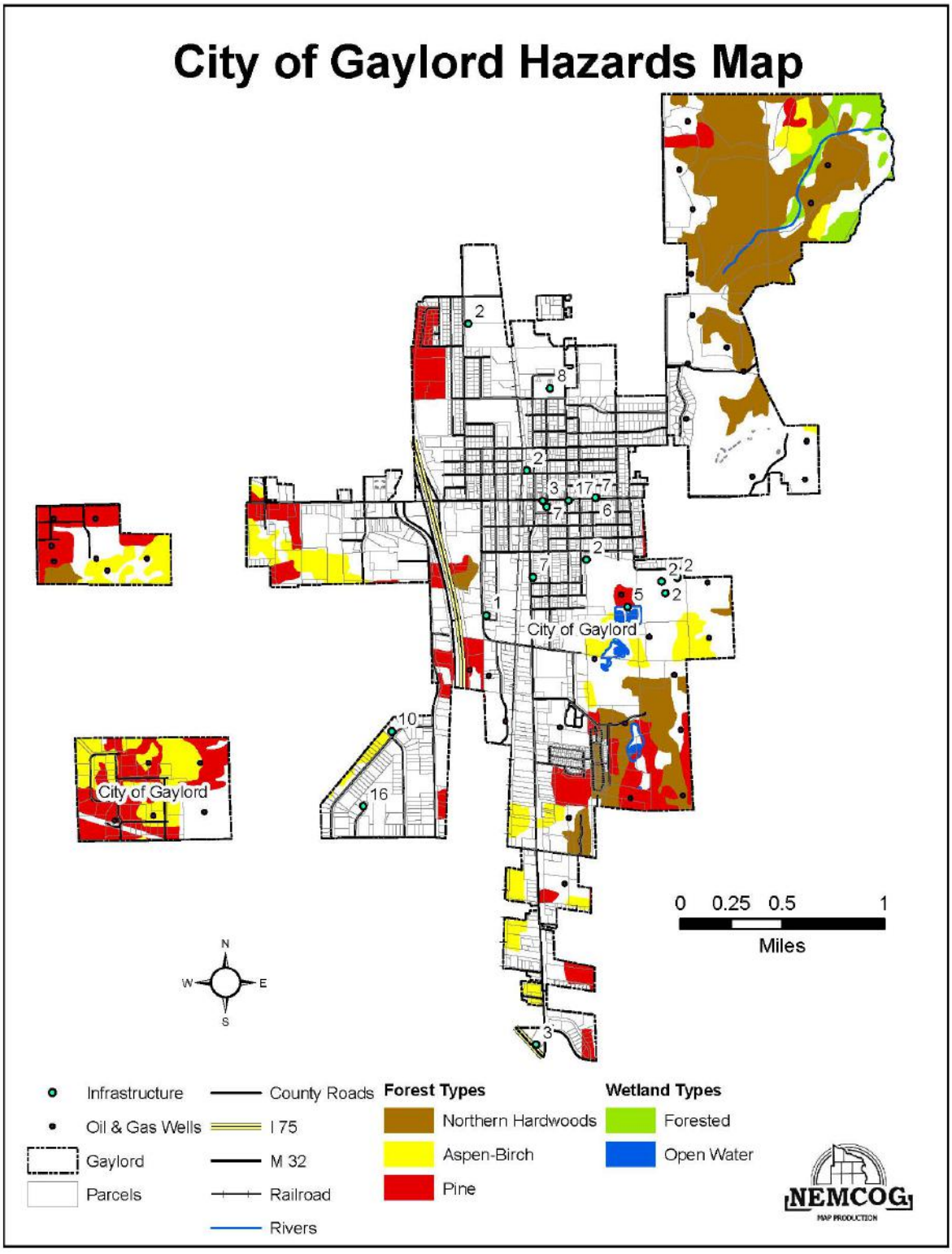

Figure 6-26 City of Gaylord Hazards Map

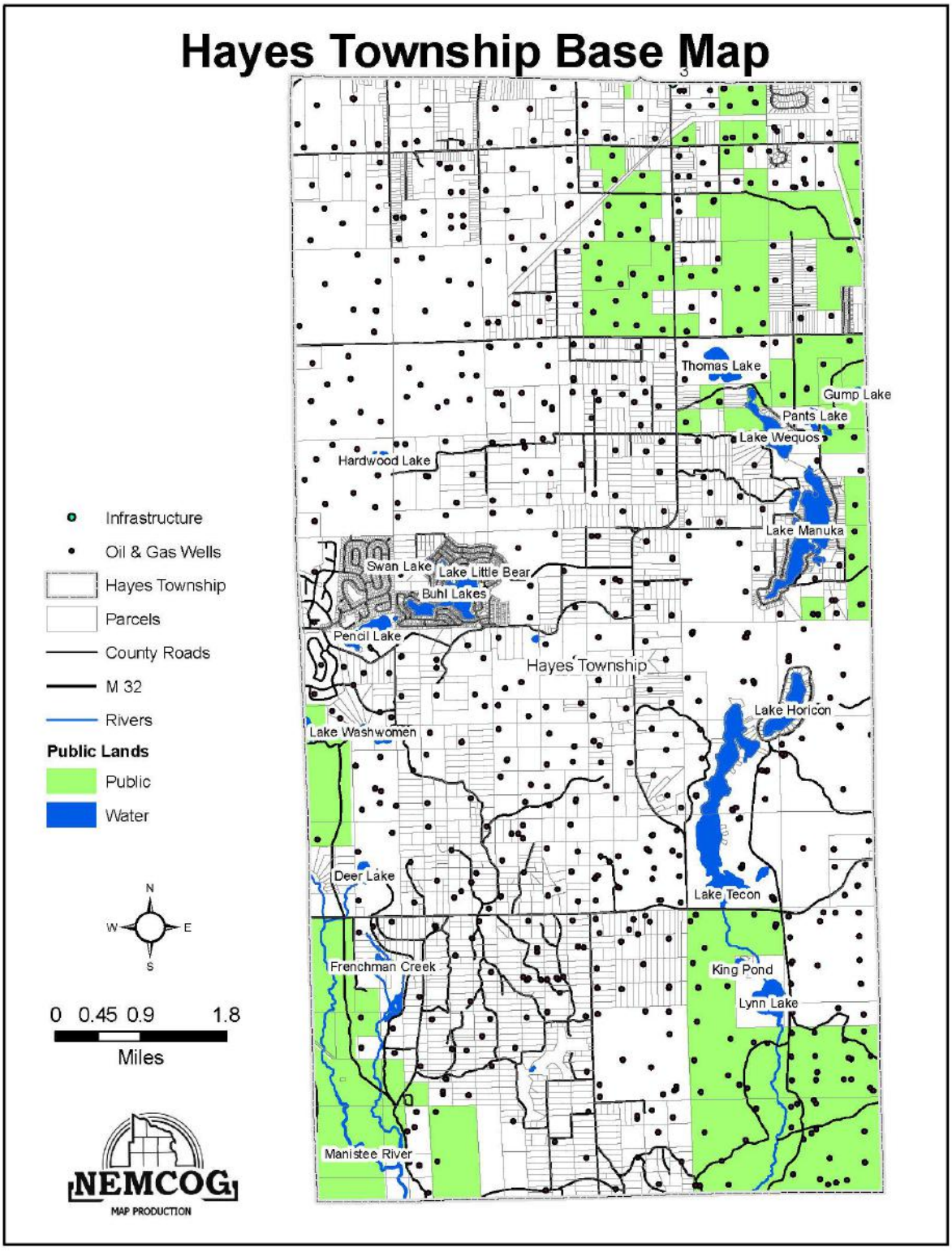

Figure 6-27 Hayes Township Base Map

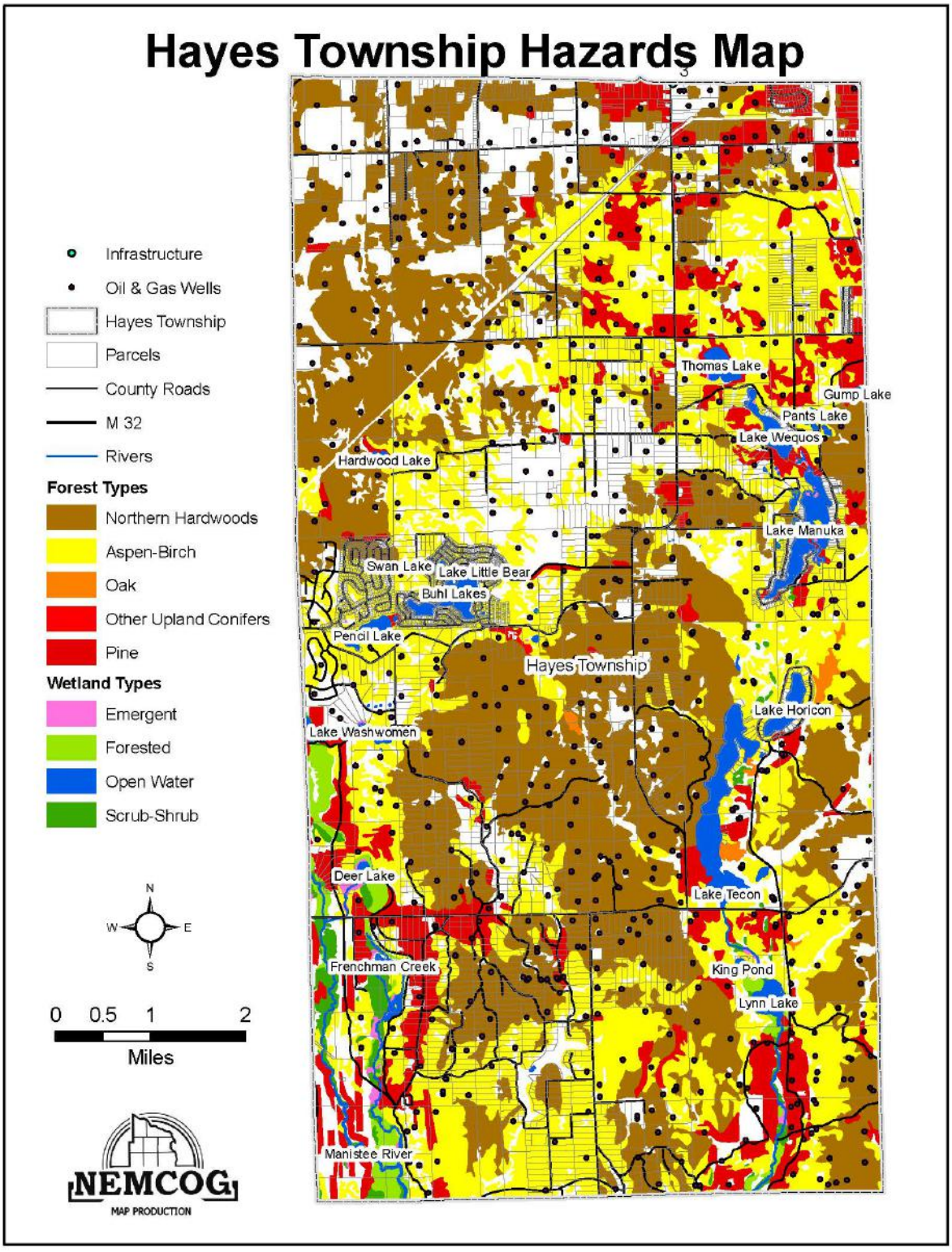

Figure 6-28 Hayes Township Hazards Map

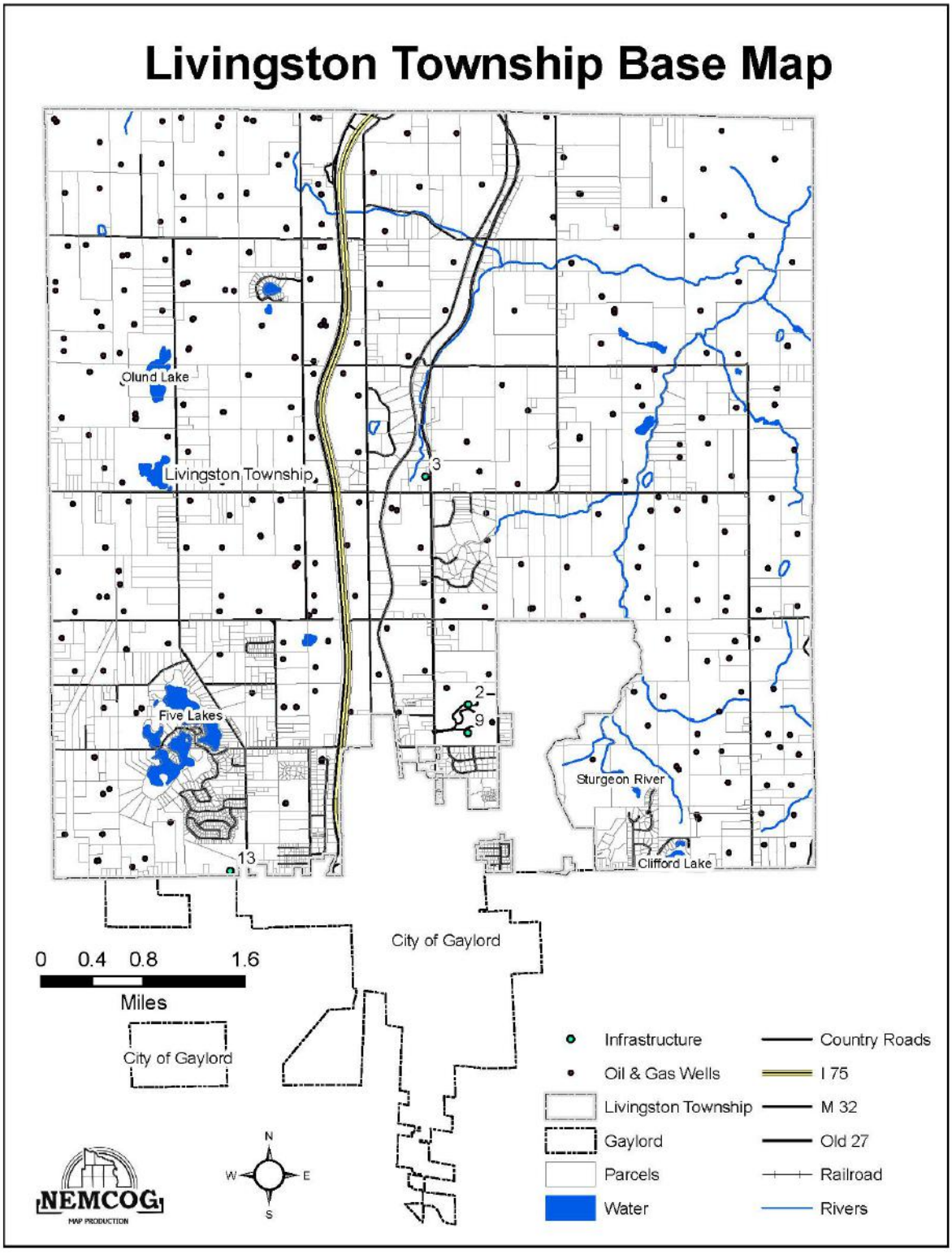

Figure 6-29 Livingston Township Base Map

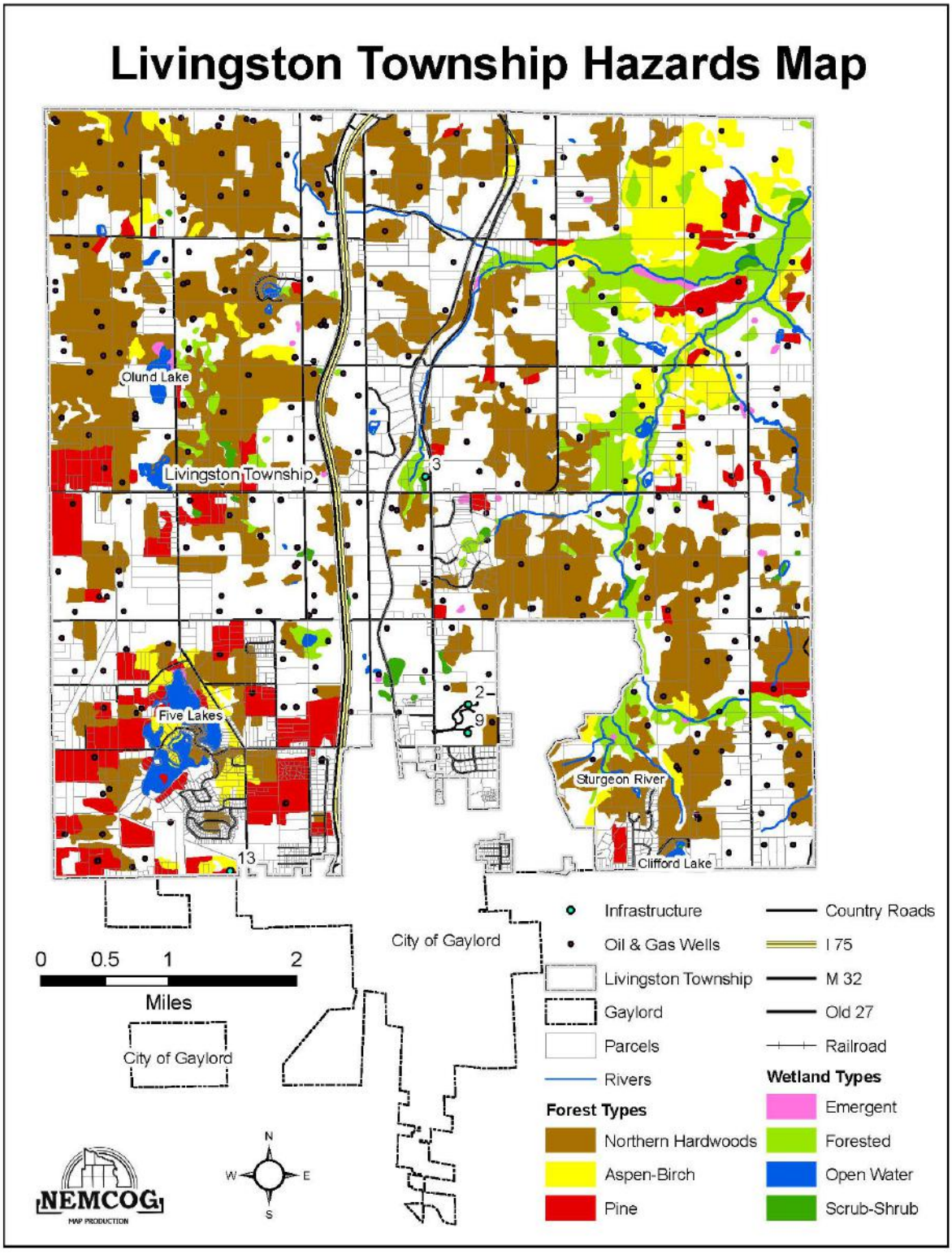

Figure 6-30 Livingston Township Hazards Map

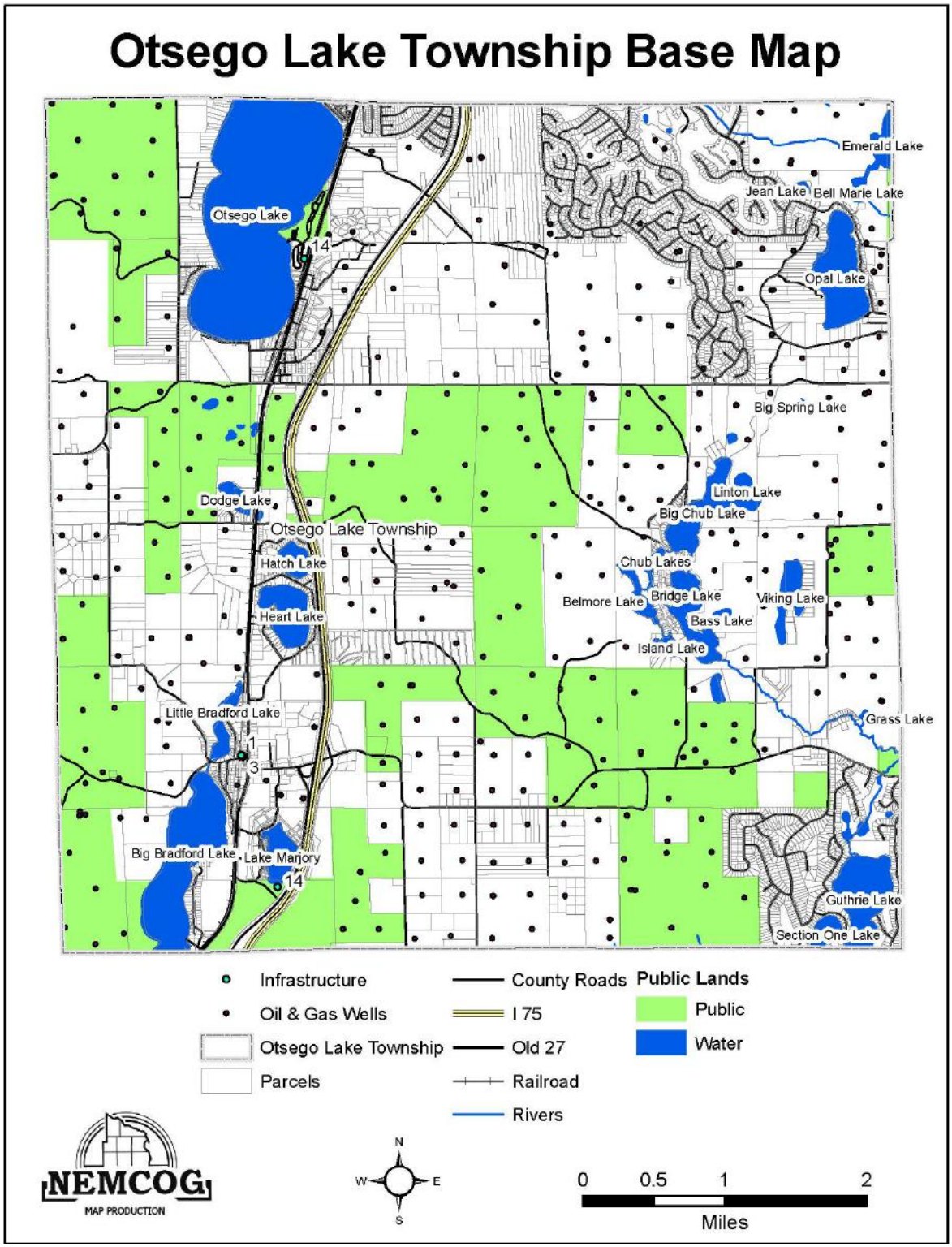

Figure 6-31 Otsego Lake Township Base Map

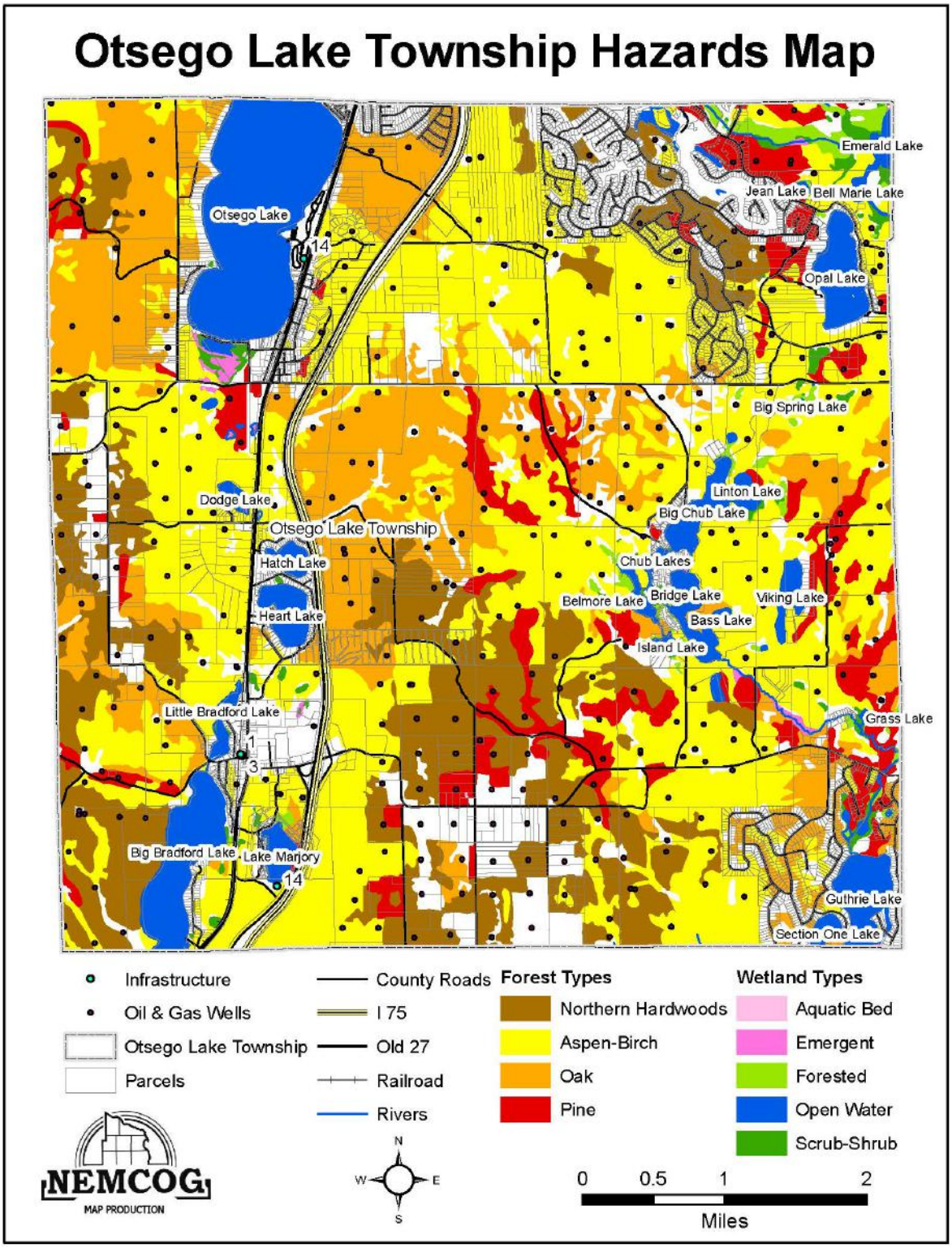

Figure 6-32 Otsego Lake Township Hazards Map

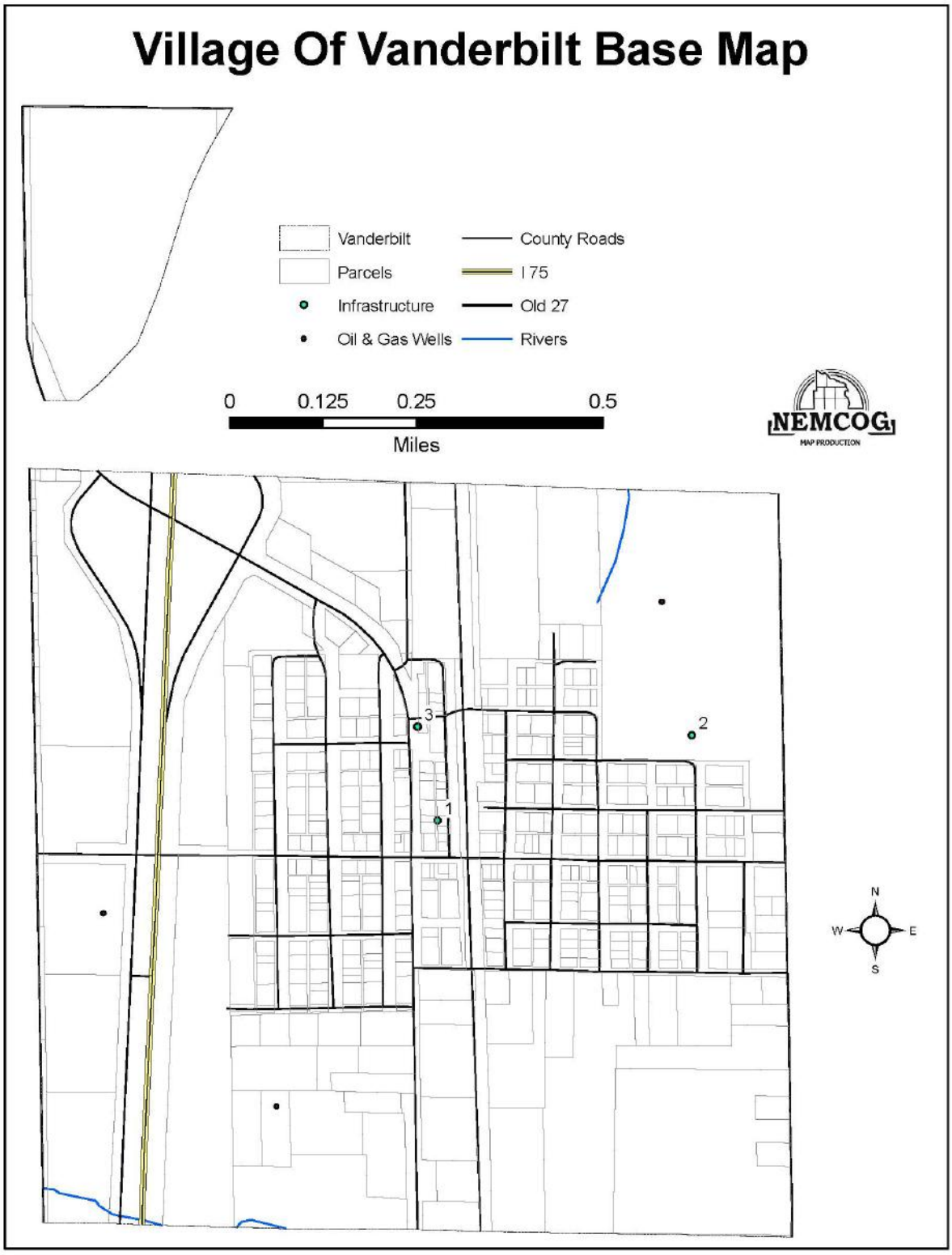

Figure 6-33 Village of Vanderbilt Base Map

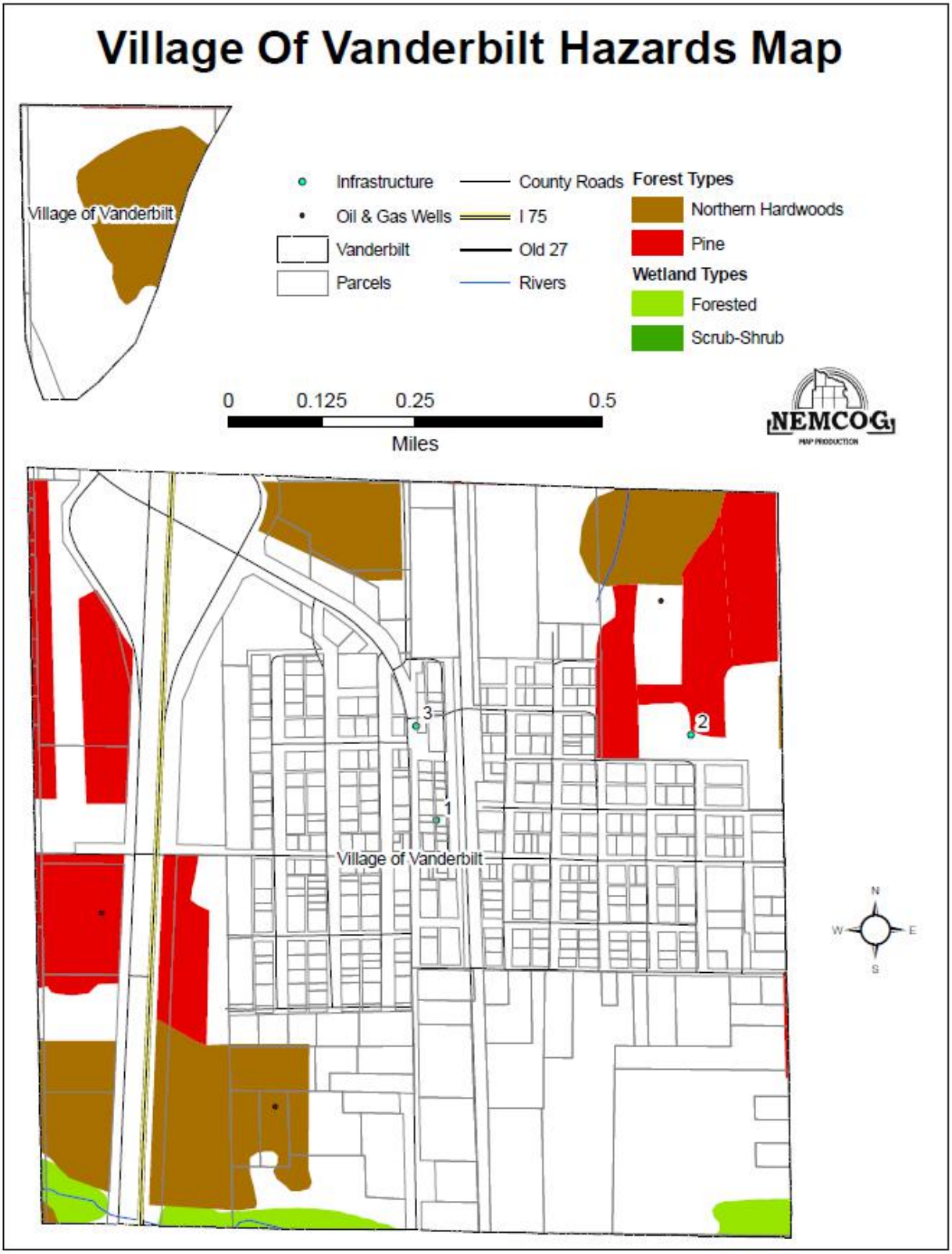

Figure 6-34 Village of Vanderbilt Hazards Map

Risk and Vulnerability Assessments

After identifying which hazards pose a risk in Otsego County, the LEPC 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 LEPC evaluated the ranked hazards based on their risk and vulnerabilities. It should be noted the sleet and ice storm events, and snowstorm events are displayed as winter weather hazards in the Priority Risk Index.

To begin the hazard ranking process, the county's LEPC selected evaluation criteria by determining which aspects were of most concern to the community. The LEPC 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, capacity to cause physical damage, size of affected area, speed of onset, population impact, casualty potential, economic impacts, duration of threat, seasonal risk pattern, environmental impact, predictability of the hazard, ability to mitigate, availability of warning systems, public awareness, and collateral damage. The LEPC rated likelihood of occurrence, size of affected area, population impact, casualty potential, duration of threat, predictability of the hazard, public awareness, and ability to mitigate as "Always very important." The LEPC rated economic impacts, and environmental impact as "Usually important." Finally, the LEPC rated capacity to cause damage, speed of onset, seasonal risk pattern, availability of warning systems, and collateral damage as "Sometimes important."

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

- **Likelihood of Occurrence:** The frequency a particular hazard event will occur. The more frequent the event occurs, the greater potential there will be for damage and a negative impact on the community.
- **Population Impact:** The percent of the county's population that may be affected directly or indirectly by a hazard event.
- **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.
- **Size of Affected Area:** The size of a geographic area that a hazard will affect. The larger the area affected, the greater the impact a hazard has on a community; even though the size of an area does not indicate the destructive potential of a hazard. For example, a blizzard may affect an entire state, while a flood may affect a portion of a municipality.
- **Public Awareness:** The ease at which the public can be notified about a hazard event. Hazards that have little or no available warning systems tend to be a public safety issue for the population. This criterion does not address the current level of public awareness in the community.
- **Economic Impacts:** The monetary damages incurred from a hazard event that include public and private damages. Direct physical damage costs and indirect impact costs, such as lost business and tax revenue, are included in this criterion.

Then, the LEPC 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 LEPC 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 LEPC 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

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

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

Size of Affected Area	
Entire Area (Impacts all or most of the county)	10 pts
Large Area (Impacts ½ to ¾ of the county)	7 pts
Moderate Area (Impacts less than ½ of the county)	4 pts
Small Area (Impacts a small area in the county)	1 pt
Unable to be Determined	0 pts

Public Awareness	
Significant Value (Awareness will save lives and/or property)	10 pts
Some Value (Awareness may save lives and/or property)	7 pts
Limited Value (Awareness will have limited effects)	4 pts
No Value (Awareness does not have an effect)	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

Table 6-8 Otsego County Priority Index								
Evaluation Criteria								
Rank	Hazard	Likelihood of Occurrence (25%)	Population Impact (15%)	Economic Impacts (10%)	Public Awareness (15%)	Ability to Mitigate (25%)	Size of Affected Area (10%)	Score
1	Winter Weather Hazards (ice and sleet storms, and snowstorms)	10	10	4	10	9	10	9.15
2	Oil and Gas Accident (well and pipeline)	4	10	8	7	10	10	7.85
3	Public Health Emergency	6	10	10	7	7	10	7.80
4	Wildfire	7	7	10	10	7	7	7.75
5	Infrastructure Failure	5	10	10	4	7	10	7.10
6	Extreme Temperatures (Extreme Heat and Extreme Cold)	4	10	1	10	7	10	6.85
6	Drought	7	10	10	4	4	10	6.85
8	Severe Winds (derecho)	10	5	4	7	4	10	6.70
9	Structural Fire	10	1	10	7	7	1	6.55
10	Transportation Hazardous Material Accident	7	4	10	7	7	1	6.25
10	Fixed Site Hazardous Material Accident	7	4	10	7	7	1	6.25
10	Scrap Tire Fire	1	4	10	10	10	4	6.25
13	Riverine, Flash, and Urban Flooding	6	1	10	10	7	1	6.00
14	Transportation Accident (land/air/water)	10	1	1	7	7	4	5.95
15	Hailstorms	7	10	4	4	1	10	5.50
16	Tornadoes	4	7	4	10	3	0	4.70
17	Lightning	4	1	7	10	1	0	3.60
18	Sabotage/Terrorism/Nuclear Attack	1	10	10	1	1	1	3.25
19	Civil Disturbance	1	1	1	1	4	1	1.75
20	Karst Sinkholes (subsidence)	0	1	1	1	1	1	0.75

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, public awareness, and the size of the affected area. 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 6-9 Otsego County Risk and Vulnerability Assessment Summary			
Rank	**Hazard**	**Risk Assessment**	**Vulnerability Assessment**
1	Winter Weather Hazards (ice and sleet storms, and snowstorms)	High Probability/High Impact	Minor
2	Oil and Gas Accident (well and pipeline)	Low Probability/High Impact	Noticeable
3	Public Health Emergency	Low Probability/High Impact	Severe
4	Wildfire	High Probability/High Impact	Severe
5	Infrastructure Failure	High Probability/High Impact	Severe
6	Extreme Temperatures (Extreme Heat and Extreme Cold)	High Probability/Low Impact	Noticeable
6	Drought	Low Probability/High Impact	Noticeable
8	Severe Winds (derecho)	High Probability/Low Impact	Severe
9	Structural Fire	High Probability/High Impact	Noticeable
10	Transportation Hazardous Material Accident	Low Probability/High Impact	Noticeable
10	Fixed Site Hazardous Material Accident	Low Probability/High Impact	Noticeable
10	Scrap Tire Fire	Low Probability/High Impact	Severe
13	Riverine, Flash, and Urban Flooding	High Probability/High Impact	Noticeable
14	Transportation Accident (land/air/water)	High Probability/Low Impact	Minor
15	Hailstorms	Low Probability/Low Impact	Noticeable
16	Tornadoes	Low Probability/High Impact	Severe
17	Lightning	Low Probability/Low Impact	Minor
18	Sabotage/Terrorism/Nuclear Attack	Low Probability/High Impact	Severe
19	Civil Disturbance	Low Probability/Low Impact	Minor
20	Karst Sinkholes (subsidence)	Low Probability/Low Impact	Minor

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Chapter 7
Goals and Objectives

Overview

The community goals and objectives for Otsego 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 hazard mitigation efforts within Otsego County. The goals are broad in nature with slightly more specific objectives. 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.
- 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 hazard effects.

GOAL 2: Minimize Damage to Private and Public Property

Objectives

- Apply proactive mitigation measures to prevent hazard damage.
- Obtain necessary equipment, resources and training to protect property if a hazard occurs.
- Adopt policies to make properties less vulnerable.
- 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 hazard damage.
- Obtain resources and equipment to ensure essential services are maintained during a hazard.

GOAL 4: Coordinate hazard mitigation with growth and development planning

Objectives

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

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 Otsego 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 7 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.

Chapter 8
Mitigation Strategies and Priorities

Overview

After determining Otsego 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, administrative potential, political impact, legal ramification, environmental impact, overall benefit, and cost effectiveness. The Otsego County LEPC, county, local governments, and special interest groups considered their budgets, available technical resources, and current visions to assess each action item's priority, and current and future progress.

Mitigation Action and Implementation Strategies

In the previous hazard mitigation plan, the mitigation actions and implementation strategies were categorized based on the hazard(s) they addressed (Appendix D). When the LEPC reviewed the strategies, they moved many action items to the all-hazard mitigation table, and multiple 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. Participate in long-term planning to provide more connector roads and reduce traffic congestion on arterial roads.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Transportation Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water)
Responsible Agencies: County Emergency Management Office, County Road Commission, State
Financial and Technical Resources: Federal Government, State
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. Develop, review, and update if necessary, the Regional EMS response plan to supplement the county's mass casualty plan.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Sabotage/Terrorism/Nuclear Attack
Responsible Agencies: County Emergency Management Office, County, Schools, Medical, State
Financial and Technical Resources: Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Initiated and 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 reviewed and updated.

3. Enforce compliance with the oil and gas industry safety regulations and standards.

Priority Level: High
Hazards Addressed: Oil and Gas Accident (well and pipeline)
Responsible Agencies: State, Federal Government
Financial and Technical Resources: 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.

4. Conduct annual meetings with the Michigan Department of Natural Resources, U.S. Forest Service, and local fire departments.

Priority Level: High
Hazards Addressed: Wildfires, Scrap Tire Fires, Structural Fires
Responsible Agencies: Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, Chester, Hayes, Corwith, and Elmira Townships (medium priority), Bagley and Livingston Townships (low priority)

Financial and Technical Resources: Local Fire Departments, State (DNR) and Federal Governments, Corwith Township (fire millage)
Progress/Status: Ongoing/Long term throughout the entire county. Almost complete. Corwith Township has completed.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority did not change since this strategy will be continually implemented.

5. Enforce open burning regulations.

Priority Level: High
Hazards Addressed: Wildfire, Structural Fire, Scrap Tire Fire
Responsible Agencies: State, U.S. Forest Service, Michigan Department of Natural Resources, Chester, Bagley, and Elmira Townships (medium priority), Corwith Township (low priority), Livingston Township
Financial and Technical Resources: Local Fire Departments, Michigan Department of Natural Resources, and Federal Governments
Progress/Status: Ongoing/Long term throughout the entire county. Michigan Department of Natural Resources is the lead responsible agency (state program).
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a high priority. The priority did not change since this strategy will be continually maintained.

6. Create a Wildfire Safety Coalition that develops a neighborhood watch program to assist in educating the public about evacuation routes, sprinkler systems, power lines, etc.

Priority Level: High
Hazards Addressed: Wildfire, Scrap Tire Fire
Responsible Agencies: Local Fire Departments, Landowners, Civic and Church Groups, Bagley and Corwith Townships (medium priority), Hayes and Livingston Townships (low priority)
Financial and Technical Resources: Civic and Church Groups, County, State
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 changed since the county plans to develop the program within the next five years.

7. Continue the house numbering program.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Hailstorms, Tornadoes, Lightning
Responsible Agencies: County Emergency Management Office, County, Dover and Chester Townships (low priority), Elmira, Corwith, and Bagley Townships (high priority), Hayes and Livingston Townships (medium priority)
Financial and Technical Resources: State, County (Equalization Department), Landowners, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. System in place through county equalization fees; however, residents/seasonal residents do not display. Corwith Township works on the strategy weekly.

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.

8. Review and update if necessary, the procedures regarding regular maintenance and equipment checks for critical equipment.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County, Chester Township (medium priority), Local Fire Department, County Road Commission, Dover, Corwith, and Elmira Townships (high priority)
Financial and Technical Resources: American Red Cross, County Road Commission, Schools, MSU Extension, County, Local Fire Department, Dover Township, Corwith Township millage
Progress/Status: Ongoing/Long term throughout the entire county. Each department is responsible for maintaining their equipment. Procedures in place in Dover Township. Corwith Township checks equipment monthly.
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.

9. Review and update if necessary, plans and procedures to determine the location of 'safe areas' and how to inform the public about their location during festivals and events (e.g., wayfinding signage for emergency shelters).

Priority Level: High
Hazards Addressed: Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Hailstorms, Tornadoes, Lightning
Responsible Agencies: County Emergency Management Office, City of Gaylord, Hayes and Elmira Townships (high priority), Livingston Township (low priority), Local Fire Department, County Road Commission, Police
Financial and Technical Resources: Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Emergency management plans in place and are reviewed annually. Limited financial resources.
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 changed to streamline emergency procedures.

10. Develop contingency plans for oil and gas industry employees and the public that include rescue and evacuation procedures.

Priority Level: High
Hazard Addressed: Oil and Gas Accident (well and pipeline)
Responsible Agencies: County Emergency Management Office, Local Fire Department, Regional Partnerships, U.S. Forest Service, Michigan Department of Natural Resources, State, Utility Company, Bagley Township (low priority), Elmira Township (medium priority), Hayes and Corwith Township (high priority)

Financial and Technical Resources: Federal Government, County Emergency Management Office, County Road Commission, County (millage), Local Fire Department (Vanderbilt-Corwith Fire Department), Local Governments (Corwith Township millage), Otsego EMS, Local Businesses with wells
Progress/Status: Ongoing/Long term throughout the entire county. In progress, working with companies.
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.

11. Meet with local industries to determine what types of hazardous material products are transported on county highways. Provide that information to the hazardous material teams and fire departments.

Priority Level: Medium
Hazards Addressed: Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident
Responsible Agencies: County Emergency Management Office, Local Businesses, Regional Partnerships
Financial and Technical Resources: County Emergency Management Office
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.

12. Conduct annual meetings with the oil and gas industry, fire departments, and law enforcement agencies.

Priority Level: Medium
Hazards Addressed: Oil and Gas Accident (well and pipeline)
Responsible Agencies: County Emergency Management Office, Utility Company
Financial and Technical Resources: County Emergency Management Office, State,
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. Build the county's GIS capabilities (create and update datasets including parcels/owners, structure location, driveways with ingress/egress conditions, roads, forest types, ownership types, floodplains, utilities (power, gas and water lines), wetlands, water features, bridges, culverts, and SARA Title III sites).

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County, Bagley Township (low priority), Elmira, Corwith, and Hayes Townships (high priority)
Financial and Technical Resources: Federal Government, County Road Commission, County (Otsego Equalization Department –technical resource), State, NEMCOG (technical), Local Governments budgets

Progress/Status: Ongoing/Long term throughout the entire county. County hires companies to maintain the county's GIS program. Most GIS is complete.
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 reviewed and updated.

14. Prepare future land use plans and capital improvement plans that include hazard mitigation implementation items.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County, Chester and Bagley Townships (low priority), MSU Extension, Elmira Township (medium priority), Corwith Township (high priority)
Financial and Technical Resources: County, Local Governments
Progress/Status: Ongoing/Long term throughout the entire county. In Progress. Chester Township has planning and zoning. Townships are covered under the county's zoning. Corwith Township's Planning Commission is working on this strategy.
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 reviewed and updated.

15. Enforce ordinances that protect the community and respect individual rights. Continue to enforce property maintenance codes.

Priority Level: Medium
Hazards Addressed: Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Severe Winds (derecho), Structural Fire, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Karst Sinkholes (subsidence)
Responsible Agencies: Chester and Elmira Townships (medium priority), Bagley and Corwith Townships (high priority), County, State, Dover, Livingston and Hayes Townships (high priority)
Financial and Technical Resources: County, Local Governments
Progress/Status: Ongoing/Long term throughout the entire county. Continually being reviewed and updated (~75-80% completed). Chester Township has an ordinance officer. Dover Township is working on putting ordinances in place. Corwith Township is looking into future planning needs. This is one of Livingston Township's top priorities.
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.

16. Develop or review and update landlord-tenant ordinances.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Public Health Emergency, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Structural Fire

Responsible Agency: County
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 did not change since the county still plans to re-attempt this strategy.

17. Ensure the county and local governments have adequate equipment and training to respond to hazard events.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, County, Chester, Livingston, and Bagley Townships (medium priority), Elmira and Corwith Townships (high priority), Local Fire Departments, County Road Commission, Police Regional Partnerships, Medical
Financial and Technical Resources: County, Local Governments, Federal Government, Local Fire Department, Schools/buses
Progress/Status: Ongoing/Long term throughout the entire county. Continually reviewed. Equipment funding through EMS. Corwith Township has 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.

18. Review well and pipeline designs. Enforce well site signing (larger signs, moving signs to gate sites, etc.), and proper pipeline construction, maintenance, and inspection.

Priority Level: Medium
Hazards Addressed: Oil and Gas Accidents (well and pipeline)
Responsible Agencies: State, Utility Company, Federal Government, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources
Financial and Technical Resources: State, County, County Emergency Management Office, County Road Commission, Federal Government, Local Businesses
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.

19. Develop a medical airlift plan.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Structural Fire, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, Local Fire Departments, Medical, Police
Financial and Technical Resources: 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.

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

Priority Level: Medium
Hazards Addressed: Public Health Emergency
Responsible Agencies: District Health Department, Medical
Financial and Technical Resources: Federal Government, State, District Health Department
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.

21. Encourage separating and buffering between industrial land uses, and other land uses and facilities (e.g., schools, nursing homes, hospitals, etc.).

Priority Level: Medium
Hazards Addressed: Oil and Gas Accident (well and pipeline), Public Health Emergency, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident
Responsible Agencies: County, Bagley and Corwith Townships (high priority), Elmira and Hayes Townships (medium priority), Livingston Township (low priority)
Financial and Technical Resources: County Emergency Management Office, County
Progress/Status: Ongoing/Long term throughout the entire county. Addressed in County Zoning Ordinance.
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.

22. Develop or review site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, local bus providers, etc.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, Bagley and Corwith Townships (medium priority), Local Fire Department, Elmira and Hayes Townships (high priority)
Financial and Technical Resources: Federal Government, Corwith Township (general fund, community partnership funding)
Progress/Status: Ongoing/Long term throughout the entire county. Located within the county emergency management plan. Corwith Township's emergency plans are in place. Annual meetings with the local bus providers.
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.

23. Review and update if necessary, the procedures regarding the distribution of emergency telephone numbers to the public. Continue monitoring the Federal Government's progress in assigning a three-digit number (988) for the National Suicide Prevention Lifeline.

Priority Level: Low
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County, Bagley, Chester, and Elmira Townships (medium priority), Hayes and Corwith Townships (high priority), Utility Company, Livingston Township, Medical, District Health Department, Police, Local Fire Departments, Emergency Medical Services
Financial and Technical Resources: County, Local Governments, Utility Company, County Emergency Management Office
Progress/Status: Ongoing/Long term throughout the entire county. 911 and 211 are 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 reviewed and updated, if necessary.

24. Review railroad inspection procedures. Identify and re-design problem areas at railroad-roadway intersections.

Priority Level: Low
Hazards Addressed: Transportation Hazardous Material Accident, Transportation Accident (land/air/water)
Responsible Agencies: Schools, State
Financial and Technical Resources: County Road Commission, State
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.

25. Identify the optimal staffing levels for the county, local governments, police, emergency medical services, and fire departments, and seek funding to meet those levels.

Priority Level: Low
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County, Chester Township (low priority), Bagley, Corwith, and Elmira Townships (medium priority), Hayes Township (high priority), MSU Extension
Financial and Technical Resources: County, Local Governments
Progress/Status: Ongoing/Long term throughout the entire county. Procedures in place and active.
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.

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. Demolish and clear vacant, condemned structures.

Priority Level: Medium
Hazards Addressed: Public Health Emergency, Structural Fire
Responsible Agencies: County, District Health Department, Bagley and Hayes Townships (medium priority), Elmira and Livingston Townships (low priority)
Financial and Technical Resources: Federal Government, State, District Health Department
Progress/Status: Ongoing/Long term throughout the entire county. Zoning and the health department addresses this strategy.
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. Improve the location, design, and maintenance of the water and sewer systems, including insulating critical components to prevent damage from ground freeze.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Sabotage/Terrorism/Nuclear Attack
Responsible Agencies: County, City of Gaylord, Chester Township (medium priority), Corwith Township (low priority), County Health Department
Financial and Technical Resources: State and Federal Governments
Progress/Status: Ongoing/Long term in the county. County Health Department is the responsible agency.
Previous Plans: This item has been retained from the 2005 and 2014 plans, in which it was classified as a medium priority. The priority did not change since the city plans to implement the strategy depending on funding.

3. Strengthen public and private structures through the review of wind engineering measures and construction techniques.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Tornadoes
Responsible Agencies: County Emergency Management Office, County
Financial and Technical Resources: 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.

4. Continue implementing building code regulations that require the proper anchoring of manufactured homes and exterior structures.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Severe Winds (derecho), Structural Fire, Hailstorms, Tornadoes
Financial and Technical Resources: 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.

5. Identify electrical systems that will overload and fail. Develop a "rolling blackout" strategy.

Priority Level: Low
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Public Health Emergency, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold)
Responsible Agencies: State, Utility Company
Financial and Technical Resources: Utility Company, State
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.

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. Provide information to the public about pollution, including but not limited to pollution control, enforcement, clean-up, and proper disposal of chemicals and scrap materials.

Priority Level: High
Hazards Addressed: Public Health Emergency, Drought
Responsible Agencies: County Emergency Management Office, County, Corwith Township (high), Bagley, Livingston, and Chester Township (low priority), Elmira Township (medium priority), District Health Department, Regional Partnerships, MSU Extension, State
Financial and Technical Resources: Federal Government, District Health Department, State, Corwith Township (general fund and Otsego County millage)
Progress/Status: Ongoing/Long term throughout the entire county. Programs in place. Chester Township has a dump day every other year. Corwith Township has a transfer station that is open weekly with a once-a-year full spring cleanup of non-hazardous materials. The county has 24 hour seven days a week recycling for paper, cardboard, and metals. Otsego Soil Conservation collects hazard materials once a year.
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. Acquire portable message signs to provide information and directions to motorists and crowds.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Transportation Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes
Responsible Agencies: County Emergency Management Office, County Road Commission, State
Financial and Technical Resources: State, County, Local Governments, Insurance Companies, County Road Commission
Progress/Status: Ongoing/Long term on the roadways throughout the entire county. Message signs for community events is currently under review.
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 depending on funding.

3. Promote the use of NOAA radios as an early warning system.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Extreme Temperatures (Extreme Heat and Extreme Cold) , Severe Winds (derecho), Hailstorms, Tornadoes, Lightning,
Responsible Agencies: County Emergency Management Office, Local Fire Department, Local Businesses, National Weather Service, Bagley and Livingston Townships (low priority), Dover Township (high priority), Hayes, Corwith, and Elmira Townships (medium priority), businesses, landowners, Regional Partnerships
Financial and Technical Resources: Federal Government, EMS (technical), County, County Emergency Management Office, Local Governments
Progress/Status: Ongoing/Long term throughout the entire county. Annual education programs are available. NOAA radios are available to anyone who wants to purchase one. Advertising campaign in place dependent on funding.
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. Develop education programs and pamphlets to encourage the installation and maintenance of smoke detectors and fire extinguishers, the proper installation and maintenance of heating systems, and the safe use and maintenance of fireplaces and chimneys, stoves, heaters, fireworks, matches, lighters, and electric and space heaters. Train residents on how to use a fire extinguisher.

Priority Level: High
Hazards Addressed: Structural Fire
Responsible Agencies: County Emergency Management Office, Local Fire Departments, MSU Extension, Insurance Companies, American Red Cross, Regional Partnerships, Elmira Township (high priority), Bagley, Corwith, and Hayes Townships (medium priority), County, Salvation Army, U.S. Forest Service, Michigan Department of Natural Resources, Schools

Financial and Technical Resources: American Red Cross, State, Federal Government, Local Fire Department, Insurance Companies, County Emergency Management Office, County, Local Governments
Progress/Status: Ongoing/Long term throughout the entire county. Yearly canvas and publicity.
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. Increase public awareness about oil and gas pipeline locations and emergency procedures.

Priority Level: High
Hazards Addressed: Oil and Gas Accident (well and pipeline)
Responsible Agencies: County Emergency Management Office, Insurance Companies, Utility Companies, State, U.S. Forest Service and Michigan Department of Natural Resources
Financial and Technical Resources: 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.

6. Identify the location of vulnerable populations (elderly, infirmed, disabled, low-income, seasonal, etc.) and establish an outreach strategy to assist them before, during, and after a hazard event.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, Chester Township (low priority), Hayes and Livingston Townships (medium priority), Dover, Bagley, Corwith, and Elmira Townships (high priority), District Health Department, Medical, Local Fire Departments, American Red Cross, Civic Groups and Churches, Michigan Department of Natural Resources, Local Businesses, Landowners
Financial and Technical Resources: County Emergency Management Office, District Health Department, Federal Government, Local Governments, County, American Red Cross, Dover Township (technical), Food pantry, Michigan Department of Natural Resources, Local Businesses, Landowners
Progress/Status: Ongoing/Long term throughout the entire county. List is continually updated and reviewed. Difficulty in identifying populations unless self-identify. Seasonal issues. Weekly efforts in Corwith Township.
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 maintained.

7. Develop an education outreach program to instruct the public about evacuation plans and emergency routes.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Scrap Tire Fire, Sabotage/Terrorism/Nuclear Attack

Responsible Agencies: Bagley, Corwith, and Elmira Townships (medium priority), Chester, Hayes, and Livingston Townships (low priority), County Emergency Management Office, Local Fire Department, County Road Commission, Salvation Army, American Red Cross, U.S. Forest Service, Michigan Department of Natural Resources
Financial and Technical Resources: American Red Cross, County, County Road Commission, State, Federal Governments, Local Fire Departments, County Emergency Management Office
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 reviewed.

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

Priority Level: Medium
Hazards Addressed: Public Health Emergency
Responsible Agencies: County, District Health Department, Medical, Bagley, Hayes, and Elmira Townships (medium priority), Corwith Township (low priority)
Financial and Technical Resources: Federal Government, County, State, District Health Department, School
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. Develop a wildfire education program that includes distributing wildfire education materials to homeowners and businesses, promoting the creation of defensible space around structures in fire-prone areas, promoting media broadcasts about fire weather and warnings, and conducting school presentations and Firewise demonstration projects.

Priority Level: Medium
Hazards Addressed: Wildfires, Scrap Tire Fires
Responsible Agencies: County Emergency Management Office, Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, Hayes and Corwith Townships (low priority), Schools, County, Bagley and Elmira Townships (medium priority), MSU Extension, Insurance Companies, Landowners, Local Businesses
Financial and Technical Resources: State, County, Federal Government, Local Fire Departments, Landowners, Local Businesses
Progress/Status: Ongoing/Long term throughout the entire county. Dependent on available funding.
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.

10. Work with insurance companies to reduce insurance premiums if homes and businesses meet "Firewise" criteria.

Priority Level: Medium
Hazards Addressed: Wildfire, Scrap Tire Fire
Responsible Agencies: Local Fire Departments, U.S. Forest Service, Michigan Department of Natural Resources, Landowners, Insurance Companies, Elmira and Bagley Township (medium priority), Hayes and Corwith Townships (low priority)
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 pursued in the future.

11. Provide public education about 'sheltering in place' during a hazardous material accident, and how to identify and assist in eliminating neighborhood drug labs.

Priority Level: Medium
Hazards Addressed: Public Health Emergency, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident
Responsible Agencies: County Emergency Management Office, County, Local Fire Department, Regional Partnerships, State, Police
Financial and Technical Resources: Federal Government, County Emergency Management Office, County, Local Governments, Local Fire Departments
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.

12. Enhance 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: Medium
Hazards Addressed: Public Health Emergency
Responsible Agencies: District Health Department, Medical, Regional Partnerships, Schools
Financial and Technical Resources: Federal Government, State, District Health Department
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 and implement a hazards education and awareness program. Conduct emergency preparedness workshops at community gatherings, provide hazard information, and encourage residents to develop a Family Disaster Plan, including the preparation of a Disaster Supplies Kit.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, Corwith and Livingston Townships (low priority), Charlton Township, Village of Vanderbilt, Otsego Lake Township, Local Fire Departments, District Health Department, Regional Partnerships, Civic Groups and Churches, American Red Cross, Elmira, Bagley, and Hayes Township (medium priority), National Weather Service, Schools, Salvation Army, County
Financial and Technical Resources: American Red Cross, County, Federal Government, State, County Emergency Management Office, District Health Department, Local Governments

Progress/Status: Ongoing/Long term throughout the entire county. Education program is in place, active, and reviewed. A school program is in place that includes classroom presentations and curriculums. Public outreach for COVID-19 resources. Corwith Township plans to have future discussions about implementation procedures.
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 reviewed and updated.

14. Promote and implement solutions to keep roads and driveways accessible to emergency vehicles.

Priority Level: Low
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: Landowners, Chester and Bagley Townships (medium priority), Corwith, Livingston, and Elmira Townships (high priority), Local Fire Departments, County Road Commission, Hayes Township (low priority)
Financial and Technical Resources: State, Federal Government, Landowners, Local Businesses, County Road Commission (public roads)
Progress/Status: Ongoing/Long term throughout the entire county. Chester Township works with the Road Commission. Zoning has addressed issue.
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 updated.

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. Improve tree trimming and maintenance efforts to create disaster-resistant public rights-of-way.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Wildfire, Infrastructure Failure, Severe Winds (derecho), Scrap Tire Fire, Hailstorms, Tornadoes, Lightning
Responsible Agencies: County Road Commission, Utility Company
Financial and Technical Resources: Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Program 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.

2. Seek support and funding to clean up environmental contamination sites, including but not limited to brownfield clean-up activities and identifying radioactive soils and high-radon areas.

Priority Level: Medium
Hazards Addressed: Public Health Emergency
Responsible Agencies: County, State, Bagley, Hayes, Corwith, Livingston, and Elmira Townships (medium priority), Livingston Township (low priority), Regional Partnerships, District Health Department
Financial and Technical Resources: Federal Government, County, State, Local Governments, Brownfield Development Committee, Local Businesses that caused contamination, County Emergency Management Office, Local Fire Departments
Progress/Status: Ongoing/Long term throughout the entire county. Currently being addressed.
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.

3. Determine high-water marks and have them verified by the Michigan Department of Environment, Great Lakes, and Energy.

Priority Level: Low
Hazards Addressed: Riverine, Flash and Urban Flooding
Responsible Agencies: County, Chester and Bagley Townships (low priority), Elmira and Hayes Townships (medium priority), Corwith and Livingston Townships (high priority), State
Financial and Technical Resources: County, State, Corwith Township (general fund)
Progress/Status: Ongoing/Long term throughout the entire county. Currently under review (historical marks have been identified; current high-water marks pass the historical ones). Corwith Township is working on.
Previous Plans: Not applicable; This strategy was added to the 2021 plan.

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. Use NOAA data to predict location(s) and warn motorists about potential white-out road hazards.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms)
Responsible Agencies: County Emergency Management Office, County Road Commission, State, National Weather Service
Financial and Technical Resources: State, County, Local Governments, Insurance Companies
Progress/Status: Ongoing/Long term throughout the entire county; Program is in place and is continually 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.

2. Review and update if necessary, mutual aid assistance for utility and communication system failures.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack
Responsible Agencies: County Emergency Management Office, County, Regional Partnerships, Bagley Township (medium priority), Elmira Township (high priority), Hayes Township (low priority)
Financial and Technical Resources: Federal Government, Local Businesses
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.

3. Enforce highway speeds.

Priority Level: High
Hazards Addressed: Transportation Hazardous Material Accident, Transportation Accident (land/air/water)
Responsible Agencies: Police
Financial and Technical Resources: Police
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.

4. Increase volunteer firefighter recruitment. Research offering paid training opportunities.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: Local Fire Department
Financial and Technical Resources: County Emergency Management Office, County, Local Governments, Local Fire Departments
Progress/Status: Ongoing/Long term for the local fire departments 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.

5. Develop a strategy to standardize equipment, so all county firefighters can operate any piece of equipment.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident,

Fixed Site Hazardous Material Accident, Scrap Tire Fire, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, Local Fire Department, U.S. Forest Service, Michigan Department of Natural Resources, City of Gaylord, Bagley, Corwith, Hayes, and Elmira Townships (medium priority)
Financial and Technical Resources: County Emergency Management Office, County, Local Fire Departments
Progress/Status: Ongoing/Long term for the local fire departments throughout the entire county. Each department is responsible for their own equipment.
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 increased in priority for the local fire departments.

6. Establish or prearrange shelters and heating/cooling centers for vulnerable populations.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Structural Fire, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, Chester Township (low priority), Bagley, Corwith, and Elmira Townships (high priority), City of Gaylord, Civic and Church Groups, Salvation Army, American Red Cross
Financial and Technical Resources: County, American Red Cross, Local Governments, District Health Department, Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Shelters in place. In progress in Corwith Township.
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 maintained.

7. Program load type into CAMEO and develop pre-evacuation plans by material type.

Priority Level: High
Hazards Addressed: Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident
Responsible Agencies: County Emergency Management Office, Regional Partnerships, U.S. Forest Service, Michigan Department of Natural Resources, National Weather Service
Financial and Technical Resources: County Emergency Management Office
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 reviewed, updated, and implemented.

8. Inventory and maintain emergency back-up generators. Provide generators for water needs, wastewater processing, communications, healthcare services, shelters, and to maintain critical facilities at acceptable operation levels.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, County, District Health Department, Salvation Army, American Red Cross, Utility Companies, Dover and Corwith Townships (high priority), Bagley and Hayes Townships (medium priority), Livingston Township (low priority), Regional Partnerships
Financial and Technical Resources: District Health Department, American Red Cross, County, State, Local Government budgets, Federal Government, Corwith Township (technical), Vanderbilt Corwith Fire Department (technical)
Progress/Status: Ongoing/Long term throughout the entire county. Progress made to inventory and provide generators. Elmira, Hayes, and Dover Townships have generators in place. Some residents have purchased home generators. Corwith Township has a backup generator for its municipal water supply for potable use (currently used for the fire department water supply).
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.

9. Expand the county's early warning system, including but not limited to identifying feasible sites for warning systems, using NOAA radios as an emergency alert system, and seeking funding to install warning systems.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, Local Fire Departments, Local Businesses, National Weather Service, Bagley Township (low priority), Dover Township (high priority), Hayes, Corwith, Livingston, and Elmira Townships (medium priority), businesses, landowners, Regional Partnerships, Police,
Financial and Technical Resources: Federal Government, EMS (technical), County, County Emergency Management Office, Local Governments, State
Progress/Status: Ongoing/Long term throughout the entire county. NOAA radios are available to anyone who wants to purchase one. No activity on stationary sirens. Use NOAA radios and Reverse 911 as the public early warning system. Expansion of the early warning system is addressed in the emergency plan.
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.

10. Provide multi-agency and inter-county scenarios, training, planning, and preparedness for events that include but are not limited to gasoline or propane accidents, mass casualty public transportation accidents (60-person accident involving a bus and logging truck, a school bus and commercial bus accident, an airfield emergency, etc.), fire suppression, etc.

Priority Level: Medium
Hazards Addressed: Oil and Gas Accident (well and pipeline), Wildfire, Infrastructure Failure, Drought, Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Transportation Accident (land/air/water), Tornadoes, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance
Responsible Agencies: Local Fire Departments, Local Businesses, County Emergency Management Office, County, County Road Commission, Medical, State, Police, Bagley and Elmira Townships (medium priority), Regional Partnerships, Livingston and Corwith Townships (high priority), Surrounding County and Local Governments, Hayes Township (low priority), Emergency Medical Services
Financial and Technical Resources: Federal Government, Local Fire Departments, Emergency Medical Services
Progress/Status: Ongoing/Long term throughout the entire county. Procedures in place. Corwith Township has completed a multi-agency, inter-county fire suppression scenario, and future scenarios are dependent on available funding.
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.

11. Train, equip, and prepare the county emergency response team, search and rescue teams, and fixed site and local hazardous material response teams.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Drought, Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, County, Local Fire Departments, Police, Regional Partnerships, Civic Groups and Churches, Corwith Township (medium priority), Bagley, Dover, Hayes, and Elmira Townships (high priority), District Health Department,
Financial and Technical Resources: County Emergency Management Office, District Health Department, Federal Government, Corwith Township (fire millage), Vanderbilt Corwith Fire Department (technical resource), Dover Township (technical resources)
Progress/Status: Ongoing/Long term throughout the entire county. Search and Rescue Program is active. Limited financial and technical resources. Corwith Township has monthly training for search and rescue teams. Emergency Response Team is active and outlined in the Emergency Management Plan.
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. Provide training regarding safety procedures and systems related to the manufacture, storage, transport, use, and disposal of hazardous materials to maintain compliance.

Priority Level: Medium
Hazards Addressed: Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident
Responsible Agencies: County Emergency Management Office, Local Fire Department, State, Regional Partnerships
Financial and Technical Resources: Federal Government, State
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. Inventory heavy equipment, wreckers, and jaws units within 30 minutes of county locations.

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Structural Fire, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Sabotage/Terrorism/Nuclear Attack
Responsible Agencies: County Emergency Management Office, Regional Partnerships
Financial and Technical Resources: 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 reviewed and updated.

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

Priority Level: Medium
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Scrap Tire Fire, Transportation Accident (land/air/water), Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Karst Sinkholes (subsidence)
Responsible Agencies: Bagley and Corwith Townships (medium priority), Insurance Companies, Local Businesses, Elmira and Hayes Townships (high priority)
Financial and Technical Resources: Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Stations have been identified in county emergency management plan. No stations in Hayes Township.
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 reviewed and updated.

15. Conduct annual site visits to acquire information about on-site products and how they are handled.

Priority Level: Medium
Hazards Addressed: Fixed Site Hazardous Material Accident
Responsible Agencies: Local Businesses, Fire Departments
Financial and Technical Resources: Federal Government
Progress/Status: Ongoing/Long term throughout the entire county. Fire Departments will reach out to businesses.
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.

16. Determine evacuation routes and emergency snow routes.

Priority Level: Low
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Wildfire, Scrap Tire Fire, Sabotage/Terrorism/Nuclear Attack
Responsible Agencies: Bagley, Corwith, and Elmira Townships (medium priority), Chester Township (low priority), County Emergency Management Office, Local Fire Department, County Road Commission, Salvation Army, American Red Cross
Financial and Technical Resources: American Red Cross, County, County Road Commission
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.

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. Identify water supplies and areas lacking adequate water supplies. Develop an integrated water supply system with year-round access that uses dry hydrants, multi-tankers, well-located water supplies, etc.

Priority Level: High
Hazards Addressed: Wildfire, Structural Fire, Scrap Tire Fire
Responsible Agencies: County, Local Fire Department, U.S. Forest Service, Michigan Department of Natural Resources, Elmira Township (high priority), Hayes Township (medium priority), Corwith and Livingston Township (low priority)
Financial and Technical Resources: State, Federal Government, County Emergency Management Office, County, Local Governments, Local Fire Departments, County Road Commission, Corwith Township (fire millage)
Progress/Status: Ongoing/Long term throughout the entire county. Annual review and update. Hayes Township helped install five dry hydrants. Inventory and dry hydrant construction has been completed and is continually reviewed. Corwith Township has a water well to fill fire trucks in a couple of minutes per demand and a float dock to water intake at a stream or lake (pending weather is not an issue).

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 monitored.

2. Develop, review, and update if necessary, strategies to ensure redundancies in the utility and communication systems.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Oil and Gas Accident (well and pipeline), Public Health Emergency, Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning, Sabotage/Terrorism/Nuclear Attack, Civil Disturbance, Karst Sinkholes (subsidence)
Responsible Agencies: County Emergency Management Office, Regional Partnerships, State, Utility Company
Financial and Technical Resources: Federal Government, Utility Company, Local Businesses
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.

3. Inventory problem sections of roadways. Improve critical road/stream crossings, and place snow fences or vegetation along critical roads to limit blowing and drifting of snow over the roads.

Priority Level: High
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Infrastructure Failure, Transportation Hazardous Material Accident, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water)
Responsible Agencies: Bagley and Elmira Townships (medium priority), Chester and Hayes Townships (low priority), County Road Commission
Financial and Technical Resources: State (MDOT), NEMCOG (technical), County Road Commission, Federal Government, State
Progress/Status: Ongoing/Long term throughout the entire county. In Progress. Plans are annually updated. In Corwith Township, most roads are completed.
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.

4. Coordinate with local governments to assure proper location, installation, cleaning, monitoring, and maintenance of septic tanks.

Priority Level: Medium
Hazards Addressed: Public Health Emergency, Infrastructure Failure
Responsible Agencies: County, District Health Department, Local Governments
Financial and Technical Resources: County, Local Governments, District Health Department
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.

5. Construct structures to prevent the public from coming in contact with contaminated sites or waters (including flood waters).

Priority Level: Medium
Hazards Addressed: Oil and Gas Accident (well and pipeline), Public Health Emergency, Infrastructure Failure, Transportation Hazardous Material Accident, Fixed Site Hazardous Material Accident, Scrap Tire Fire, Riverine, Flash and Urban Flooding, Transportation Accident (land/air/water), Sabotage/Terrorism/Nuclear Attack
Responsible Agencies: Regional Partnerships, District Health Department, Police
Financial and Technical Resources: County Emergency Management Office, County, Local Governments, Local Fire Department
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.

6. Inventory and bury power and utility lines in densely populated areas, where feasible and cost effective.

Priority Level: Low
Hazards Addressed: Winter Weather Hazards (ice and sleet storms, and snowstorms), Wildfire, Infrastructure Failure, Extreme Temperatures (Extreme Heat and Extreme Cold), Severe Winds (derecho), Scrap Tire Fire, Transportation Accident (land/air/water), Hailstorms, Tornadoes, Lightning
Responsible Agencies: Utility Company
Financial and Technical Resources: Utility Company
Progress/Status: Ongoing/Long term throughout the entire county. Status unknown.
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.

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Chapter 9
Plan Maintenance

Implementation, Monitoring, and Evaluation

The Otsego County Board of Commissioners and the Otsego County Emergency Management Office are the primary entities responsible for implementing the Otsego County Hazard Mitigation Plan. The County Board of Commissioners 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 Otsego Emergency Management Office and the Otsego County Local Emergency Planning Committee (LEPC). 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 LEPC is organized under the Michigan SARA Title III Program and meets on a regular basis to carry out its duties. The County LEPC will function as the Hazard Mitigation Committee (HMC). Since the HMC is a sub-committee of the Otsego County LEPC, it will function under the Otsego County Board of Commissioners. The HMC and the Emergency Manager will be responsible for monitoring and overseeing the implementation of the hazard mitigation plan. Staff support will be provided by the Otsego County Emergency Management Office and will coordinate with the County Board of Commissioners. The Otsego County Emergency Manager will provide program administration and project oversight on an ad-hoc basis.

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 Otsego 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 in identifying the tasks needed to complete a project, 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 County Board of Commissioners, 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.

Additionally, the HMC and the Otsego County Emergency Management Office 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 plan implementation, there have been favorable outcomes, and other agencies and stakeholders have

participated as expected. Involvement with the HMC will be determined by available emergency management staff time.

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. The HMC will coordinate and 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:

- Otsego County Departments
- City of Gaylord
- Village of Vanderbilt
- Bagley Township
- Corwith Township
- Livingston Township
- Chester Township
- Dover Township
- Hayes Township
- Otsego Lake Township
- Elmira Township
- Charlton Township
- Township, City, and Village Fire Departments
- Otsego County Conservation District
- Otsego 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
- Natural Resource Conservation Service
- Huron Pines
- Federal Emergency Management Administration
- Michigan State Police
- District Health Department
- American Red Cross
- Insurance Companies
- Real Estate Companies
- Local Businesses
- Civic Groups and Churches

Integration

Otsego County, the City of Gaylord, the Village of Vanderbilt, all townships in Otsego County, and local and state agencies will consider integrating information from the hazard mitigation plan into their comprehensive and operations plans. When jurisdictions update their master plans, they will consider incorporating appropriate hazard mitigation information. All communities in the county will be encouraged to adopt zoning regulations to minimize hazard impacts.

Five Year Plan Review and Update

The Stafford Act, as amended by the Disaster Mitigation Act of 2000, requires the Otsego County Hazard Mitigation Plan to be updated, adopted, and re-submitted for Federal Emergency Management Agency (FEMA) approval every five years. Otsego County will need to seek funding from appropriate state and federal agencies to properly update the plan. 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, 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. After the plan receives an "approvable pending adoption" status, the County Board of Commissioners and local jurisdictions will adopt the plan and all adoption resolutions will be submitted to the State Hazard Mitigation Officer and FEMA for final plan approval.

Continued Public Involvement

Otsego 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 on the Otsego County website and regional planning agency website. Additionally, activities associated with the hazard mitigation plan will be covered at LEPC meetings since the plan will be administered by the Otsego County Emergency Management Office and the Otsego County LEPC. Opportunities for public comment will be available at these meetings.

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APPENDIX A
REGIONAL PUBLIC PARTICIPATION SURVEY

The survey results for individuals residing in Otsego 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.

Twenty-one respondents indicated they lived within Otsego County and 61.9% indicated they had not received information about how to make their household safer from natural, technological, or human-related hazards. The majority of respondents indicated the mail and internet were the most effective way to distribute information, followed by television and the radio. Out of these respondents, 52.4% reported they have not experienced a hazard event in the last five years. The respondents who had experienced a hazard event indicated they had experienced winter storms, summer storms, hurricanes, and windstorms.

Natural Hazards

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

- Snow/ice storms: 81.0%
- Windstorms/high winds: 71.4%
- Extreme cold events: 66.7%
- Wildfires: 42.9%
- Thunderstorms: 38.1%
- Tornadoes: 33.3%

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

- Flooding: 76.2%
- Drought: 61.9%
- Extreme Heat: 42.9%

Respondents feel Otsego County is best prepared to handle extreme cold events (90.5%), snow/ice storms (85.7%), thunderstorms (81.0%), windstorms/high winds (57.1%), and tornadoes (52.4%). Respondents feel Otsego County is least prepared to handle droughts (50%). Respondents were unsure if the county is prepared to handle extreme heat events (47.6%), and flooding (47.6%). Approximately 76.2% of respondents indicated they were either unsure or the county was least prepared to handle wildfires.

Technological Hazards

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

- Power failure: 80.1%
- Communications failure: 76.2%
- Oil and gas accidents: 71.4%
- Hazardous material spills: 61.9%
- Road accidents: 80.1%
- Structural fires: 90.5%

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

- Dam failure: 90.5%
- Air transportation accidents: 42.9%
- Railroad accidents: 60.0%
- Water transportation accident: 66.7%
- Water and wastewater treatment system failure: 47.6%

Respondents are split on their concern level for terrorism/sabotage: 38.1% are very concerned or somewhat concerned, while 38.1%% are not very concerned or not concerned.

Respondents feel Otsego County is best prepared to handle road accidents (76.2%), structural fires (71.4%), hazardous material spills (61.9%), oil and gas accidents (61.9%), air transportation accidents (57.1%), and power failures (47.6%). Respondents are unsure if the county is prepared to handle dam failure (70.0%), terrorism/sabotage (57.1%), railroad accidents (52.4%), water or wastewater treatment system failure (52.4%), communications failures (50.0%), and water transportation accidents (42.9%).

Human-Related Hazards

Approximately 66.7% of respondents are very concerned or somewhat concerned about cyber attacks. About 61.9% of respondents are not very concerned or not concerned about chemical or biological attacks.

Respondents are unsure if the county is prepared to handle chemical or biological attacks (50.0%) and cyber-attacks (57.1%).

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 (100%)
- Creating an inventory of at-risk buildings and infrastructure (100%)
- Taking steps to safeguard the local economy following a disaster (95.2%)
- Disclosing natural hazard risk on real estate transactions (95.2%)
- Making their home more disaster-resilient (90.5%)
- Policies to prohibit development in areas subject to natural hazards (81.0%)
- Protecting historical or cultural structures (81.0%)
- Regulatory approaches (76.2%)
- The use of tax dollars to reduce risk and losses from natural disasters (71.4%)

Approximately 57.1% of respondents did not support non-regulatory approaches to reduce risk and loss associated with disasters.

Respondents recommended increasing hazard mitigation awareness efforts, distributing information through the internet, mail, and television, increasing milfoil awareness at local lakes, and addressing cyber communication security.

APPENDIX B
PLANNING PROCESS SUPPORTING DOCUMENTS

Regional Public Participation Survey Publicity

https://www.petoskeynews.com/news/community/hazard-mitigation-plan-creators-seek-public-input/article_3109f950-de2c-5ce6-b62e-91a6e74557e1.html

Hazard Mitigation Plan creators seek public input

Arielle Breen Aug 14, 2019

OTSEGO COUNTY — Otsego County is in the process of updating its with assistance from Northeast Michigan Council of Governments.

Otsego County prepared its first Hazard Mitigation plan in 2005 and updated it in 2014. The update will amend the 2014 Hazard Mitigation plan.

In the upcoming months, the draft Otsego County Hazard Mitigation Plan will be available for review and comment. Organizers said they plan to have the updates completed sometime in late October through early November.

The planned update will inventory the county's potential hazards, assess county risks and vulnerabilities from hazards, and develop mitigation strategies.

Otsego County and Northeast Michigan Council of Governments are conducting a survey to get input from residents and businesses about their perceptions and opinions regarding natural hazards, and the preferred methods and techniques used to reduce the risks and losses from these hazards.

The responses will be used to inform the plan update.

The survey will be available online at *surveymonkey.com/r/NEMCOGhazardsurvey*. Paper copies will be available at the Otsego County EMS Building, 100 McLouth Road in Gaylord.

The completed paper copy of the survey can be mailed to NEMCOG at P.O. Box 457, 80 Livingston Blvd. Suite U-108, Gaylord, MI 49734. The deadline for completing the survey is Sept. 23.


otsego county hazard mitigation
Otsego County Hazard Mitigatio
otsegocountymi.gov/otsego-county-hazard-mitigation-survey/
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OTSEGO COUNTY HAZARD MITIGATION SURVEY
Posted on August 26th, 2019
Share
The Hazard Mitigation Survey is being used to collect the perceptions and opinions about natural, technological, and human-related hazards, and the preferred methods and techniques used to reduce risks and losses from these hazards. The information provided will be used to update the hazard mitigation plan in Otsego County. Please click here to complete the survey.
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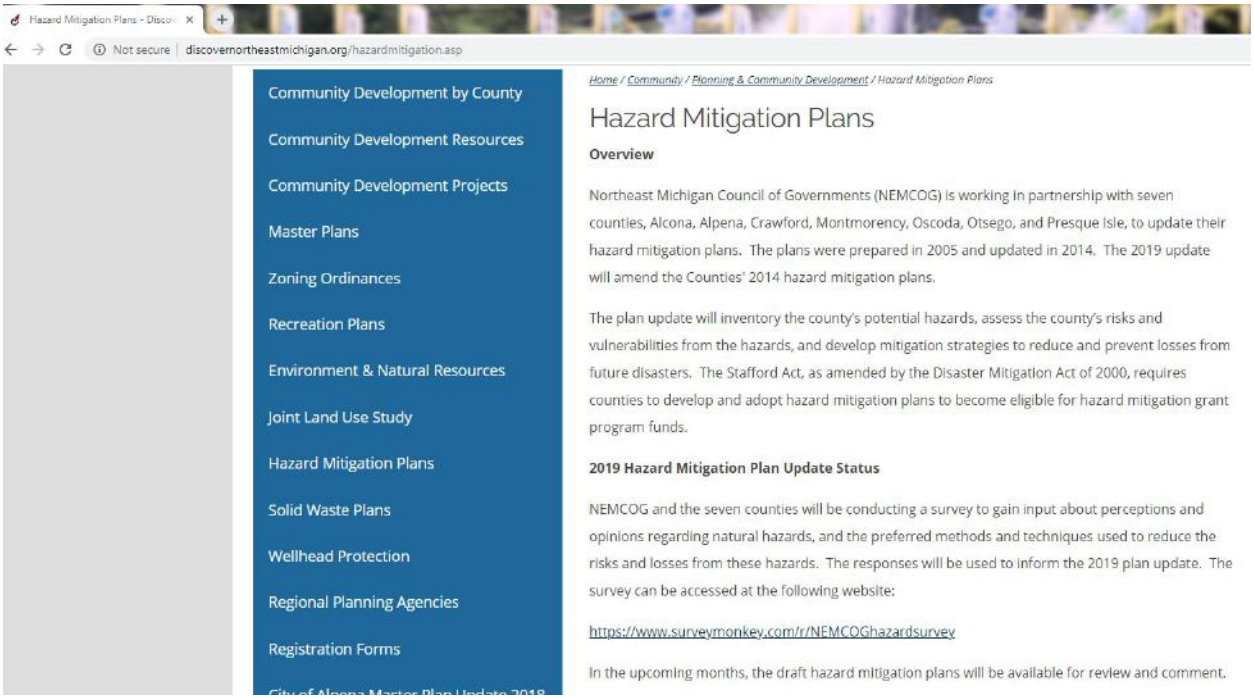
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Registration Forms
Home / Community / Planning & Community Development / Hazard Mitigation Plans
Hazard Mitigation Plans
Overview
Northeast Michigan Council of Governments (NEMCOG) is working in partnership with seven counties, Alcona, Alpena, Crawford, Montmorency, Oscoda, Otsego, and Presque Isle, to update their hazard mitigation plans. The plans were prepared in 2005 and updated in 2014. The 2019 update will amend the Counties' 2014 hazard mitigation plans.
The plan update will inventory the county's potential hazards, assess the county's risks and vulnerabilities from the hazards, and develop mitigation strategies to reduce and prevent losses from future disasters. The Stafford Act, as amended by the Disaster Mitigation Act of 2000, requires counties to develop and adopt hazard mitigation plans to become eligible for hazard mitigation grant program funds.
2019 Hazard Mitigation Plan Update Status
NEMCOG and the seven counties will be conducting a survey to gain input about perceptions and opinions regarding natural hazards, and the preferred methods and techniques used to reduce the risks and losses from these hazards. The responses will be used to inform the 2019 plan update. The survey can be accessed at the following website:
https://www.surveymonkey.com/r/NEMCOGhazardsurvey
In the upcoming months, the draft hazard mitigation plans will be available for review and comment.

Meeting Agendas, Minutes, and Sign-in Sheets

Northeast Michigan Council of Governments
80 Livingston Blvd Suite U-108 | PO Box 457 | Gaylord, MI 49734 | Voice: 989.705.3730 | Fax: 989.705.3729 | nemcog.org

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.

Public Comment
None

Adjournment
The meeting was adjourned at 11:45 a.m. The next Board Meeting will be held on May 16, 2019 at the University Center in Gaylord.

OTSEGO COUNTY LEPC MEETING MINUTES FOR MAY 20, 2019

CALL TO ORDER: Mary Sanders called the meeting to order at 10:00 am. The sign in sheet is attached with these minutes. The March 18, 2019 meeting minutes were approved.

OLD BUSINESS: CERT is having a difficult time with keeping volunteers and events to use the volunteers.

NEW BUSINESS: Christina McEmber from NEMCOG was present to give the overview of the hazard mitigation plan that needs to be updated this year. She gave a brief discussion of each chapter and stated that chapters 5,6,7 are the keys for this group. The human element and the new technology will be reviewed and the strategy employed for this updated plan will be shown for completion. The completed plan will have to be approved by all units of local government. There will be a focus on the number of people who are involved with the review. There will need to be public meetings and possible focus groups during the process.

Jon Deming, emergency manager, reported on the exercise for the EOC and the work for review to be completed. He spoke of the Motorola radios and the need for the county administrator and county chair of the commissions to have communication. Plans have been submitted for the airshow to be held June 12/16. There are still2 vacant positions at the 911 department. Jessica had no new information for the Sara III program.

MEMBER DISCUSSION: Dave Duffield, Otsego Co fire chief, reported that new truck is being lettered and should be in service in June. Cheryl Collins, DHS, reported on the progress being made for a safe environment in the state building being rented on US 27 South. Rachel Fritsch, county administrator, reported of the work progress for the Iron Belle Trail, the court proceedings holding up the demolition of the motel property, a $50,000 grant received for Veterans needs, and the library expansion. Brian Jergerson, Salvation Army, stated that there is monies for utilities payments and a new employee has been very helpful for their clients. Munson Otsego Memorial Hospital reported work is on going for the addition for the ED department. Dave Parsell, Gaylord Community Schools, reported that major work will be completed this summer for the front entrances for 3 schools.

PUBLIC COMMENT: There were no additional comments.

The next meeting is **August 26, 2019 at 10 am at the UC**.

Submitted by Mary Sanders, Chair.

OTSEGO COUNTY EMERGENCY MANAGEMENT

LEPC 5/20/19

	Name	Signature	Organization	E-mail	Emergency Support Function														
					EFS #1 Transportation	EFS #2 Communications	EFS #3 Public Works	ESF #4 Firefighting	EFS #5 Info. and Planning	EFS #6 Mass Care	EFS #7 Logistics	EFS #8 Public Health	EFS #9 Search and Rescue	EFS #10 Hazmat	EFS #11 Natural Resources	EFS #12 Energy	EFS #13 Public Safety	EFS #14 Long Term Recovery	EFS #15 External Affairs
1	D. Robertson		Treetops																
2	[illegible] Sanders		[illegible]																
3	Cheryl Collins		MDHHS									X							
4	[illegible]		OC FD					X											
5	[illegible]		GPD														4		
6	[illegible]		NWS																
7	[illegible]		G.C.S																
8	[illegible]		OCEMS																
9	Rachel Fritz		Otsego County																
10	Brian Jorgenson		ISD																
11	Carrie Kowalski		OMH																
12																			

Appendix B

OTSEGO COUNTY LEPC AGENDA

August 26, 2019

UNIVERSITY CENTER AT 10 AM

ROLL CALL, SIGN IN SHEET

INTRODUCTION OF GUESTS

APPROVAL OF THE May 20 ,2019 MEETING MINUTES

OLD BUSINESS: **HAZARD MITIGATION PLAN – CHRISTINA MC EMBER NEMCOG**

NEW BUSINESS: **JON DEMING EMERGENCY MANAGEMENT**

JACKIE HAAG 911

JESSICA BASINSKI SARA III

MEMBER DISCUSSION:

PUBLIC COMMENT:

OTSEGO COUNTY LEPC MEETING DATE
At the UC @ 10 A

LEPC Meeting Dates 2019/2020

August 26, 2019

December 9, 2019

March 23, 2020

May 18, 2020

August 24, 2020

OTSEGO COUNTY LEPC MEETING MINUTES FOR AUGUST 26, 2019

CALL TO ORDER: Mary Sanders called the meeting to order at 9:05 am. The sign in sheet is attached to the minutes. The May 20, 2019 minutes were approved with motion by Dave and second by Matt. Motion carried.

OLD BUSINESS: The focus of today's meeting was the review of the Hazard Mitigation Plan led by Christina McEmber from NEMCOG. The plan is required to be updated each 5 years and the members reviewed Chapters 7,8,9. This review is a continuation from the May 20, 2019 meeting. Updates, comments, and concerns were heard in regards to priority, responsible agency, funding sources, and progress. When the review is completed, public meetings will be held with all governmental units in the county. The survey responses are accepted until Sept 23 and the township association meeting will review the plan with all the townships on Oct 15. The county commissioners will approve the completed document at the December 17 meeting.

NEW BUSINESS: None at this meeting

MEMBER DISCUSSION: Carol from the Red Cross spoke about the smoke alarm program and they are partnering with United Way for the 9/11 event. The weather service is hosting a media program/training with a national speaker on Oct 10. Brian Webber, jail administrator, spoke of the jail overcrowded conditions, the work release day program, the 1700 outstanding warrants that are not being addressed, and the effect of drug abuse in this county. There is a dire need for a new jail that would house up to 150 beds for the size of our county. Planning is beginning to gather information, pricing, long range goals, community input for a building project. Matt Barresi informed the members that monies have been awarded to the replacing of the 927 runway at the airport and that work is continuing on the negotiations with the National Guard. Chris Churches spoke to the work he is doing for special use permits and the private road ordinance for Otsego County. John Clement said that there is a membership drive to recruit new CERT members. The Gaylord Police Chief informed the audience of their use of body cameras beginning in Oct., their support of SANE, and the possibility of adding a negotiation team member to the force.

PUBLIC COMMENT: There was no additional comment.

The next meeting is **DECEMBER 9, 2019 AT 10 AM**

Proposed meetings in 2020 are March23, May 18, August 24 December 14

Submitted by Mary Sanders, Chair

Northeast Michigan Council of Governments
80 Livingston Blvd, Suite U-108
PO Box 457
Gaylord, MI 49734
Direct: 989-705-3730 Fax: 989-705-3729
www.discovernortheastmichigan.org

Sign in Sheet

Project Name:	**Hazard Mitigation**
Project Number:	**340**
County:	**Otsego**

Date	Name and Title	Agency/Jurisdiction/Organization	Hourly Rate	Signature: I verify the hourly rate associated with my name is accurate.
8/26/2019	JON DEMING EMC	OTSEGO CO		
8/26/2019	Jessica Basinski Planner	Otsego County		
8/26/2019	DAVID Duffield Chief	Otsego Co Fire Dept		
8/26/2019	MARY M. Sanders	Twp Assoc		
8/26/2019	Cheryl Collins	Otsego Cnty MDHHS		
8/26/2019	DW Robinson	Twnships Services		
8/26/2019	CHRIS CHURCHILL	OTSEGO COUNTY		
8/26/2019	Matt Biarcesi	Airport		
8/26/2019	Ron RABIDEAU	ARC		

Appendix B

8/26/2019	Carol Rebinneau ~~Red Cross~~ / DPM	Red Cross		
8/26/2019	John Clements COORDINATOR/AEC	CERT/RACES		
8/26/2019	Brian Webber. Sheriff's office.	Sheriff's office		
8/26/2019	Patrick Bak National Weather SVC	NWS		
8/26/2019	Frank Claeys	Gaylord City police		
8/26/2019				
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Appendix B

OTSEGO COUNTY TOWNSHIP OFFICERS ASSOCIATION
OTSEGO COUNTY LIBRARY, OCTOBER 15, 2019

Tom Wagar, Chairperson, opened the meeting at 6:05 pm with the Pledge of Allegiance. Eight units were represented with 40 people in attendance. The minutes of July 16, 2019 were reviewed. The current balance is $1595.83. Mary met with Suzy DeFeyter , county clerk, in regards to the payment of the election advertising notices. After discussion Diane Purgiel made the motion to have the county bill the individual townships for the pro- rated costs. Sue Schaedig seconded the motion. Motion carried. Maureen Derenzy, Library Director, welcomed the group to the expanded library and gave a brief history of how the construction continued and all the advantages the new space will meet for the community and for the activities that can be provided for all ages. Kim Awrey was introduced as the new Assistant City of Gaylord Manager. Joe Duff will retire October 2020.

Lynda Rutkowski gave a presentation for the use of Narcane for drug overdoses. She presented a hand out of the power point presentation. She had several kits available for members to take for use when necessary to save a life. Lynda also spoke of a community meeting on Oct 28 for families against narcotics dealing with recovery for all affected. She explained the need and the importance of saving lives.

Jon Deming, Emergency Manager, introduced Christiana McEmber who spoke about the updated Hazard Mitigation Plan update. All units of government will need to pass a resolution in support of the plan. There will be a public hearing later this fall. Our number one threat is the winter storms. Also, Jon mentioned that the townships and county officials still need to have the NIMS trainings to qualify for funding in the event of a disaster. This also includes the fire department personnel. He will review the lists and inform the units who has completed the classes.

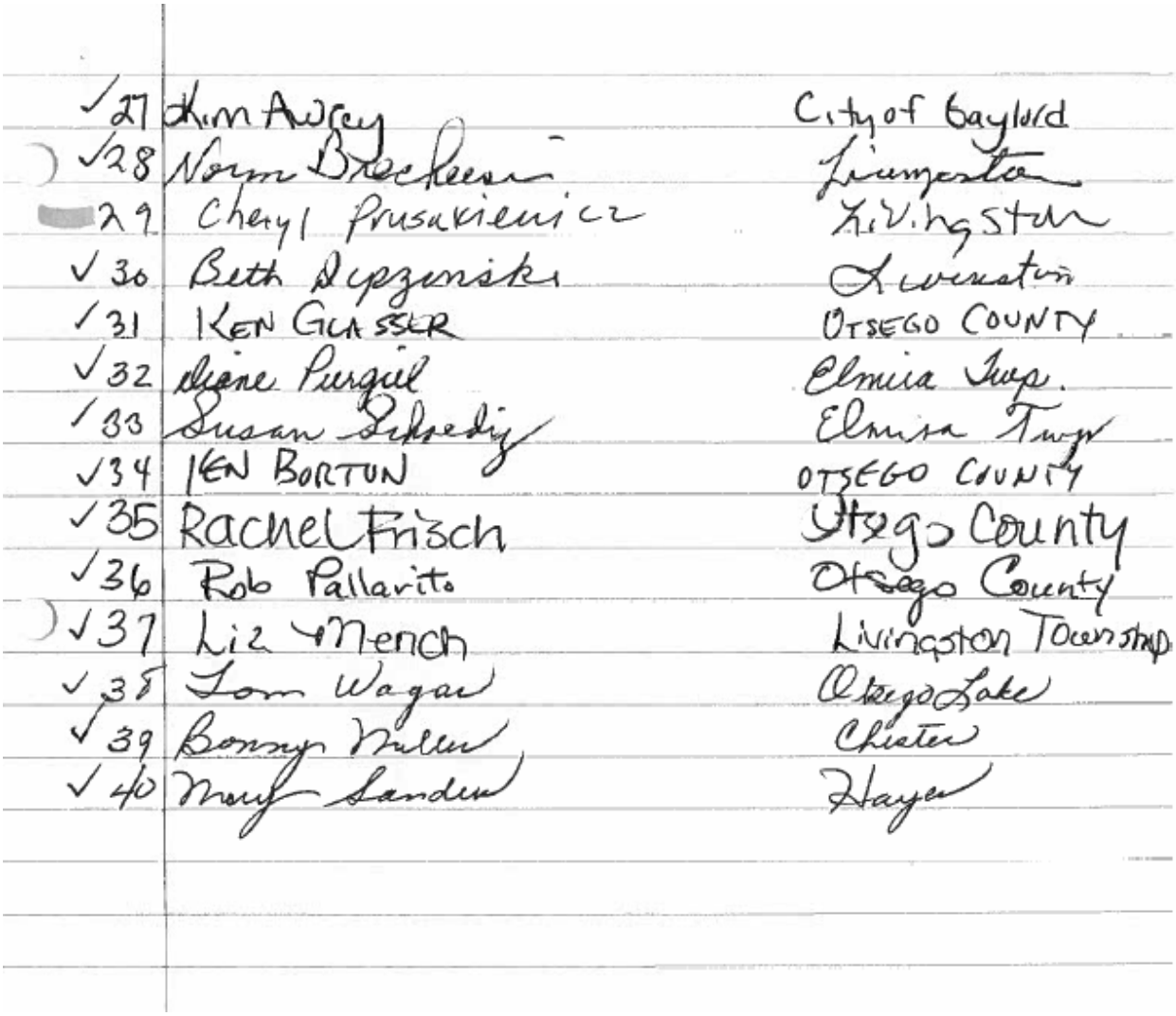
Rudi Edel, Pigeon River Discovery Center, gave a presentation of the improvements and the history of the area. One building built in 1935 has been remodeled and preserved and is now the new center for the forest. The DNR has given the group a second cabin to be preserved—1950 cabin known as the Jerry Myers building. This will be used for student lodging in the future. Rudi spoke of the various educational programs during 2019. Currently, there is a donor who will match fund raising efforts up to $30,000 for this fund at the Otsego Community Foundation. This will be vital to the future endeavors.

Jason Melancon, road commission manager, gave brief report of the projects completed and that the township meetings for 2020 planning are scheduled for Thursday.

Rachel Frisch, county administrator, gave a detailed report of county activities and spoke of the library project. The county building is having a new roof, new windows, and painting. The 2020 budget is nearly completed but they need to see what occurs afer the 147 line item vetos. The Otsego Lake drain must be replaced In 2020 costing $200,000. She spoke of the trail openings both in Gaylord and in Vanderbilt. There will upgrades to the county park for electricial services. Work continues with the need for a jail and the commissioners are proceeding with studies and analysis and are working toward a millage in 2020.

Bonny Miller, vice chair, gave a report from Sharon Schultz, district representative from MTA. Members should know that the next MTA convention will be in Traverse City on April 27-30, 2020.
Meeting adjourned at 7:45 pm. Submitted by Mary Sanders, sec/tres

	Otsego County Library	Oct 15, 2019
✓1	Christina McEmber	Assistant Planner, NEMCOG
✓2	Lynda Rutkowski	Catholic Human Services
✓3	Mike Dipzinski	OCRC Commissioner
✓4	~~Troy Hyde~~	OCRC "
✓5	William T Holewinski	OCRC "
✓6	Jason Meloncon	OCRC
✓7	Diane Franckowiak	Elmira
✓8	DALE Holeschak	ELMIRA
✓9	Jessica Henke	Elmira
✓10	REBECCA HOUSE	DOVER
✓11	JANET KWAPIS	DOVER
✓12	Fred Burns	Bayley
✓13	Michelle Noirot	Bagley
✓14	Debbie Whitman	Corwith
✓15	VERNON KASSUBA	CORWITH
✓16	TOM KELLOGG	CORWITH
✓17	PAT COULTES	CORWITH
✓18	Henry Mason	Commissioner
19	Rusi Edel (DOVER)	Discovery Center.
✓20	JON DEMILLY	OTSEGO CO E M
✓21	Matt Nowicki	Sheriff's Office
22	Jackie Keyser	Chester
✓23	Melissa Szymanski	Chester
✓24	Katherine C. Miller	Chester
✓25	Wanda Basinski	Chester
26	Maureen Derency	Otsego County Library



✓27	Kim Awrey	City of Gaylord
✓28	Norm Brockelsby	Livingston
29	Cheryl Prusakiewicz	Livingston
✓30	Beth Dzyzenski	Livingston
✓31	KEN GLASSER	OTSEGO COUNTY
✓32	Diane Purgiel	Elmira Twp.
✓33	Susan Sikorsky	Elmira Twp
✓34	KEN BORTON	OTSEGO COUNTY
✓35	Rachel Frisch	Otsego County
✓36	Rob Pallarito	Otsego County
✓37	Liz Mench	Livingston Township
✓38	Tom Wagar	Otsego Lake
✓39	Bonny Miller	Chester
✓40	Mary Sanders	Hayes

Otsego County Public Meeting Minutes for November 19, 2019

Present: Jon Deming, Jessica Basinski, Chris Churches, Mary Sanders, Lt. Michael de Castro, and Christina McEmber.

Jon Deming called the meeting to order at 1:00 pm. No public was present at the meeting. Those present are part of the LEPC and had attended previous plan update meetings. Comments and suggestions about the plan were discussed. These included the following: updating contact information, changing color schemes in tables to highlight differences in data, and the addition of a mitigation strategy to address floodplain damages. There were no comments or suggestions from the Otsego County Administrator. Next steps were discussed: the draft plan will be submitted to the State and FEMA for approval pending adoption. Then, the plan will be submitted to the County's Board of Commissioners and local jurisdictions for adoption. The meeting was closed at 1:10 pm.

Submitted by Christina McEmber

Northeast Michigan Council of Governments
80 Livingston Blvd, Suite U-108
PO Box 457
Gaylord, MI 49734
Direct: 989-705-3730 Fax: 989-705-3729
www.discovernortheastmichigan.org

Sign in Sheet

Project Name:	**Hazard Mitigation**
Project Number:	**340**
County:	**Otsego**

Date	Name and Title	Agency/Jurisdiction/Organization	Hourly Rate	Signature: I verify the hourly rate associated with my name is accurate.	Email
11/19/2019	Lt Michael de Castro	EMHSD	Ø		dcastro@michigan.gov
11/19/2019	Jon DEMING	OTSEGO COEM			jon@ocems.com
11/19/2019	Jessica Basinski	Otsego Co Emergency			j.basinski@ocems.com
11/19/2019	CHRIS CHURCHES	OTSEGO CO. PLANNING & ZONING			CCHURCHES@OTSEGOCOUNTY.MI.GOV
11/19/2019	MARY Sanders	Hayes Twp Supervisor			msanders@freeway.net
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80 Livingston Blvd Suite U-108 | PO Box 457 | Gaylord, MI 49734 | Voice: 989.705.3730 | Fax: 989.705.3729 | nemcog.org

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

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

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SUV

2014 Ford Escape SE. AWD. $9,800. As low as $185 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2014 Ford Escape Titanium. AWD, navigation, 2.0L. $10,672. As low as $202 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2014 Ford Escape Titanium. AWD. $11,400. As low as $216 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2014 GMC Terrain SLE. AWD. $11,250. As low as $177 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2014 GMC Terrain SLE. AWD. $11,500. As low as $180 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2014 Kia Sorento LX. AWD. $12,300. As low as $193 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2015 Chevy Suburban. $30,950. CARFAX One owner, 20" wheels, Bluetooth, OnStar, Tow pkg., Heated leather seats, Rear camera, Dave Kring Chevy Cadillac. 1861 US 31 North, Petoskey. 231-347-2585

2015 Dodge Durango. $28,450. CARFAX 1 owner, Heated leather seats, Universal remote. Dave Kring Chevy Cadillac. 1861 US 31 North, Petoskey. 231-347-2585

2015 Kia Sportage LX. AWD. $13,500. As low as $212 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2015 Lincoln MKX. AWD, sunroof, navigation. $21,500. As low as $337 a moth. Jim Wernig

SUV

2016 GMC Acadia Denali AWD. GMC Certified pre-owned, Sunroof, Rear camera, Remote start, Tow pkg. $26,950. Dave Kring Chevy Cadillac. 1861 US 31 North, Petoskey. 231-347-2585

2017 Cadillac XTS. $27,990. CARFAX One owner, 3.6L V6, Leather heated seats, Remote start, Rear camera, Blind zone alert. Dave Kring Chevy Cadillac. 1861 US 31 North, Petoskey. 231-347-2585

2017 Dodge Durango Express. AWD, sunroof. $13,200. As low as $250 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2017 Dodge Journey GT. AWD. $16,850. As low as $264 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2017 Ford Edge. $18,950. CARFAX one owner, Rear camera, Heated seats, Turbo. Dave Kring Chevy Cadillac. 1861 US 31 North, Petoskey. 231-347-2585

2018 Toyota RAV4. $23,950. 4WD, Low Tire Pressure Warning, Lane Departure Alert, only 36k miles. Dave Kring Chevy Cadillac. 1861 US 31 North, Petoskey. 231-347-2585

2019 Chevy Blazer. Lease as low as $219 a month for 24 months with $995 due at signing. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2019 Chevy Traverse LT. AWD, Demo. MSRP $41,600. Buy as low as $29,873.35. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2020 Chevy Equinox. AWD, 2FL, 1.5T. Lease as low as $239 a month for 24 months with $1,595 due at signing. Jim Wernis

TRAILERS

2019 Sure-Trac Low Profile 5x8 Dump Trailer. Power Up, Power Down Hydraulics. MSRP $5,495. Sale Price $4,495. Save $1,000.

TRUCKS

2007 Chevy Tahoe LTZ. $7,950. 4WD, Alloy wheels, 5.3L V8, Remote start, Heavy duty trailer hitch pkg., StabiliTrak. Dave Kring Chevy Cadillac. 1861 US 31 North, Petoskey. 231-347-2585

2010 Toyota Tundra Limited. Crew max, navigation, sunroof, 5.7L V-8, $16,350. As low as $309 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2011 Chevy Avalanche LTZ. Sunroof, DVD. $14,800. As low as $280 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2011 Ford F-150. Super crew, FX4, 5.0L V-8, $17,900. As low as $338 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2011 Toyota Tacoma. Double cab, 4.0L V-6, $20,500. As low as $321 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2012 Dodge Ram 1500 Laramie Longhorn. Crew cab, navigation, sunroof. $20,700. As low as $391 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2013 Chevy Silverado 1500. Reg cab, W/T, 4.3L V-6, $17,900. As low as $281 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2014 GMC Sierra 1500 SLE. Double cab, 5.5L V-8. $26,500. As low as $415 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2014 GMC Sierra 1500. $15,950. CARFAX One owner, 4WD, 5.3L V8, Hitch. Dave Kring Chevy Cadillac.

TRUCKS

2016 Chevy Silverado 1500 LT. Double cab, Z-71, 5.3L V-8. $27,850. As low as $436 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2016 Chevy Silverado 1500 LTZ. Double cab, 6.2L V-8, max trailering. $32,000. As low as $502 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2016 GMC Sierra 1500 SLT. Crew cab, sunroof. $34,000. As low as $532 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2017 Chevy Silverado 1500 LT. Double cab, 4.3L V-6. $26,721. As low as $418 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2017 Chevy Silverado 1500 LT. Double cab, Z-71, 5.3L V-8, $29,200. As low as $457 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2017 Honda Ridgeline RT L-T. Crew cab, navigation. $23,200. As low as $363 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2018 Chevy Silverado 1500 LT. Double cab Z-71, midnight edition, 5.7L V-8, $32,800. As low as $514 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-6161. www.ChevyCentral.com

2018 Chevy Silverado 1500 LT. Double cab, 5.3L V-8. $29,735. As low as $465 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2018 Ford F-150 XLT. Super crew, lifted, 5.0L V-8. $36,900. As low as $578 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

TRUCKS

2019 Chevy Colorado 4x4 ZR2 Extended Cab. Lease as low as $249 a month for 36 months with $995 due at signing. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2019 Chevy Silverado 1500 LT. Double cab, 5.3L V-8. $27,905. As low as $437 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2019 Chevy Silverado 4x4 LT Double Cab. Lease as low as $179 a month for 24 months with $995 due at signing. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2019 Chevy Silverado 4x4 LT Double Cab. Lease as low as $196 a month for 24 months with $995 due at signing. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

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VANS

2010 Ford Transit Van. Front bucket seats, Cargo area vinyl flooring, 180 degree rear cargo doors. $7,450. Dave Kring Chevy Cadillac. 1861 US 31 North, Petoskey. 231-347-2585

2012 Buick Enclave Premium. AWD, navigation, sunroof. $13,700. As low as $259 a month. Jim Wernig Chevrolet. 2401 Old 27 South, Gaylord. 989-732-5161. www.ChevyCentral.com

2013 Dodge Caravan. $9,450. CARFAX One owner, Third row seating, 1st and 2nd rowbucket seats. Dave Kring Chevy Cadillac. 1861 US 31 North, Petoskey. 231-347-2585

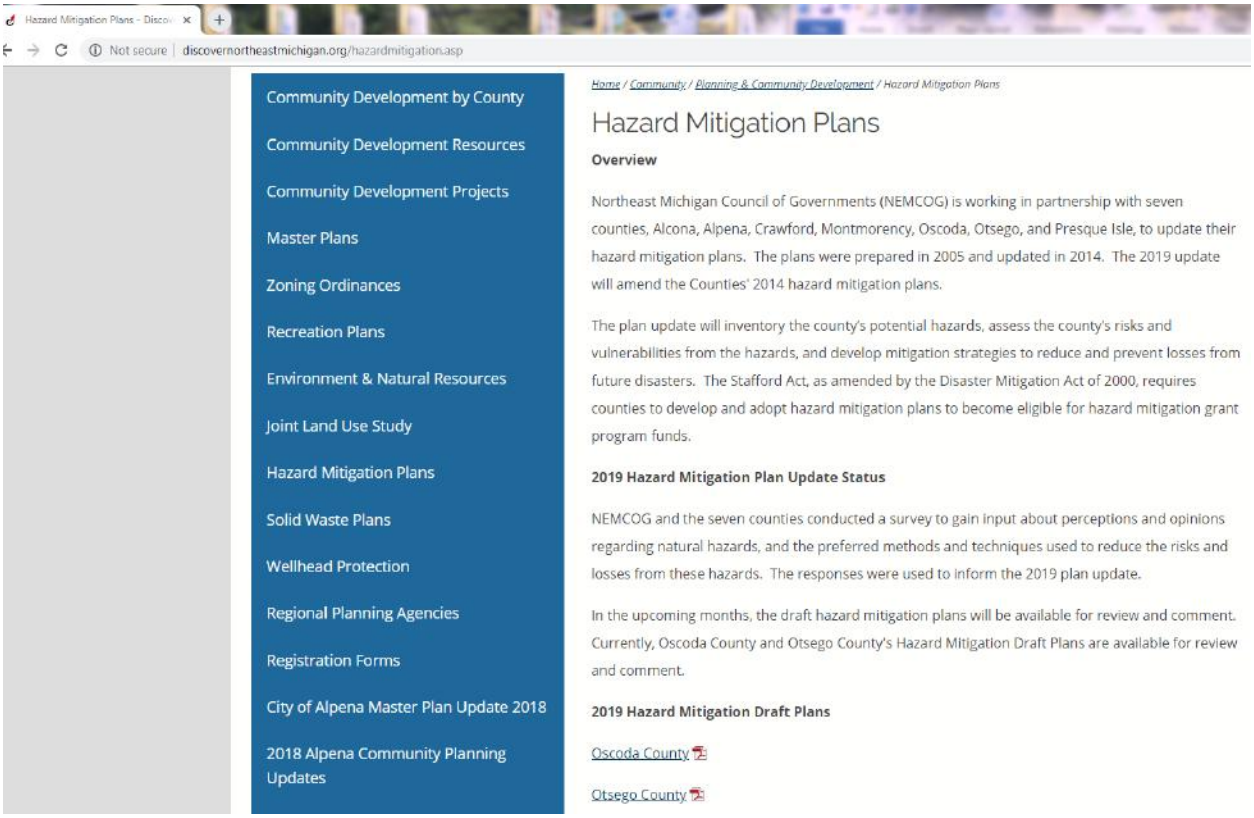
2017 GMC Savanna. $18,950. CARFAX One owner, 4.8L V8. Dave Kring Chevy Cadillac. 1861 US 31 North, Petoskey. 231-347-2585

WANTED

WANTED TO BUY. Baseball, football, basketball cards before 1970. Paying cash. 231-373-0842. 989-569-1201 Tawas area

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

Otsego 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 November 19 at 1p.m. at the University Center at 80 Livingston Blvd, Gaylord Michigan. Public comments are requested either in person or by representative at the public meeting, or at OCEMS, 100 McLouth Road, Gaylord, Michigan or by email at cmcember@nemcog.org. The draft plan is available for review on Otsego County's website and NEMCOG's website. A paper copy is available at OCEMS, 100 McLouth Road, Gaylord, Michigan.


Hazard Mitigation Plans - Disco
Not secure | discovernortheastmichigan.org/hazardmitigation.asp
Community Development by County
Community Development Resources
Community Development Projects
Master Plans
Zoning Ordinances
Recreation Plans
Environment & Natural Resources
Joint Land Use Study
Hazard Mitigation Plans
Solid Waste Plans
Wellhead Protection
Regional Planning Agencies
Registration Forms
City of Alpena Master Plan Update 2018
2018 Alpena Community Planning Updates
Home / Community / Planning & Community Development / Hazard Mitigation Plans
Hazard Mitigation Plans
Overview
Northeast Michigan Council of Governments (NEMCOG) is working in partnership with seven counties, Alcona, Alpena, Crawford, Montmorency, Oscoda, Otsego, and Presque Isle, to update their hazard mitigation plans. The plans were prepared in 2005 and updated in 2014. The 2019 update will amend the Counties' 2014 hazard mitigation plans.
The plan update will inventory the county's potential hazards, assess the county's risks and vulnerabilities from the hazards, and develop mitigation strategies to reduce and prevent losses from future disasters. The Stafford Act, as amended by the Disaster Mitigation Act of 2000, requires counties to develop and adopt hazard mitigation plans to become eligible for hazard mitigation grant program funds.
2019 Hazard Mitigation Plan Update Status
NEMCOG and the seven counties conducted a survey to gain input about perceptions and opinions regarding natural hazards, and the preferred methods and techniques used to reduce the risks and losses from these hazards. The responses were used to inform the 2019 plan update.
In the upcoming months, the draft hazard mitigation plans will be available for review and comment. Currently, Oscoda County and Otsego County's Hazard Mitigation Draft Plans are available for review and comment.
2019 Hazard Mitigation Draft Plans
Oscoda County
Otsego County

APPENDIX C
ADOPTION RESOLUTIONS

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

Insert Adoption Resolutions

APPENDIX D
PREVIOUS PLANS' MITIGATION ACTIONS AND STRATEGIES

The following tables present the mitigation actions and strategies that were included in the 2014 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. Encourage continuation of house numbering program	High	A, B, C	T	County-wide	Ongoing	Ongoing	Ongoing
2. Communities will acquire and maintain an adequate level of emergency power generators to supply emergency water needs, wastewater processing, emergency communications, emergency health care, and shelters.	High	C, H, P, I, V	B, C, T	County-wide	Ongoing	Mid-term	Mid-term
3. Review and develop site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, etc .to cover all potential hazards.	Medium	A, C, D,	T	County-wide	Ongoing	Short-term	Short-term
4. Ensure key gasoline stations have the capacity to pump gasoline during power outages.	Medium	C, K,M	T	County-wide	Identified Stations	Mid-term	Mid-term
5. Organize 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.	Medium	A, C, D, H, I, N	B, C, T	County-wide	Work is being done – seasonal issues	Short-term	Short-term
6. Continue to develop Emergency Response Team program to help prepare for all hazard events in the county.	Medium	A, D, H, X	A, H, T	County-wide	Ongoing/Active	Mid-term	Mid-term
7. Develop and implement a public education program for all natural hazards that threaten the community.	Medium	A, C, D, H, I, N, X	B, C, T	County-wide	Ongoing/Active	Ongoing	Ongoing
8. Provide trained, equipped, and prepared search and rescue teams.	Medium	A, B, D, N, W, X	A, H, T	County-wide	Ongoing/Active	Mid-term	Mid-term
9. Identify adequate water supplies for emergency firefighting, areas lacking adequate water supplies and develop strategy to construct dry hydrants.	Medium	C,D,	Q, T	County-wide	Completed	Short-term	Short-term
10. Review current status and provide back-up generators to maintain community infrastructure at acceptable operating levels during extended power failures.	Medium	A,C,X	B, C, T	County-wide	Ongoing/Progress made	Mid-term	Mid-term
11. Ensure that the County and individual communities have adequate equipment, staff, and training to respond to transportation-related accidents specific to their needs.	Medium	A,B,C,D,E,S, X	B, C, T	County-wide	Ongoing/Active	Mid-term	Mid-term
12. To address multiple hazards in the county improve tree trimming and maintenance efforts to prevent limb breakage and safeguard nearby utility lines. The end goal is to create and maintain a disaster-resistant landscape in public rights-of-way.	Medium	P,E	T	County-wide	Ongoing	Long-term	Long-term
13. Promote need for early warning systems across county.	Low	A C,D,O,X	T	County-wide	Completed	Short-term	Short-term
14. Encourage residents to develop a Family Disaster Plan that includes the preparation of a Disaster Supplies Kit.	Low	A,I,N,V	T	County-wide	Education program in place	Long-term	Long-term
15. Promote and implement solutions for keeping roads and driveways accessible to vehicles and fire equipment.	Low	C, D,E	T	County-wide	Completed/Ongoing	Mid-term	Mid-term
16. Increase usage of NOAA Weather Radio by promoting use of radios to county residents, organizations and businesses. Use NOAA radios as a community emergency alert system to information on hazard events.	High	A, D,O,M	T	County-wide	Education Programs ongoing	Mid-term	Mid-term

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Mitigation Actions & Implementation Strategies ***A. Multi-Hazard Actions. #2***	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
17. 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)	Medium	B, C, F	B ,C, Q, T	County-wide	Ongoing	Ongoing	Ongoing
18. Produce and distribute family emergency preparedness information relating to all natural hazards affecting the County.	Low	A, B, H, I, V, O	B, C, H, T	County-wide	Education program in place	Short-term	Short-term
19. Develop plans to identify and inform persons of "Safe Areas" during festivals/events. (Include signs and directions to shelters)	Low	A, C, D, E, W	T	Gaylord	Initiated ongoing	Short-term	Short-term
20. Develop an all hazards education and awareness program in schools, which includes classroom presentations and incorporating wildfire and weather hazard preparedness into school curriculums.	Medium	A, O, R	B	County-wide	Ongoing	Long-term	Long-term
21. Identify feasible sites for public early warning systems and networks and seek funding to install.	Low	A, C	C	County-wide	No activity on stationary sirens using NOAA and Reverse 911	Mid-term	Mid-term
22. Conduct workshops at community gatherings to encourage residents to develop a Family Disaster Plan, which includes the preparation of a Disaster Supplies Kit.	Low	A, C, D, H, I, V	A, B, C	County-wide	Ongoing	Long-term	Long-term
23. Enforce a balanced system of ordinances that protect the community as-a-whole while respecting the rights of individuals.	Low	B, C, F, Q	B	County-wide	Completed and Ongoing reviews	Long-term	Long-term
24. Identify & expand community awareness of evacuation plans, and emergency snow routes.	Low	A, C, D, E, I, V	B	County-wide	Ongoing	Mid-term	Mid-term
25. Encourage use of NOAA radios throughout community	High	A, O	B	County-wide	Ongoing	Mid-term	Mid-term
26. Review and improve program to provide regular maintenance and equipment checks of all critical equipment.	High	B, C, D, E	B, C, D, E	County-wide	Ongoing each department	Ongoing	Ongoing
27. Where feasible and cost effective (more densely populated areas) bury and protect power and utility lines.	Low	P	P	County-wide	Ongoing	Long-term	Long-term
28. Acquire portable/changeable message signs to direct crowds and provide information.	Low	E	E	County-wide	Under review	Mid-term	Mid-term
29. Review and improve strategy for providing public with emergency telephone numbers	Low	B, C, P	B, C, P	County-wide	In place 911 and 211	Long-term	Long-term
30. Study and implement development of public information to cover hazards effecting county.	Low	A	A	County-wide	Ongoing educational opportunities	Ongoing	Ongoing
31. Identify optimal staffing levels for County and community needs – seek funding to meet optimal levels	Low	B, C, F, G	B, C	County-wide	In place and active	Long-term	Long-term
32. Individual communities should prepare future land use plans and capital improvement programs to plan for their future hazard mitigation needs.	Medium	B, C, F, G	B, C, F, G	County-wide	Active/ongoing	Long-term	Long-term

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Mitigation Actions & Implementation Strategies B. Winter Weather Hazards	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Establish heating centers/shelters for vulnerable populations	High	A, C, I, N V	B, C, H, T	Countywide	Identified and Ongoing	Short-term	Short-term
2. 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	High	A, C	A, H, T	Countywide	Identified and Ongoing	Short-term	Short-term
3. Prearrange for shelters for stranded motorists/travelers and others	High	A, C, I, N, V,	B, C, H, T	Countywide	Identified and improving	Mid-term	Mid-term
4. 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	C, E,	E, Q, T	Countywide	Plans are updated each year	Mid-term	Mid-term
5. Study and employ available NOAA data to predict location and warn motorists of potential white-out road hazards.	High	A, E, O, Q,	B, C, K, Q	Countywide	Program in place and ongoing	Short-term	Short-term
6. Acquire portable signs to inform motorists of high wind area, lake effect snow area and road glazing area on major highways.	High	A, E, Q,	B, C, K, Q	I-75	Ongoing	Mid-term	Mid-term

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Mitigation Actions & Implementation Strategies C. Extreme Temperatures.	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Identify location and organize outreach to vulnerable populations during periods of extreme temperatures…	High	A,C.H,I	T	County-wide	Program in place and ongoing	Short-term	Short-term
2. Study and improve location and design and maintenance of water and sewer systems (to include insulation of critical components to prevent damage from ground freeze)	Medium	B,C,	Q, T	Gaylord	Ongoing	Mid-term	Mid-term
3. Improve and/or enact landlord/tenant ordinances.	Medium	B	Q, T	County-wide	Attempted once and will retry	Mid-term	Mid-term
4. Continue to enforce property maintenance codes.	Medium	B	B, C	County-wide	Ongoing	Mid-term	Mid-term

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Mitigation Actions & Implementation Strategies **D. Wildfire**	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Conduct annual wildfire planning with all fire departments and MDNR.	High	C, D, J	D, Q, T	County-wide	Ongoing	Short-term	Short-term
2. Develop a program to instruct residents on proper procedures for wildfire evacuation, …	High	C, D, J	B, C, D, Q, T	County-wide	Ongoing	Short-term	Short-term
3. Review and strict enforcement of open burning regulations.	High	C, J, Q	D, Q, T	County-wide	Ongoing	Short-term	Short-term
4. Conduct multi-agency, inter-county emergency management response exercises for fire suppression	Medium	A, B, C, D.	T	County-wide	Completed	Mid-term	Mid-term
5. Coordinate countywide wildfire education program: distribution of materials via direct mailings, school presentations.; Incorporate Firewise demonstration projects.	Medium	A, D, J, R	B, C, Q, T	County-wide	Ongoing	Mid-term	Mid-term
6. Work with insurance companies to provide wildfire safety information to area residents, and consider reduction of insurance premiums if homes meet "Firewise" criteria.	Medium	C, D, K, J, U	Q, T	County-wide	In Place and ongoing	Mid-term	Mid-term
7. Promote creation of defensible space around structures in fire-prone wildland areas.	Medium	A, D, J	T	County-wide	In Place and ongoing	Mid-term	Mid-term
8. Distribute wildfire education materials to homeowners and businesses..	Medium	A, B, C, D, G, J	D, Q, T	County-wide	In Place and ongoing		Short-term
9. Promote media broadcasts of fire weather and fire warnings	Medium	A, D, J, O	B, C, M, Q	County-wide	In Place and ongoing		Mid-term
10. Develop program to form Wildfire Safety Coalition to develop neighborhood watch program to instruct others about escape routes, sprinkler systems, power lines, etc…	Low	C, D, N, U	B, C, N, Q	County-wide	In Place and ongoing		Mid- term
~~Develop program to inspect campsites in public forest areas to insure safe open fires, where allowed.~~		~~C,J~~			~~Mid-term~~		~~Removed~~
~~Identify communities or neighborhoods to develop "Firewise" demonstration projects.~~		~~A,C,J,N~~			~~Short-term~~		~~Removed~~
~~Develop and implement strategy to introduce "Firewise" program in risk communities.~~		~~A,C,D,, J~~			~~Mid-term~~		~~Removed~~

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Mitigation Actions & Implementation Strategies E. Transportation Accident, #1	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Provide training, planning, and preparedness for mass-casualty incidents involving all modes of public transportation.	High	A, E, Q, S	T	County-wide	In place	Ongoing, short-term	Ongoing, short-term
2. Encourage long-term planning that provides more connector roads for reduced congestion of arterial roads.	High	B, E, Q,	Q, T	County-wide	Ongoing	Ongoing	Ongoing
3. Review and/or develop Regional EMS response plan to assist county's mass casualty plan.	High	A, B, Q, R, S	T	County-wide	Initiated & in progress	Short-term	Short-term
4. Provide for exercise gasoline or propane accidents.	High	D, M	T	County-wide	Completed	Mid-term	Mid-term
5. Provide more training for fireman, police and first responders to school bus and commercial bus accidents.	Medium	A, D, W	T	County-wide	Completed	Mid-term	Mid-term
6. Provide more training for airfield emergencies involving all county fire departments.	Medium	A, C, D, X	T	County-wide	Completed	Mid-term	Mid-term
7. Inventory current heavy equipment, wreckers and jaws units within 30 minutes of county locations.	Medium	A, X	T	County-wide	Completed	Short-term	Short-term
8. Arrange and conduct meeting with all local bus providers and review their emergency plans.	Medium	A, C	T	County-wide	Completed	Short-term	Short-term
9. Exercise a 60 person accident involving a bus and logging truck.	Medium	A, D, S, W	T	County-wide	Completed	Mid-term	Mid-term
10. Research and develop medical airlift plan for plane accidents.	Medium	A, D, S	T	County-wide	Completed	Mid-term	Mid-term

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Mitigation Actions & Implementation Strategies E. Transportation Accident, #2	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
11. Review procedures for railroad inspections and improved designs at problem railway/roadway intersections.	Low	E, Q	E, Q	County-wide	Completed & Ongoing	Mid-term	Mid-term
12. Encourage strict highway speed enforcement during school transport times.	High	B, C, Q, W	B, C, Q	County-wide	Completed & Ongoing	Ongoing	Ongoing
13. Meet with local industries from surrounding counties to determine type of products transported over county highways, and provide local HAZ/MAT team and fire agencies with this information.	Medium	A, M, X	A	County-wide	Completed & Ongoing	Mid-term	Mid-term
14. Program load type into CAMEO and develop pre-evacuation plans by material type.	High	A, J, O, X	A	County-wide	Completed & Ongoing	Mid-term	Mid-term
15. Hold annual meeting with pipeline industry and local fire and law enforcement agencies.	Medium	A, P	A, D, Q	County-wide	Completed & Ongoing	Mid-term	Mid-term

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Mitigation Actions & Implementation Strategies F. Severe Winds	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Review current and proposed improvements to wind engineering measures and construction techniques to strengthen public and private structures against severe wind damage	Medium	A, B	T	County-wide	Ongoing	Short-term	Short-term
2. Continue to implement building code regulations that require the proper anchoring of manufactured homes and exterior structures…	Medium	B	B, C, Q, T	County-wide	Ongoing	Mid-term	Mid-term

Mitigation Actions & Implementation Strategies G. Gas and Oil Production	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Increase public awareness of pipeline location and appropriate emergency procedures in case of pipeline problem.	High	A, K, P, Q	T	County-wide	Ongoing	Mid-term	Mid-term
2. Research and develop contingency plans for worker and public protection, including inclusion of rescue and evacuation procedures for well hazard areas in emergency plans.	High	A, D, J, P, Q, X	T	County-wide	Ongoing	Mid-term	Mid-term
3. Enforce community and operator compliance with Oil/gas industry safety regulations and standards	High	Q, T	T	County-wide	Ongoing	Mid-term	Mid-term
4. Develop and implement strategy to improve and enforce well site signing, to include larger signs and moving signs to gate site.	Medium	D, J, Q	B, M, Q	County-wide	Ongoing	Short-term	Short-term
5. Review pipeline design and enforce proper pipeline construction, maintenance and inspection.	Medium	P, Q, T	E, A, B, Q, T	County-wide	Ongoing	Mid-term	Mid-term
~~Explorer enlisting aid of insurance companies to provide evacuation information for oil & gas related incidents.~~		~~K~~				~~Mid-term~~	~~Removed~~

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Mitigation Actions & Implementation Strategies H. Structural Fire	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Develop public education and school programs related to the use of stoves, heaters, fireworks, matches/lighters, etc.	High	A, D, I, J, R, V	D, T	County-wide	Ongoing	Mid-term	Mid-term
2. Develop program to encourage landlords and families to install and maintain smoke detectors and fire extinguishers. Train residents in use a fire extinguisher.	High	A, C, G, K	Q, T	County-wide	Ongoing	Ongoing, Short-term	Ongoing, Short-term
3. Identify adequate water supplies for emergency firefighting, areas lacking adequate water supplies and develop strategy to construct dry hydrants.	High	B, C, D, J	Q, T	County-wide	Completed	Short-term	Short-term
4. Develop information and programs about safe and responsible use of electric and "space" heaters.	High	B, D, G, K	D, T	County-wide	Ongoing	Ongoing Short-term	Ongoing Short-term
5. Promote safe use and maintenance/cleaning of fireplaces and chimneys…	High	D, G, K	T	County-wide	Ongoing	Ongoing Short-term	Ongoing Short-term
6. Develop strategy to standardize equipment so that all firefighters in County system can operate any piece of equipment.	Medium	A, C, D, J	A, B, C, D,	Fire Departments	Ongoing	Mid-term	Mid-term
7. Increase volunteer recruitment, and study offering paid training.	High	D	A, B, C, D,	Fire Departments	Ongoing	Long-term	Long-term
8. Develop integrated water supply system using multi-tankers to well-located water supplies, with easy year around access.	Medium	D	A, B, C, D,	Fire Departments	Completed	Long-term	Long-term
9. Review and develop programs to raise community awareness on proper installation and maintenance of heating systems.	Medium	A, B, D, K	A, B, C	County-wide	Ongoing	Ongoing, Mid-term	Ongoing, Mid-term

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Mitigation Actions & Implementation Strategies I. Public Health Emergencies	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Provide back-up generators for water and wastewater treatment facilities to maintain acceptable operating levels during power failures	High	A,B, C	H, Q, T	County-wide	Completed	Mid-term	Mid-term
2. Inform public and support pollution control, enforcement and cleanup; proper disposal of chemicals and scrap materials	High	A, B, H, X	H, Q, T	County-wide	Ongoing	Ongoing	Ongoing
3. Demolish and clear vacant condemned structures in populated areas to prevent rodent infestations	Medium	B, C, H	H, Q, T	County-wide	In progress	Mid-term	Mid-term
4. Encourage residents to receive immunizations against communicable diseases	Medium	H, S	H, Q, T	County-wide	In progress	Ongoing	Ongoing
5. Maintain a community public health system with sufficient disease monitoring and surveillance capabilities to adequately protect the population from large-scale outbreaks	Medium	H	H, Q, T	County-wide	Completed	Ongoing	Ongoing
6. Increase public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies	Medium	HS, X	H, Q, T	County-wide	Completed	Ongoing	Ongoing
7. Seek support and funding to clean up sites of environmental contamination	Medium	B, C, Q	B, C, Q, T	County-wide	Ongoing	Short-term	Short-term
8. Expand community support of free or reduced-expense clinics and school health services	Medium	B, C, H, S	B, H, Q, T	County-wide	Completed	Mid-term	Mid-term
9. Coordinate with local communities to assure proper location, installation, cleaning, monitoring, and maintenance of septic tanks	Medium	B, H	B, C, H	County-wide	Ongoing	Ongoing	Ongoing

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Mitigation Actions & Implementation Strategies J. Fixed Site Hazmat, #1	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Develop and/or improve public warning systems and networks for hazardous material releases.	High	A, X	T	County-wide	Complete	Short-term	Short-term
2. Review and/or implement strategy to train, equip, and prepare site and local hazardous material emergency response teams.	High	A, X	T	County-wide	Ongoing	Short-term	Short-term
3. Inform public and support pollution control, enforcement and cleanup; proper disposal of chemicals and scrap materials.	Medium	A, C, G, Q	H, Q, T	County-wide	Ongoing	Mid-term	Mid-term
4. Provide annual training to County Fire Departments related to on site products, and how they are handled.	Medium	M	T	County-wide	Completed	Short-term	Short-term
5. Provide training in and compliance with all safety procedures and systems related to the manufacture, storage, transport, use, and disposal of hazardous materials.	Medium	A, D, Q, X	Q, T	County-wide	Completed/ Ongoing	Mid-term	Mid-term
6. Educate public and implement steps to encourage "shelter in place" response to Hazmat incidents.	Medium	A, B, D, X	T	County-wide	Ongoing	Short-term	Short-term
7. Continue emphasis on policies and training stressing importance of safety above other considerations.	Medium	A, D, X	T	County-wide	Ongoing	Ongoing, Short-term	Ongoing, Short-term
8. Research and develop contingency plans for worker and public protection, including inclusion of rescue and evacuation procedures for well hazard areas in emergency plans.	Medium	A, D,	A, B, C, D	County-wide	On-going	Mid-term	Mid-term
9. Provide public education to help identify and eliminate clandestine neighborhood drug labs in the County.	Medium	Q, W, X	A, B, C, D	County-wide	On-going	Mid-term	Mid-term
10. Reinforce planning emphasis on proper separation and buffering between industrial areas and other land uses.	Medium	B, C	A, B, C, D	County-wide	Completed & Ongoing	Mid-term	Mid-term
11. Emphasize locating industrial areas away from schools, nursing homes, hospitals, in future planning.	Medium	B, C, F	A, B, C, D	County-wide	Completed & Ongoing	Long-term	Long-term
12. Protect public contact with contaminated sites or waters (including flood waters)	Medium	H, W, X	A, B, C, D	County-wide	Completed & Ongoing	Mid-term	Mid-term
13. Continue brownfield cleanup activities.	Medium	B, C, Q	A, B, C, D	County-wide	On-going	Ongoing	Ongoing
14. Identification of radioactive soils and high-radon areas.	Medium	H, Q, X	A, B, C, D	County-wide	On-going	Long-term	Long-term

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Mitigation Actions & Implementation Strategies K. Infrastructure Failure	Priority	Responsible Agency	Funding Sources	Application	Progress	Original Status	New Status
1. Review and improve mutual aid assistance for failures in utility and communications system.	High	A, B, C, X	T	County-wide	Ongoing	Mid-term	Mid-term
2. Review and develop strategies to identify and employ generators for backup power at critical facilities.	High	A, B, C, P	B, C, T	County-wide	Ongoing	Mid-term	Mid-term
3. Review and develop strategies to insure redundancies in utility and communications systems, especially "lifeline" systems.	Medium	A, P, Q, X	M, P, T	County-wide	Ongoing	Mid-term	Mid-term
4. Identify electrical systems that will fail due to overload and develop "Rolling blackout" strategy	Low	P, Q	P, Q	County-wide	Ongoing	Long-term	Long-term
5. Identify sites and obtain support to improve critical road/stream crossings.	Low	E, F	E, Q, T	County-wide	Identified sites and working to fix	Mid-term	Mid-term

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. County EMS/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	**X.** Regional Partnerships