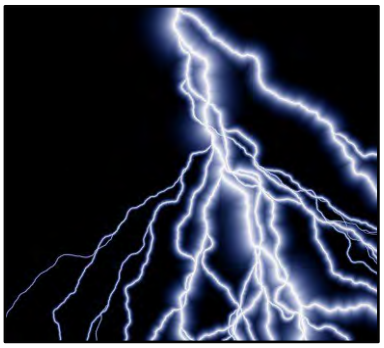

Hazard Mitigation Plan

Lapeer County, MI

Draft

This document was prepared by the GLS Region V Planning and Development Commission staff in collaboration with the Lapeer County Office of Emergency Management.

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Introduction

In Lapeer County, the Office of Emergency Management is the coordinating agency for all emergency management activities. The office is responsible for continually monitoring and updating the Lapeer County Comprehensive Emergency Management Plan, as well as many other disaster related activities.

As part of our continuing effort to manage these many varied threats, protecting life and property, the Lapeer County Office of Emergency Management has developed the Lapeer County Hazard Mitigation Plan with assistance from the Genesee Lapeer Shiawassee (GLS) Region V Planning and Development Commission. The plan identifies natural, technological, and human-related hazards relevant to the County and assesses its vulnerability to each hazard. The plan also identifies mitigation strategies for each hazard. Mitigation strategies are actions or policies that can be implemented today to reduce or eliminate damage from future hazard events.

The Federal Emergency Management Agency (FEMA) requires that each community have a FEMA approved hazard mitigation plan to be eligible for future FEMA hazard mitigation funding. The Lapeer County Hazard Mitigation Plan complies with the requirements of a multi-jurisdictional hazard mitigation plan as outlined by FEMA. Communities within Lapeer County that have adopted this plan also comply with the FEMA requirement.

Questions and comments concerning this document should be addressed to Mary Piorunek, Director, Lapeer County Office of Emergency Management, 2332 W. Genesee Street, Lapeer, MI 48446 (810) 667-0242 or by e-mail to: mpiorunek@lapeercounty.org.

Lapeer County Emergency Management Advisory Council Members

- Emergency Management Representative - Mary Piorunek
- Law Enforcement Representative - Andy Engster
- Law Enforcement Representative - David Frisch
- Fire Representative - Terry Kluge
- Fire Representative - Jeremy Compau
- Health/First Aide Organization Representative - Kathy Haskins
- Health/First Aide Organization Representative - Kimberly Goldorf
- Broadcast/Print Media/Communication Representative - Jeff Satkowski
- Broadcast/Print Media/Communication Representative - Krystal Moralee
- Hospital Personnel Representative - Denny Fitzpatrick
- Agriculture Representative - Phil Kaatz
- Education Representative - Steve Zott
- Citizen-at-Large Representative - Joe Medved
- Community/Human Services Representative - Kevin Boxey
- Community/Human Services Representative - Cheryl Clark
- Transportation Representative - Zebodiah Schons
- Transportation Representative - Kelly Bales
- Emergency Medical Services Representative - Russ Adams
- Board of Commissioners Representative - Rick Warren

Lapeer County Board of Commissioners

- Gary Roy (Chairman)
- Lenny Schneider (Vice-Chairman)
- Brenden Miller
- Dyle Henning
- Rick Warren
- Linda Jarvis
- Bryan Zender

GLS Region V Planning and Development Commissioners

- Richard Van Haaften (Chairperson)
- Jeffrey Kelley (Vice-Chairperson)
- Derek Bradshaw (Treasurer)
- Alan Himelhoch
- Ed Benning

- Cathy Lane
- Shawnice Dorsey
- Robert Johnson
- Mike Hemmingsen
- Destain Gingell
- Gregory Brodeur

Communities Represented by the Lapeer County Hazard Mitigation Plan

The Lapeer County Hazard Mitigation Plan includes two cities, eighteen townships, and seven villages. (See list below.) Staff contacted each local unit of government and asked if they would consider including recommendations from the Lapeer County Hazard Mitigation Plan into the next update of their master and zoning plans. Each one of the local units of government in Lapeer County agreed to consider this request.

Village of Almont - Steve Schneider, President
Almont Township - Paul Bowman, Supervisor
Arcadia Township - John Howell, Supervisor
Attica Township - Al Ochadleus, Supervisor
Burlington Township - Robert Howland, Supervisor
Burnside Township - Chad Dempsey, Supervisor
Village of Clifford - Gary Ferguson, President
Village of Columbiaville - Tom Wood, President
Deerfield Township - Ray Hayes, Supervisor
Village of Dryden - Alen Graham, President
Dryden Township - Tina Papineau, Supervisor
Elba Township - Mike Boskee, Supervisor
Goodland Township - Ron Cischke, Supervisor
Hadley Township - Ernie Monroe, Supervisor
City of Imlay City - Joi Kempf, Mayor
Imlay Township - Steve Hoeksema, Supervisor
City of Lapeer - Deborah Marquardt, Mayor
Lapeer Township - Scott Jarvis, Supervisor
Marathon Township - Fred Moorhouse, Supervisor
Mayfield Township - Dan Engelman, Supervisor
Village of Metamora - John Clark, President
Metamora Township - Dave Best, Supervisor
Village of North Branch - M. Kelly Martin, President
North Branch Township - Gary Swoish, Supervisor
Oregon Township - Jill Bristow, Supervisor
Village of Otter Lake - David Dorr, President
Rich Township - David Scheuer, Supervisor

Plan Development and Oversight

The Lapeer County Emergency Management Advisory Council/Local Emergency Planning Committee (EMAC/LEPC) is the Lapeer County entity responsible for overseeing the development of the Lapeer County Hazard Mitigation Plan. The EMAC/LEPC has the following responsibilities in Lapeer County:

1. Investigate the potential for hazards in the community.
2. Act as the Local Emergency Planning Committee to review, improve and implement plans to deal with hazardous chemical accidents.
3. Integrate such plans into the main Lapeer County Comprehensive Emergency Management Plan (CEMP).
4. Disseminate information obtained under Title III to the general public.
5. Act as the Emergency Management Advisory Council to advise and develop plans for utilization of the resources and facilities of the County as set forth in P.A. 390.

EMAC/LEPC membership consists of no more than two members from each of the following categories:

1. Elected Officials
2. Local Government
3. Law Enforcement
4. Emergency Management
5. Fire
6. Health/First Aide Organization
7. EMS
8. Environmental Organization
9. Hospital Personnel
10. Transportation
11. Agriculture
12. Broadcast/Print/Media/Communication
13. Community/Human Services
14. Facility Operator
15. Organized Labor
16. Education
17. Citizen-at-Large

Plan Development Work Items and Meetings

1. In January 2019, staff submitted an application to the MSP/FEMA for funding to update the Lapeer County Hazard Mitigation Plan.

2. In September 2020, staff received a finalized grant agreement from the MSP/FEMA to begin updating the plan.

3. In October and November 2020, staff collected data related to Lapeer County hazards from various local, county, and state agencies.

4. In December 2020, staff developed a preliminary list of hazards for Lapeer County based on data collected and hazards prioritized in the previous hazard mitigation plan update.

5. On January 11, 2021, surveys were sent out to government officials, community organizations, and the public to gain input on the challenges that face each individual community within Genesee County. A copy of the survey utilized to collect information about community hazards and priorities can be found in Appendix B.

6. On January 13, 2021, staff attended a Lapeer County EMAC meeting. During the meeting, staff provided an update on the Lapeer County hazard mitigation planning process. Staff also worked with the committee to update the Hazard Rankings for the plan. The Hazard Ranking list was revised and approved during the meeting.

7. A description of the process used to create the prioritized list of hazards are included in the Lapeer County Hazard Summary section of the plan. During the process of developing the original Lapeer County Hazard Mitigation Plan, staff worked with EMAC to establish goals and objectives. Those goals and objectives have been reviewed, revised, and reaffirmed for this plan update.

8. A public meeting notice was placed in the Lapeer County Press on January 17, 2021 for a Genesee County Hazard Mitigation Plan Update public meeting. The notice was also posted on social media, the GCMPC website, and emailed to local governments and a public involvement list. This mailing list has approximately 1,400 entries and its breakdown can be summed up by the following categories:
    - 20% other businesses (287)
    - 20% elected officials (280)
    - 17% governmental organizations (241)
    - 8% religious organizations (120)
    - 8% educational organizations (116)
    - 7% community organizations (101)
    - 6% transportation-related businesses (88)
    - 6% concerned citizens (81)
    - 6% neighborhood associations (78)
    - 2% senior citizen organizations (24)
    - <1% organizations for the disabled (7)

9. On January 26, 2021, staff held a Lapeer County Hazard Mitigation Plan Public Meeting. During the meeting, staff reviewed the following information about Lapeer County's Hazard Mitigation Plan Update: purpose of the plan, goals and objectives, and hazard vulnerability. Staff also answered questions and responded to comments from those who attended the meeting. A survey was available during the meeting for input as well.

10. On March 12, 2021, staff released a call for hazard mitigation projects to all Lapeer County municipalities. Projects were to be received no later than March 26, 2021. A copy of the form for requested projects is attached. Please see Appendix C for documentation regarding the projects received.

11. Staff reviewed the project applications and surveys that were received and drafted a list of mitigation strategies for each hazard.

12. Using information collected on Lapeer County hazards, the goals and objectives, the prioritized list of hazards and mitigating strategies, staff composed a draft of the Lapeer County Hazard Mitigation Plan update.

Lapeer County Community Profile

Historical Perspective

Lapeer County was once part of the Northwest Territory. By an ordinance of the Congress of the United States, passed July 13, 1787, the whole of the territory of the United States, lying northwest of the Ohio River, though still occupied by the British, was organized as the Northwest Territory.

The County of Wayne, named in the honor of General Anthony Wayne, was formed from a portion of the Northwest Territory, August 11, 1796. It included all the Lower Peninsula, portions of Northern Ohio and Indiana and part of Illinois and Wisconsin.

On May 7, 1800, the Territory of Indiana was formed and included all the lower peninsula of Michigan. After Ohio and Indiana became states, the Territory of Michigan was formed. Governor Hull, of the Michigan Territory, recognized Wayne County. Monroe County was established in 1817, Macomb, Mackinaw, Brown, and Crawford counties in 1818. (The last two now being part of Wisconsin.) On October 9, 1819, Col. Lewis Cass was appointed Territorial Governor.

In January 1820, the County of Oakland was formed. On September 18, 1822, Governor Cass set Lapeer County's boundaries, although it remained part of Oakland County until it was organized. Lapeer County officially became a county on February 2, 1835. The first recorded election for county officers, with 520 people voting, was in 1837.

How come the name "Lapeer"? Early tradition gives, as the actual source of the naming of this city and County, the following: The south branch of the Flint River, which has its rise in Lapeer County, flows northwestward, and throughout quite a distance of its course, flows over rocky bed. It is thought that this was suggested by the French and Indian traders, who frequently passed over this section, the name of stone or flint. "The Stone" in French is "LePierre," but the English translation of the Canadian French accent of this word is "Lapeer". Hence, Governor Cass chose "Lapeer" as the name of the county.

The first settler in Lapeer was Alvin N. Hart, who was born in Cornwall, Connecticut on February 11, 1804. He came to Lapeer in 1831 and platted the Village of Lapeer on November 8, 1833. The plat was registered in Pontiac, December 14, 1833, in Associate Judge Bagley's Court, County of Oakland.

Alvin Hart became a state senator in 1843, representing the Lapeer, Oakland, Genesee, Shiawassee, Tuscola and Saginaw Counties and the entire Upper Peninsula. He was instrumental in having the state capitol moved from Detroit to Lansing. His death occurred on August 22, 1874. He is buried in Lapeer.

Jonathon R. White, the second settler in Lapeer, was born in South Hadley, Mass., in 1806. He also settled in Lapeer in 1831.

Being of pioneer stock, Hart and White each wanted to start their own town; Hart forming what was known as Lapeer, and White platting what was known as Whitesville. Whitesville was located on what is now South Main Street in Lapeer, from the railroad tracks to DeMill Road.

White and his friends built Lapeer County's first courthouse in 1839, on the site of the school administration building. White got the job after Hart ran into legal problems related to his original courthouse building. Court was first held in a Lapeer County courthouse on July 7, 1840. Hart built the present courthouse in 1846. This structure is listed on the national historical register and is one of the oldest operating courthouses in the nation. This significant historical site is an outstanding example of Greek revival architecture and is a community focal point. Hart rented it to the County for one dollar, and court was first held there in April 1847. In 1853, the County bought Hart's courthouse for $3,000. It became County property in 1858. White's courthouse building eventually became a school.

The White family built a large, impressive building, which was called White's Opera House. It was located where Bishop Kelley School is at the present time. Business apparently was not good enough because in 1879, the building was moved piece by piece to its present location at the southeast corner of Court and Nepessing Streets. The building is now commonly known as the White Block. However, the building is now in the process of being demolished.

Lumber was the principal industry from the 1830's until 1870, with over (70) sawmills in Lapeer County. However, by 1887 with the removal of the forests, the market would change from sawmills to the manufacturing of stump pulling machines. At this same time Lapeer would become an agricultural County. Then by 1949, with 46 cows per square mile, Lapeer County boasted the greatest concentration of dairy cattle in Michigan. Around this time period, farming was beginning to take over the land.

Through the efforts of Governor John T. Rich, from Elba Township, the Lapeer State Home & Training School was established in 1894, with a capacity of 200 patients.

Besides Rich, prominent Lapeer County residents included Governor Moses Wisner, State Supreme Court Chief Justice Joseph B. Moore, Congressman Louis C. Cramton, and author Marguerite de Angeli.

Today, Lapeer County is a well-balanced community of farms, small industry, and urban residents, serving the heavy industry of Genesee and Oakland counties.

The Federal Bureau of Census lists the 1970 population of Lapeer County at 52,361. The 1980 official population is listed as 70,038; the 1990 at 74,768; the 2000 at 87,904; a 2010 population count listed at 88,319 persons; and a 2019 population of 87,607.

Lapeer County consists of 18 townships, 7 villages, and 2 cities and has approximately 666 square miles. Please see **Figure 1-2** for a map of Lapeer County.

(History compiled by Lyle F. Stewart, former Lapeer County Clerk, and Russell Franzen, local historian and former District Court Administrator)

Regional Setting

Territorial Governor Lewis Cass, by an Executive Act, set Lapeer County's boundaries on September 10, 1822. Governor Cass' proclamation, dated February 8, 1831, explained that Hervey Parke, Stephen V. R. Trowbridge, and Gideon O. Whittemore were appointed commissioners to locate the County's "seat of justice." They recommended, and Cass approved, that the seat of justice be located "at a point bearing south forty-six degrees and thirty minutes west, distant twenty-seven chains from the northeast corner of section five in township seven north, of range ten east, and a short distance westward from the junction of Farmer's creek with the Flint River, on lands owned by the United States." (Lapeer County Sesquicentennial Reader by Russell Franzen)

Figure 1-1

Presently, Lapeer County is 663 square miles. It is located 56 miles north of Detroit, and 48 miles west of the Canadian border between the cities of Port Huron and Flint. Three major state highways, M-24, M-90 and M-53 provide immediate surface access to the interstate system (I-69). Bishop International Airport, 20 miles to the west, offers a link to major air

carriers, and AMTRAK passenger and CN freight service offer an east-west rail line corridor. See **Figure 1 -1** for an illustration of the county's location within the State of Michigan. See **Figure 1-2** for a map of Lapeer County.

Figure 1-2

Source: Genesee County GIS

Government

The governing board and policy-making body of the county is the Lapeer County Board of Commissioners. While many of its powers, duties and responsibilities are prescribed by law, and diffused through the wide -spread use of commissions, boards, committees, and independently elected county officers, the Board is in charge of developing and approving county policy setting the budget.

The County Administrator provides general administrative and liaison support for the Board of Commissioners, coordinates Board Committee Meetings, and maintains committee files. The Administrator assists the Board and County departments with analysis of legislative matters at the state and federal level. The County Administrator's office serves as the Freedom of Information Act (FOIA) Coordinator for Lapeer County.

There are seven districts in the county with one commissioner from each district elected every two years. Each year a Commissioner is chosen among the seven to serve as Chairperson. There are numerous other elected local officials in the county. They include the County Clerk, the Prosecutor, the Register of Deeds, the Sheriff, the Treasurer, and the Drain Commissioner, in addition to judges from Probate, Circuit, and District Courts.

Transportation

There are four major highways in Lapeer County, three state and one federal. M-24 and M-53 are north-south trunk lines. M-90 and I-69 are the main east-west trunk lines. Access to I-75 is approximately 25 miles using either I-69 west or M-24 south. There are approximately 360 miles of primary roads and 948 miles of local roads in the County (792 miles of those are gravel roads). The Road Commission presently has a very extensive detailed list of proposed projects for each community in Lapeer County. The traffic counts for the above trunk lines, as of December 2019 according to the Michigan Department of Transportation are:

- M-24: 21,422 (north of Old M-21)
- M-24: 17,965 (south of I-69)
- I-69: 31,478 (west of M-24)
- I-69: 27,505 (east of M-24)
- M-53: 11,965 (north of M-21)
- M-53: 19,189 (south of M-21)
- M-90: 3,100 (west of M-24)
- M-90: 3,431 (east of M-24)

In addition to road traffic, Dupont Airport, an instrument flight rules Class A airport, services small and twin-engine planes with a runway length of 2,925 feet for private planes and cargo service. It is in Mayfield Township, which is within minutes of McLaren Lapeer Region.

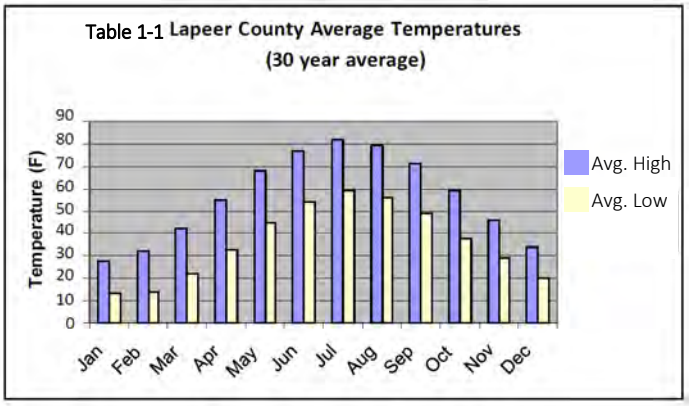
With Bishop International Airport located 20 miles to the west offering a link to major air carriers, and AMTRAK passenger and CNX freight service available via an east-west rail line corridor, the County has an integrated transportation network.

The Greater Lapeer Transportation Authority offers transit service with a fleet of 20 buses. Their headquarters is located within the City of Lapeer. Services are available to all citizens, but presently only provide transport within the City of Lapeer and to Lapeer, Mayfield, Oregon, Elba, and Deerfield Townships.

The Lapeer County School District has 9 handicapped vehicles (able to accommodate 35 wheelchairs) and approximately 55 regular school buses.

Climate

Although Lapeer County does not directly border any of the Great Lakes, its climate is modified somewhat by northeast winds off Lake Huron and by west winds off Lake Michigan. For the most part, the climate of Lapeer County is cool and humid" (Soil Survey of Lapeer County, Michigan). Lapeer County's average rainfall is 34 inches, and the average snowfall is 40 inches. The average minimum temperature in January is 13 degrees, and the average maximum in July is 82 degrees. The growing season is approximately 130 days long (NOAA Climate Summary). See Table 1-1 and Table 1-2 for average temperatures in Lapeer County.



Source: Weather Channel Averages and Records for Lapeer County

Table 1-2 Lapeer County Average Temperatures

Month	Avg. High	Avg. Low	Mean	Avg. Precip.	Record High	Record Low
Jan	28	13	21°F	1.53 in.	66°F (1950)	-26°F (1984)
Feb	32	14	23°F	1.12 in.	68°F (1999)	-24°F (1994)
Mar	42	22	32°F	1.95 in.	79°F (1998)	-15°F (1978)
Apr	55	33	44°F	2.86 in.	87°F (1960)	4°F (1965)
May	68	45	56°F	2.78 in.	92°F (1988)	23°F (1966)
Jun	77	54	66°F	3.12 in.	100°F (1988)	31°F (1966)
Jul	82	59	70°F	3.13 in.	100°F (1988)	36°F (1983)
Aug	79	56	68°F	3.46 in.	98°F (1955)	29°F (1976)
Sep	71	49	60°F	3.75 in.	98°F (1953)	25°F (1959)
Oct	59	38	49°F	2.63 in.	89°F (1971)	17°F (1982)
Nov	46	29	38°F	2.68 in.	80°F (1950)	1°F (1950)
Dec	34	20	27°F	1.97 in.	65°F (1998)	-14°F (1963)

Source: Weather Channel Averages and Records for Lapeer County

Soils/Topography

Lapeer County is known to be one of the most complex Counties in the State for soil surveys. There are over 60 kinds of soils in the County. Trees, both hardwood and coniferous, have affected the soils of Lapeer County more than other kinds of living organisms. "Soil is defined as the product of interaction from five major factors: climate, living organisms (especially vegetation), parent material, topography, and time. Differences in any one of these factors result in the formation of a different kind of soil" … "Except for the organic soils (peat and muck), the soils in Lapeer County formed in material deposited by glaciers. The texture of this glacier-deposited material ranges from gravel and sand to clay." (Soil Survey of Lapeer County, Michigan).

The glacier deposits from 9,000 years or more ago, resulted in deposits ranging from less than 20 feet to more than 250 feet. "Several distinctive topographic features of Lapeer County resulted from the last glaciations. Two terminal moraines (an accumulation of earth and stones carried and finally deposited by a glacier) were formed; these are now represented by two chains of hills, one that extends from Dryden to Hadley and another that extends from Deanville to Columbia (*Soil Survey of Lapeer County, Michigan).* Rolling topography exists mainly in Almont, Burnside, and Elba Townships. "At one time, during the glacial period, water flowed from Lake Huron westward across Lapeer County and eventually to Lake Michigan. The channel through which it flowed followed the present dry muck channel east of Imlay City, then ran northwest along Cedar Creek to the North Branch of the Flint River and then southwest along the Flint River into Genesee County. High sand terraces along the Flint River indicate that a considerable volume of water once flowed through this channel. Most of Lapeer County is within the Flint River Watershed. (Soil Survey of Lapeer County, Michigan).

It appears that M-53 is the transitional area when it comes to major changes in the soil types of the County. On the East side of M-53 (from Old M-21, north towards North Branch), the soils are mostly muck and flat, on the west they are mostly sandy loam and rolling hills.

Topography, which affects soil formation, varies extremely in Lapeer County, from depressional to steep. "In steep areas, local differences in relief are as much as 150 to 200 feet. In other parts of the County, there are large plains that have slopes of less than 2 percent (such areas near Columbiaville). (Soil Survey of Lapeer County, Michigan).

Population and Housing

With the proximity of Lapeer County to the Detroit area, the substantial job markets in Oakland, Macomb, and Genesee Counties, and the attractive semi-rural lifestyle (and other attributes), Lapeer continues to see some population increase. The 2010 Census shows that between 2000 and 2010, the population increased by just over 400 persons. The 2010 population was at 88,319 persons and the 2010 Census counted 32,815 households in Lapeer County. Between 2010 and 2019, population decreased by 712 persons making the 2019 population 87,607 with 32,145 households. Please see **Figure 1-3** for population density of Lapeer County.

Lapeer County has approximately 137 persons per square mile with a land area of 663 square miles. The County has 273 large-scale apartment buildings and 2416 mobile homes. Key 2019 demographic (**Table 1-4**) and housing data (**Table 1-5**) is highlighted in the tables below.

Economy

Currently, Lapeer County has traditionally been ranked as having one of the lowest millage rates in Michigan. The County's 2019 General Operating budget is $20,301,714. Other sources of revenue include license and permits, fines and forfeitures, charges for services, interest, and state and federal money.

Employment

Lapeer County has a very diverse economic base consisting of agriculture, manufacturing, retail, service industry, governmental and educational; see **Table 1-3** and **Table 1-6** for more info. The Lapeer Development Corporation (LDC), as the lead economic development agency, continues to bring new businesses to the area and assists in the expansion efforts of existing firms. During 2019, the LDC made significant changes to align with the growing demand for public-private partnerships. Investments were made so that collaboration of public, private, educational and workforce development projects could be stimulated for continued growth and enhancement.

The County has joined with Genesee, Shiawassee, St. Clair, Tuscola, Huron, and Sanilac Counties to develop the I-69 Thumb Region which helps to create a unified action in the region leading to new jobs, international marketing opportunities, and investments. The Accelerate Plan, an Economic Development plan, was developed in 2014 to guide this process.

According to the Lapeer Development Corporation, the top employers in Lapeer County are:

- McLaren Health Care Corporation - healthcare
- Lapeer Community Schools – public school district
- Pinnacle Foods – food processing
- Kamax, LP – Bolts, screws, rivets and fasteners manufacturer
- Lapeer Plating and Plastics – Injection molding, chrome plating and decorative painting on plastic
- Lapeer County – government
- Walmart – retail
- Champion Bus – manufacturer of small and mid-size buses
- ZF – machining of metal products
- Mold Masters – Plastic injection molding
- Meijer Great Lakes Limited - retail

Table 1-3 Top 10 Industries by Jobs	Total # of Employees	%
Services	9,354	36.06
Retail Trade	5,684	21.91
Manufacturing	3,952	15.24
Public Administration	2,200	8.48
Construction	1,188	4.58
Finance, Insurance & Real Estate	1,095	4.22
Transportation & Communications	926	3.57
Agricultural, Forestry & Fishing	606	2.43
Mining	13	0.05

Source: Michigan Economic Development Corporation

Table 1-4 Lapeer County Demographics Highlight		
	Estimate	Percent
Population		
Total population	87,607	87,607
Male	44,292	50.6%
Female	43,315	49.4%
Median age (years)	44.5	
Under 18 years	17,414	19.9%
65 years and over	16,432	18.8%
Race		
Total population	87,607	100%
White	84,680	96.7%
Black or African American	1,477	1.7%
American Indian and Alaska Native	1,263	1.4%
Asian	889	1.0%
Native Hawaiian and Other Pacific Islander	0	0
Some other race	847	1.0%

Source: U.S. Census Bureau 2019 Estimates

Table 1-5 Lapeer County Housing Highlight		
	Estimate	Percent
Housing Occupancy		
Total housing units	36,980	100%
Occupied housing units	33,902	91.7%
Vacant housing units	3,078	8.3%
Homeowner vacancy rate	1.0	
Rental vacancy rate	0.0	
Units in Structure		
Total housing units	36,980	100%
1-unit, detached	30,933	83.6%
1-unit, attached	752	2.0%
2 units	737	2.0%
3 or 4 units	833	2.3%
5 to 9 units	617	1.7%
10 to 19 units	419	1.1%
20 or more units	273	0.7%
Mobile home	2,416	6.5%
Boat, RV, van, etc.	0	0.0%
Housing Tenure		
Occupied housing units	33,902	100%
Owner-occupied	28,755	84.8%
Renter-occupied	5,147	15.2%
Average HH size of owner-occupied unit	2.59	
Average HH size of renter-occupied unit	2.19	
Value		
Median (dollars)	190,400	
Gross Rent		
Median (dollars)	798	

Source: U.S. Census Bureau 2019 Estimates

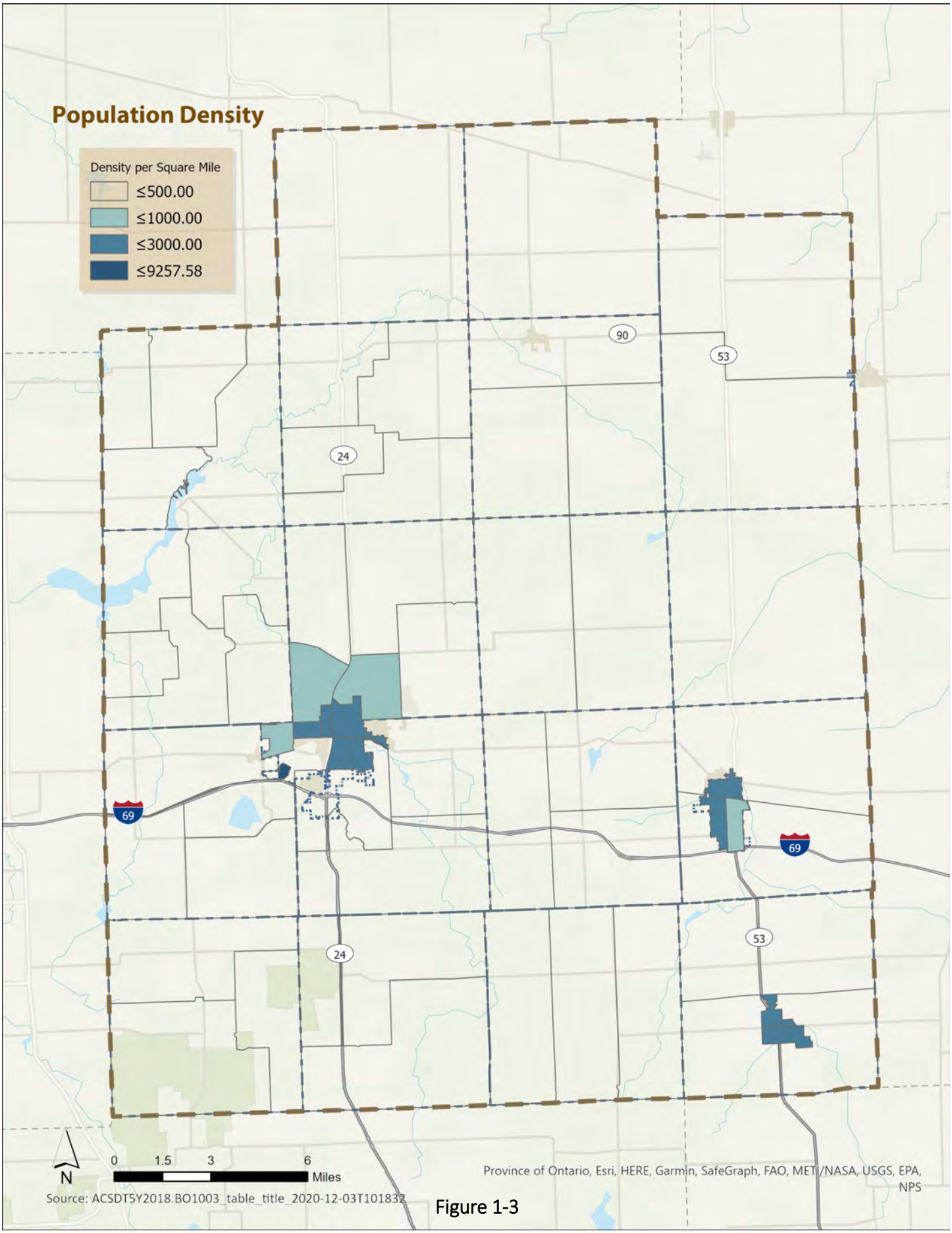


Figure 1-3

Source: Genesee County GIS and 2018 ACS 5-Year Estimates

Table 1-6 Top 10 Industries by Establishment Type	Total Establishments	Total # of Employees	%
Heavy Construction	229	863	6.94
Health & Medical Services	210	1,045	6.37
Banks & Financial Institutions	146	549	4.43
Member Organizations	135	545	4.09
Specialty Stores	135	463	4.09
Government	125	2,200	3.79
Agricultural Services	109	371	3.30
General Construction	106	325	3.21
Transportation	106	643	3.21
Other Business Services	106	348	3.21

Source: Michigan Economic Development Corporation

Land Use Characteristics & Changes in Local Land Development

A cooperative countywide initiative for planned growth has been a major focus in Lapeer County, with preserving the peaceful atmosphere at the heart of the planning. The County consists of 411,526 acres, 159 lakes and 2 state parks. As of the 2017 Agricultural Census, there were 1,013 farms located throughout Lapeer, with a total acreage of 165,464 and an average farm size of 163 acres. The 2017 Agricultural Census shows market value of agricultural products in Lapeer County to be $69 million

The remainder of land consists of 26.0% forest, 1.3% pasture, 1.3% water and 33.9% other (with approximately 10,000 of these acres being State land). The 2017 Census estimates showed Lapeer County at 86.69% rural and 13.31% urban. However, some may disagree on the percentage of the "rural" community (USDA, Michigan Agricultural Statistics Service). See **Table 1-7** for land use statistics for Lapeer County.

Table 1-7 Geographic Stats	Lapeer County	Michigan
Land area (square miles)	663	56,539
Persons per square mile	137	177

Source: U.S. Census Geographic Quick Facts, 2019

Almost all the townships and cities within Lapeer County have prepared individual Land Use and/or Zoning Ordinances and update them as needed to coincide with changes in development at the local level.

Community Facilities

Hospitals/Health Facilities

The Lapeer County Health Department offers an array of services including, but not limited to: public health, immunization, environmental health, laboratory, maternal and child health, adult health communicable disease control, substance abuse, home health care, County Medical Examiner and animal control services.

McLaren Lapeer Region is a full-service acute care hospital with 222 beds and a staff of more than 100 physicians. This facility is also the largest employer in Lapeer County, with approximately 1,025 employees. Some of their in-house services are inpatient care in intensive care, emergency medicine, chemical abuse treatment, psychiatric care, physical medicine and rehabilitation department, cardiac rehab, clinical laboratory, diagnostic imaging, MRI services (two days per week) and cardiopulmonary service. Lapeer Regional is affiliated with the McLaren Health Care Corporation.

McLaren has developed a network of care sites in Lapeer, Imlay City, Columbiaville, North Branch and Metamora. Some offsite outpatient services include kidney and cancer center, behavioral health, sports medicine, and a wellness center. St. Joseph's Mercy North has an urgent care and occupational medicine facility in Almont. The facility provides: treatment of minor illnesses and injuries, workman's comp injuries, physicals, drug screens, standard tests, allergy injections, wellness and safety programs and ergonomic analysis.

Currently there are 22 nursing care facilities in the County that provide thousands of beds for assisted living.

Lapeer County is served by a tiered EMS system. Located throughout the Lapeer County area are various Medical First Responder, Basic Life Support, Limited Advanced and Advanced Life Support ambulance services. EMS agencies are dispatched through the Lapeer County Central Dispatch Center. Citizens can access the EMS by dialing 9-1-1. Medical First Responder (MFR) services are provided by Burlington Fire and Rescue, Deerfield First Responders, Dryden Fire and Rescue, Marathon Area First Responders, and Metamora Fire and Rescue. Each MFR unit is staffed with at least one licensed Medical First Responder or Basic Emergency Medical Technician. Lapeer County EMS, Marlette EMS, Mayville Area Ambulance Service, MedStar and Pro Med provide basic life support, limited advanced life support and advanced life support transport services throughout Lapeer County. Each ambulance is staffed at a minimum with one Paramedic or Emergency Medical Technician Specialist and a Basic Emergency Medical Technician. EMS agencies in Lapeer County respond to more than 3,000 emergency calls a year with 19 ambulances and over 200 EMS personnel, as well as (1) disaster trailer and (1) off road special rescue vehicle. The Lapeer County EMS Medical Control Authority provides medical care oversight for the Lapeer County EMS system. Authority for Medical Control is provided by the State of Michigan through Public Act 179, 1990.

The Lapeer County Mental Health Center provides a wide range of professional mental health and related services for all residents in Lapeer County, as well as for institutions and agencies serving our communities. Emergency, short, and long-term counseling services are also provided.

Police and Fire Stations

There are 16 fire stations and 7 police stations in Lapeer County. The Michigan State Police post, Lapeer County Sheriff's Department and Thumb Correctional Facility (prison) are all located within the City of Lapeer. The Sheriff's Department has 1 road patrol lieutenant, 7 road patrol sergeants and 23 road patrol officers. In addition to road patrol, there are divisions of the Sheriff's Department for: corrections, detectives, clerical and communications. In all, the Sheriff's Department employs over 80 people. The County Jail is the only lock up facility in the County and is used by all local police departments. Almont Township, Dryden Township, City of Imlay City, City of Lapeer, Lapeer Township, and Metamora Township all provide their own municipal police departments. The Thumb Correctional Facility, a level 2 prison, has nearly 1,000 beds, and employs over 300 people.

The population and government units of Lapeer County depend on 15 separate volunteer fire departments. The Lapeer County Firefighter's Association has over 350 members. The City of Lapeer has one full-time Chief, Fire Marshal and Fire Inspector. An enhanced 911 (E911) facility is located on Genesee Street, directly behind the City of Lapeer Public Safety building. The facility was built in 1997 and is also the location of the Lapeer County Emergency Operations Center. The dispatching service utilizes state-of-the-art computer systems to receive emergency calls and to direct fire, police, and ambulance units to the emergency scene. A 911 Authority Board was established in 1994 and is made up of representatives from the Michigan State Police, Lapeer County Sheriff's Department, City of Lapeer, City of Imlay City, County Board of Commissioners, Township Association, Lapeer County Firefighter's Association and a citizen-at-large. Please see **Figure 1-4** for Emergency Facilities in Lapeer County.

Emergency Management and Homeland Security

The Office of Emergency Management for the County of Lapeer serves as the disaster services coordination office for the county and has an Emergency Operations Center located in the basement of the 911 facility.

The Office of Emergency Management is responsible for continually monitoring and updating the County's Emergency Response Plan, as well as many other disaster related activities:

Mitigation: Eliminate, reduce or prevent long-term risk to human life and property from natural and man-made hazards.

Emergency Preparedness: Advance emergency planning that develops operational capabilities and facilitates an effective response in the event an emergency occurs.

Figure 1-4

Source: Genesee County GIS and Lapeer County Office of Emergency Management

Emergency Response: Action taken immediately before, during or directly after an emergency to save lives, minimize damage to property and enhance the effectiveness of recovery.

Recovery: Short-term activity to return vital life support systems to minimum operating standards and long-term activity designed to return life to normal or improved levels.

Major accomplishments of the Lapeer County Office of Emergency Management in the last five years includes:

- Establishing the Alert Lapeer County mass notification system
- Integrated Public Alert and Warning System (IPAW) memorandum of understanding created
- Community Emergency Response Team (CERT) monthly trainings held
- Skywarn trainings with annual attendance around 125 people
- Monthly tornado siren tests April through October
- $2.5 million in Homeland Security Grants managed

Shelters

Lapeer County has community shelters that can be used to serve residents after a hazardous event has occurred. Many of these are schools, churches, or community centers.

Early Warning Sirens

The county currently has 39 installed early warning sirens. See **Figure 1-5** for a map showing the early warning sirens. The map includes precise buffer zones for the range the siren can be heard. This allows for accurate coverage to be evaluated by the magnitude of the range for each specific siren. These buffer zones indicate areas of early warning coverage in the county. Approximately 39% of the population is covered by a siren, leaving 61% of the population outside the estimated range of a siren.

Dams and Bridges

Under the Inland Lake Act 146 of 1961, the Lapeer County Drain Commissioner is responsible for maintaining the following dam structures within Lapeer County: Merritt Lake, Lake Metamora, Lake Lapeer (identified as a "high hazard"), Lake Nepessing and Winn Lake. There are also two (2) dams that are overseen by Inter-County Drain Boards. There are 35 dams in total in Lapeer County. The North Branch Mill Creek flood control structure is under the jurisdiction of the Inter-County Drain Board, which includes drain commissioners from Lapeer, Sanilac, and St. Clair Counties, as well as a representative from the Michigan Department of Agriculture. There is also the Potters Lake Dam, which is overseen by the Black Creek Inter-County Drain Board with members from Genesee and Lapeer County, and the Department of Agriculture. The Lapeer County Drain Commissioner is also responsible for almost 530 miles of drains throughout Lapeer County. In addition, there are 161 bridges included in the county's infrastructure. Please see **Figure 1-6** for Dams and **Figure 1-7** for Bridges in Lapeer County.

Educational Facilities

There are five public school districts covering territory in Lapeer County, plus the Lapeer County Intermediate School District. The school districts include the Almont Community Schools, Dryden Community Schools, Imlay City Community Schools, Lapeer Community Schools and North Branch Community Schools. Overall, there are 9 elementary schools, 5 middle schools, 7 high schools, 1 vocational technical center (shared by the 5 school districts), 3 nonpublic schools, 1 charter school, and a virtual learning academy. Adult classes are offered throughout the County through the public school systems.

There are four colleges/universities that serve the Lapeer County community: St. Clair Community College, Mott Community College, Kettering University, and U of M Flint. There is also the Health Enrichment Center, which is nationally accredited and a recognized school of therapeutic massage.

Utilities/Solid Waste

Consumers Energy provides Lapeer County with gas service. They also offer electric service to Hadley, Oregon, Marathon, and Elba Townships. Detroit Edison provides electrical service to the remainder of the municipalities in Lapeer County.

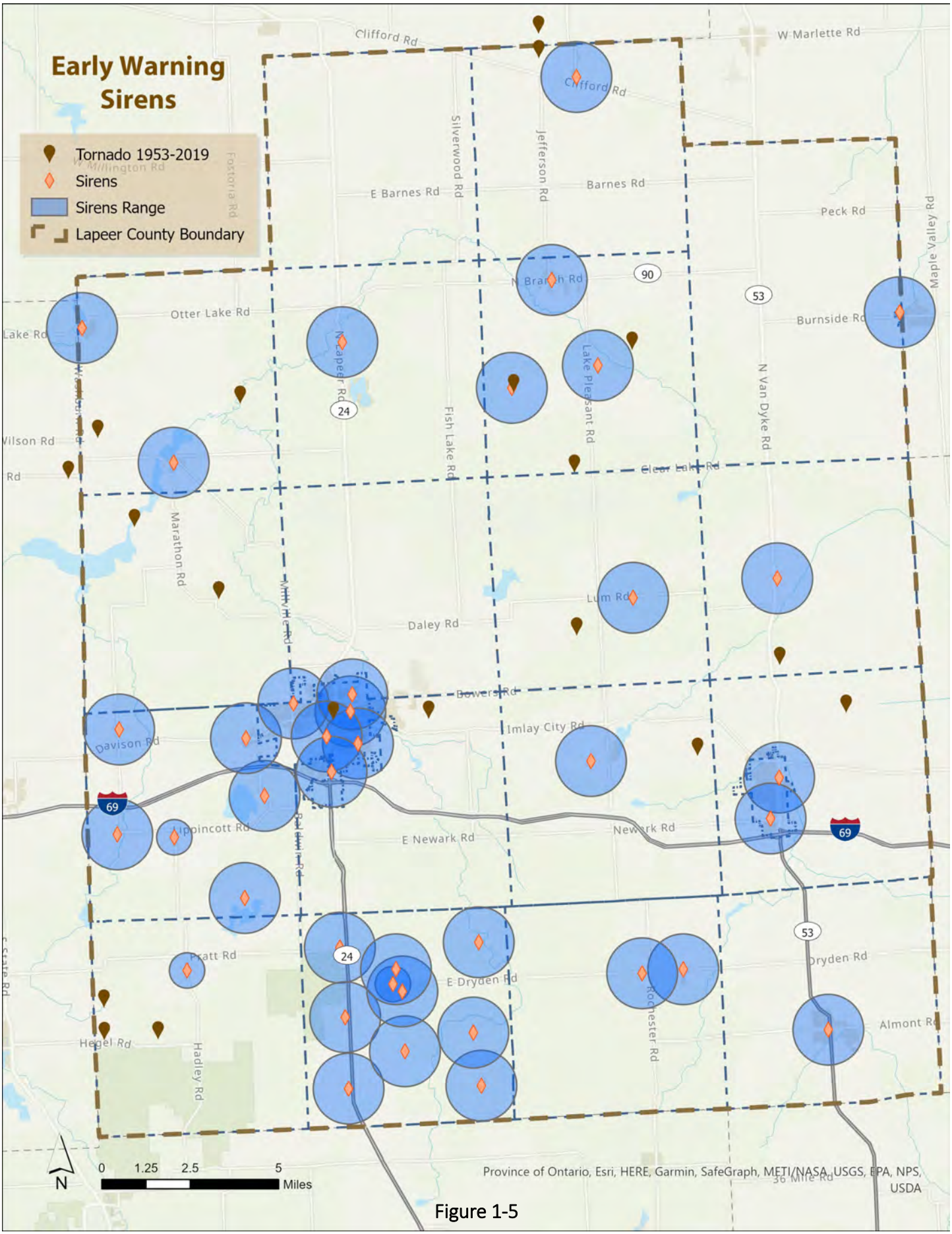


Figure 1-5

Source: Genesee County GIS and National Oceanic and Atmospheric Administration

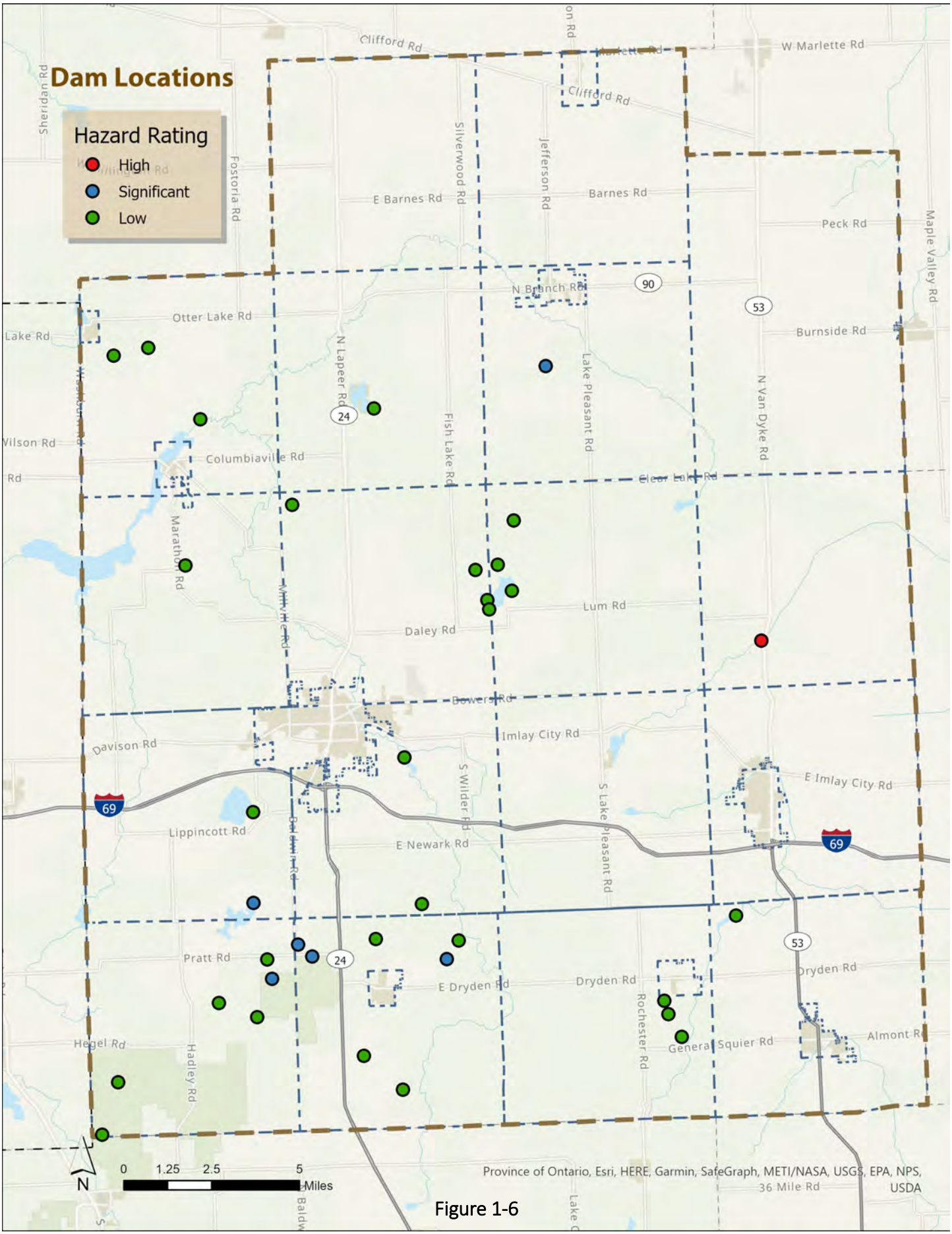


Figure 1-6

Source: Genesee County GIS

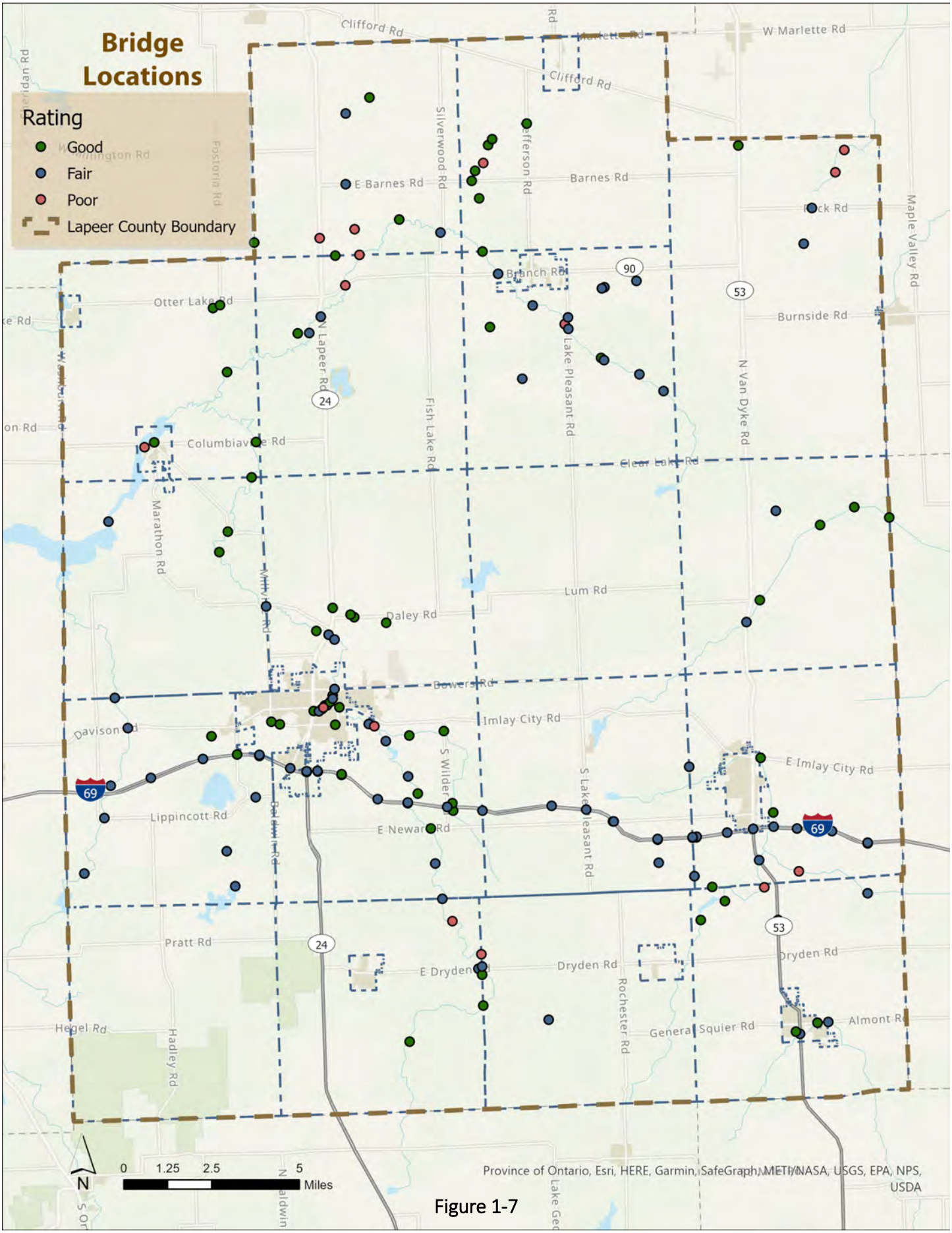


Figure 1-7

Source: Genesee County GIS

The five main telephone service providers to residents within Lapeer County are: Centurylink, AT&T, Mediacom, Comcast, and Verizon Wolverine Telephone provide service to part of the north/western corner of the county. Multiple carriers have provided cell phone and internet access in various locations throughout the County.

The Detroit Metropolitan Water System has a 6' pipeline running east-west across the County. A 10' pipe comes in from Port Huron. Near Imlay City, the pipe then splits sending a 6' pipe westward along Bowers Road, then down Oregon Road. This line furnishes water for the City of Lapeer, City of Imlay City and Mayfield Township (Dupont Airport only). This line continues to service Genesee County. The remaining split in Imlay City sends an 8' pipeline into a southward direction, furnishing the Village of Almont. The City of Lapeer does have one water tower, capable of holding 750,000 gallons of water. However, it is not in service currently. The City of Lapeer also operates a Wastewater Treatment Plant serving City residents and companies (including the Industrial Park). The remainder of the County is served by individual onsite septic/drain field systems.

The Greater Lapeer County Utilities Authority is a mandated board, with the responsibility to oversee any issues pertaining to the Detroit Water System. Its membership is composed of several townships, cities, and villages. Unless an urgent issue arises, this group meets annually.

As of September 30, 1998, there are no longer any solid waste disposal facilities operating within Lapeer County. The County currently exports its solid waste to surrounding communities. There are three transfer stations operating within the County, one in North Branch, one in Brown City, and the other in Almont. The County relies primarily on the private sector to provide solid waste removal service to the residents and commercial sectors of the County. Some haulers also offer curbside recycling.

Cultural Facilities

The Lapeer County Courthouse boasts the title of the oldest working courthouse in Michigan, and still serves its intended purpose 155 years after construction. There are also three museums throughout the County (North Branch, Imlay City and Columbiaville).

Another historical point, the Marguerite de Angeli Branch Library (author of "Copper-Toed Boots") located within the City of Lapeer, is the main branch and reference center for eight branches. It was built in 1923, and in 1984 doubled its size when a new addition was added.

There are seven other library sites throughout Lapeer County (Clifford, Columbiaville, Elba, Goodland Township, Hadley Township, Metamora, and Otter Lake); and between them, they circulate over a quarter of a million items per year. There are also five independent libraries in Almont, Dryden, Imlay City, Attica Township and North Branch. The Lapeer County Library system links its eight branches with an automated circulation system and on-line catalog.

The City of Lapeer's Pix Theater opened on April 9, 1941 and offers an array of events from comedy shows, music presentations, children's shows and lectures. Today, The Pix still retains its original art deco façade and marquee. The City also has a 50,000 square-foot Community Center that contains a wide variety of physical activity rooms, meeting rooms, outdoor facilities, as well as housing the administrative offices for the city parks and recreation department. In November of 2013, a fire that started next door to the theater caused extensive damage to the historic structure. The roof and ceiling were damaged, along with walls and carpet. Much of the damage was caused by water. The theatre was later reopened after repairs were made.

The Lapeer County Historical Society was established in the 1960's. They maintain a very strong support on historical preservation of Lapeer County with their focus primarily on education. Their membership is made up of over 100 citizens. With the enthusiastic support of approximately 30 volunteers, a museum (housed within the Historic Courthouse) is open to the public during special events, tours and in-school programs are available, continuous restorations are made to the Historic Courthouse, as well as giving support to citizens who wish to restore a historic home.

Recreational Facilities

There are five major lakes throughout the County, each with its own unique activities: Holloway Reservoir, Lake Nepessing, Lake Minnewanna, Big Fish Lake and Long Lake. The Flint River flows through the County, offering canoeing and fishing in some areas. There are also some areas that have parks, trails, and color tours: Lapeer State Game Area, Ortonville Recreation Area and Metamora-Hadley Recreation Area. The Metamora-Hadley Recreation Area offers a sandy beach, boat rentals and beautiful camping sites. The camp features special activities for the different holidays and even reopens for spirited Halloween camping activities. There are also eight other campgrounds located throughout the County.

Lapeer County has approximately fifteen golf courses as well as several "stocked" fishing ponds. No matter where you are in Lapeer County, a fairway or fishpond is not far away. Some other attractive activities/facilities throughout the County are:

River Route System - There are 26 miles of public canoeing, but presently only 6 miles (between Millville and Norway Lake Road) are considered useable due to hazardous conditions created over the years from fallen trees.

Polly Ann Trail - In January of 1999, 19.7 miles of the abandoned railroad corridor, (formerly the Polly Ann Railroad) in Lapeer County began being converted into the Polly Ann Trail. Originally, the Polly Ann Railroad was a 99-mile route passenger train, which once ran from Pontiac to Caseville. It begins at Kings Mill, going in a southern direction through the townships Arcadia, Imlay (also Imlay City), Attica, Dryden (also Village of Dryden), then it continues into Oakland County. The linear park will benefit the "non-motorized" recreation enthusiast. It offers an environment for walkers, joggers, runners, hikers, wheelchairs, skiers, bicyclists, equestrians and naturalists.

General Squire Memorial Park - General Squire Memorial County Park is a National Historic site in Dryden. It is home to Forest Hall and The Old Mill. Forest Hall is a seasonal hall with seating for 125, a kitchen, modern restrooms and a fireplace. The Old Mill is available year-round; it seats 60 and has a fireplace. Throughout the park, there are picnic areas, a pavilion, nature trails, fishing, lighted sledding and tobogan run, lighted ice-skating rink, softball diamonds and children's play equipment.

Torzewski County Park - located on Pero Lake, "The Wetlands" features a 360' and 100' long waterslides, small children's pool, a pirate ship pool, and a full service "Snack Shack". The Park also has an amphitheater, picnic areas, nature trails, pontoon boat rentals, fishing, 5 pavilions, sand volleyball courts, softball diamond, horseshoes and children's play equipment.

Seven Ponds Nature Center - The center has 3,131 acres of deep, glacial lakes, wetlands, fields, and woodland providing shelter for many different plants and animals. Boardwalks and bridges enable visitors to reach pond edges and shorelines. Towers provide scenic overlooks. They maintain areas of special interest: "Earls' Prairie", "Wildfowl Feeding Area", "Butterfly Garden" and a "Herb Garden". The educational facility features an assembly room, library, bookstore, Lischer Herbarium, natural history collection, observation beehive, touch table, Michigan bird display and a bird feeding area. As part of their staff, they offer a full-time naturalist and other wildlife interpreters.

City of Lapeer Parks/Community Center - The City of Lapeer has nine parks located throughout the City. Some only have pavilions, while others have play equipment, ball diamonds and camping sites available. A 2.2-mile pathway connects three of the parks. The City of Lapeer also has a Community Center complete with a competition pool, weight and fitness area, specialized rubber track, basketball & volleyball courts, multipurpose rooms, outdoor basketball and sand volleyball courts, seasonal ice rink and a child care room.

Polar Palace Ice Rink - This facility is a full service ice arena offering 2 NHL Hockey rinks (85 feet x 100 feet), seating for approximately 1,400 people, a heated mezzanine for a capacity of 100 people, high school and youth hockey programs, skate rental and sharpening, game room and concession stand.

Eastern Michigan Fairgrounds - Imlay City (38 acres). Host of the Annual Eastern Michigan Fair (4H Livestock as well); Woods & Water weekend event; Truck/Tractor Pull and other events.

Lapeer State Game Area - Located across four townships in the northwest part of Lapeer County with a total of 8,500 acres. The Game Area provides public access and fishing on all lakes except in the Canadian Goose Refuge. There are 40 miles of trails for horseback riding and snowmobiling.

Regional Recreational Facilities/Attractions

The summer season brings many individual community festivals: Lapeer Days (180 - 200,000 guests) Imlay City Blueberry Festival (8 - 10,000), Eastern Michigan Fair (28 - 30,000), North Branch Days (6 - 10,000) and Metamora Balloon Festival (1,500 – 2,000).

Hazardous Material Sites

As of March 2019, there are currently 18 Sites in Lapeer County designated SARA Title III, Section 302 Sites. These are sites where hazardous materials are stored. (See "Hazardous Materials Incidents at Fixed Sites" for more details regarding 302 Sites.) These sites are required to have an emergency plan on file with the Office of Emergency Management, Fire Department, and their own facility. See Figure 1-8 for a map of the 302 Sites.

Organizations

Lapeer County has a strong human services network. Organizations related to aging, credit/legal services, housing, infant/prenatal, transportation and veteran services are a few of the human service areas represented in Lapeer County. Another great resource is offered by Lapeer County United Way. The First Call For Help directory provides a resource directory for services offered to residents in the County who may be in need.

The County also has the Multi-Purpose Collaborative Body - a voluntary group of individuals that serve several functions in the County: 1) It is a vehicle for communication among human service agencies so they can share resources and prevent duplication of efforts, 2) it identifies county human needs and initiates action to meet those needs and involves localities whenever appropriate, and 3) it encourages all agencies to be represented on the Council and foster cooperation among these agencies.

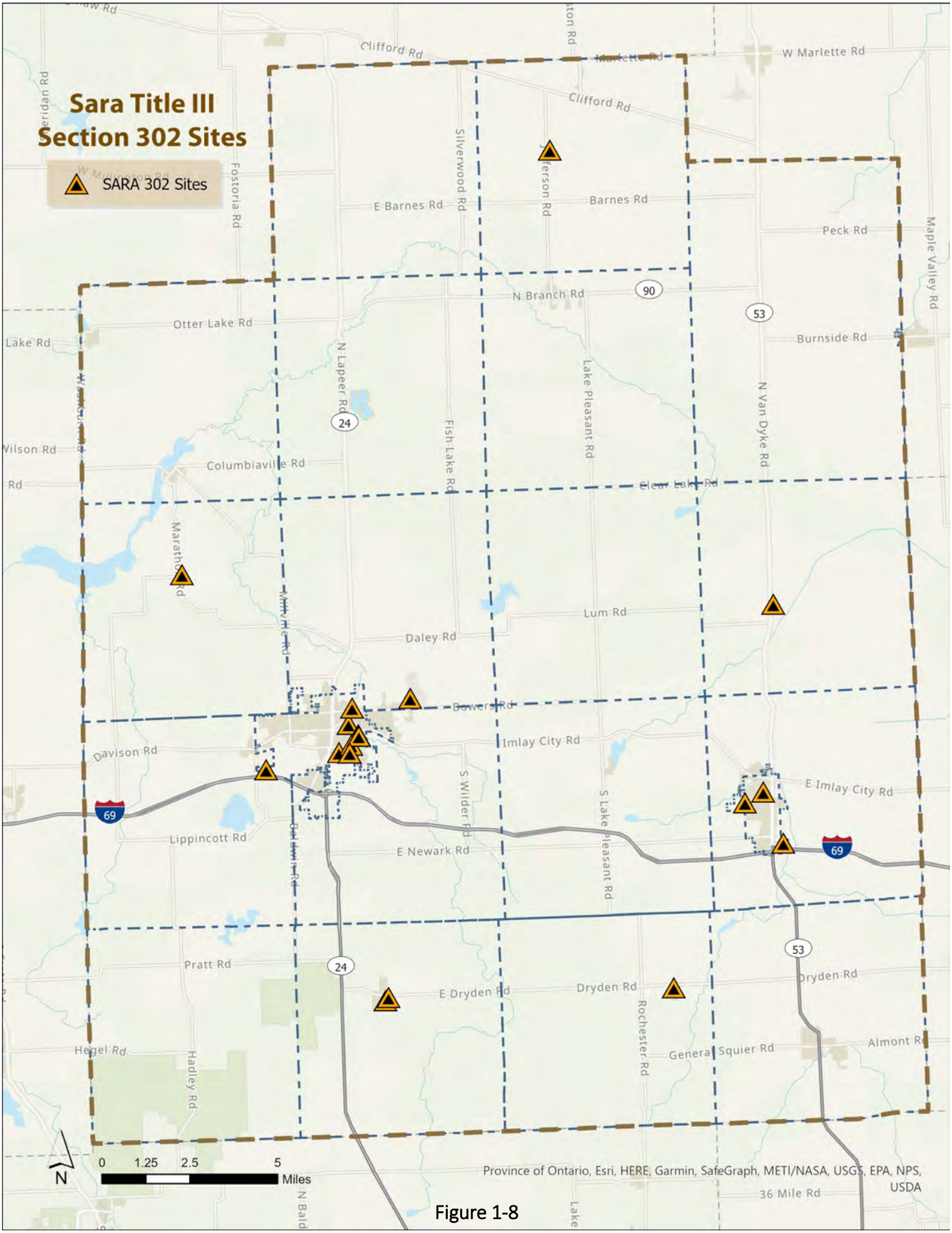


Figure 1-8

Source: Genesee County GIS and Michigan EGLE

Community Profiles

The Community Profiles provide basic characteristics of each local unit of government. The Hazard Priorities and Hazard Mitigation Strategies for the individual local units are included where available, as well as public and governmental input. Several attempts were made to gather input from all local units, including: local meetings, surveys, participation forms, memos, phone calls and emails.

To gain the participation of the local units, staff held local meetings throughout the County, sent out surveys, requested input from the public and community organizations, reached out to each local unit of government. In addition, the Lapeer County Emergency Management Advisory Council, made up of experts involved in local government, emergency response, fire, education, health, and law enforcement from around the County was an integral part of the update. After requests using each method of outreach, some jurisdictions still did not provide information. The information that was gathered by staff, or received from the local units, is included in the individual Community Profiles, as well as under the Hazard sections, where applicable.

To include not only local officials' input, staff also sent a Hazard Mitigation Plan Update Public Participation Survey (see Appendix B) to the public participation list that includes neighboring agencies, businesses, universities and school districts, nonprofits, and citizens. The Lapeer County Hazard Mitigation Emergency Management Advisory Council (consisting of experts involved in local government, emergency response, fire, education, health, and law enforcement, etc.) was a very large part of the update. Staff held Public Input Sessions open to anyone who was interested in learning more about the Plan and making comments or suggestions. The Plan was sent to neighboring communities, all the local units within Lapeer County, posted on Genesee County Metropolitan Planning Commission's website, and advertised as a public notice in the Lapeer County Press.

Staff requested information from each jurisdiction regarding the existing authorities, policies, programs, and resources to accomplish hazard mitigation at the local level (the information that was provided can be found in Appendix B, under Hazard Mitigation Plan Update Government Participation Survey). Many of the communities intend to put policies in place and staff will continue to encourage the communities to make those changes.

In the previous plan, many communities agreed to incorporate Hazard Mitigation in the update of their Master Plans. Some of the local units have not had a Master Plan update since the completion of the previous Hazard Mitigation Plan. Staff has reminded the local units of their commitment to include Hazard Mitigation in their next update. Staff will continue to impress upon the local units the importance of incorporating Hazard Mitigation into their master plans and other important planning tools. Staff has emphasized to local officials the importance of integrating pre-hazard mitigation into other planning mechanisms as well. Each local unit is encouraged to consider the importance of being prepared for natural or man-made hazards when adopting policy and programs for their community.

Below is relevant statistics and hazard mitigation information that staff collected for each municipality in Lapeer County. This information includes details provided by local officials through surveys and project applications.

Almont Township

- 2018 Population: 6,793 (down 3.2% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Almont Township is a continuing participant in the updated plan.
- National Flood Insurance Program (NFIP) Participant
- One dam
- 20 potential structures in the floodplain, only two with insurance policies
- No repetitive loss structures
- One warning siren
- No "302" sites but does have a hazardous materials transport route

Staff collected the following information from Almont Township officials in the previous plan update;

see below. Staff requested information from Almont Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
  - Riverine Flooding
  - Snow and Ice Storms
  - Tornadoes

Staff sent out public input surveys to include citizens in the plan. The input from Almont Township showed the following:

- Citizens range from not concerned and moderately concerned about the possibility of their community being impacted by a disaster
- Almont Township residents feel that the following hazards could most impact their community:
  - Civil Disturbances
  - Extreme Temperatures
  - Hazardous Materials Incidents (Fixed Site)
  - Hazardous Materials Incidents (Transportation)
  - Inclement Weather
  - Infrastructure Failure
  - Major Transportation Accidents
  - Public Health Emergencies
  - Snow and Ice Storms
  - Terrorism
  - Tornadoes
- Additional Public Comments:
  - Update response plans, response drills, infrastructure improvements, investments in responder training
  - Provide a plan of action with communications to residents. Prepare for the worst with a community drill
  - Police presence or national guard is needed in emergency situations
  - Public education and training is needed

Mitigation Projects:

1. Project: Warning sirens. Project description: Install an early hazard warning system with 4 sirens at various locations in the Township not covered by a warning system. Proposed timeframe for implementation: 1 - 5 years. Budget: $110,000 - $120,000. Update: None, this is a newly submitted project.

Village of Almont

- 2018 Population: 2,761 (up 3.3% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- The Village of Almont is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- 111 potential structures in the floodplain, only four with insurance policies
- No repetitive loss structures
- No warning sirens
- No “302” sites but does have a hazardous materials transport route

Staff collected the following information from Village of Almont officials in the previous plan update; see below. Staff requested information from Village of Almont officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
  - Flooding
  - Inclement Weather
  - Infrastructure Failure
  - Snow and Ice Storms
  - Tornadoes
- Hazard Mitigation Strategies:
  - Update emergency response procedures
  - More training opportunities for disaster response
  - Manage the Clinton River banks

Staff sent out public input surveys to include citizens in the plan. The input from the Village of Almont showed the following:

- Citizens range from not concerned and moderately concerned about the possibility of their community being impacted by a disaster
- Village of Almont residents feel that the following hazards could most impact their community:
  - Civil Disturbances
  - Hazardous Materials Incidents (Transportation)
  - Inclement Weather
  - Infrastructure Failure
  - Major Transportation Accidents

    - Public Health Emergencies
    - Snow and Ice Storms
    - Structure Fires
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - Need a listing of what materials are being transported along the railroad that runs through the City of Lapeer
    - Encourage the public to be more prepared for disasters
    - Need more salting on the roads and better drainage options in the neighborhood

Mitigation Projects:

1. Project: Warning Sirens. Project description: Install warning sirens in the village. Proposed timeframe for implementation: 1-5 years. Budget: $50,000-$100,000. Update: Not provided.

2. Project: Infrastructure improvements. Project description: Retrofit existing sanitary sewer lift stations and/or general infrastructure components to be more resistant to natural disasters. Proposed timeframe for implementation: Unknown. Budget: $35,000-$75,000. Update: Not provided.

3. Project: Soil stabilization. Project description: Complete soil stabilization projects along the Clinton River. Install geotextiles, buffer strips, decrease slope angles. Area for improvements would be all properties that border the Clinton River or the Farnum Drain. Proposed timeframe for implementation: 1-5 years. Budget: $100,000-$150,000. Update: Not provided.

4. Project: Culvert improvements. Project description: Analyze culverts throughout the village and make necessary improvements to protect residents from flooding. The work could also include installing retention basins. Proposed timeframe for implementation: 1-5 years. Budget: $100,000-$150,000. Update: Not provided.

5. Project: Shelter. Project description: Construction of a safe room for use during emergencies, such as tornadoes. A stand-alone building that is constructed on municipal property. Proposed timeline for implementation: 1-5 years. Budget: $75,000-$100,000. Update: Not provided.

Arcadia Township

- 2018 Population: 3,106 (down 0.2% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Arcadia Township is a continuing participant in the updated plan.
- NFIP Participant
- Three dams
- No potential structures in the floodplain. However, there is one insured property
- No repetitive loss structures
- One warning siren
- No “302” sites but is near a hazardous materials transport route

Staff collected the following information from Arcadia Township officials in the previous plan update; see below. Staff requested information from Arcadia Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
    - Oil or Natural Gas Well Accidents
    - Snow and Ice Storms
    - Structure Fires
    - Wildfires
- Hazard Mitigation Strategies:
    - More access to fire hydrants
    - Expanded fire equipment/service

Staff sent out public input surveys to include citizens in the plan. The input from Arcadia Township showed the following:

- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster
- Arcadia Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Drought
    - Hazardous Materials Incidents (Fixed Site)
    - Hazardous Materials Incidents

(Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Major Transportation Accidents
    - Nuclear Attack
    - Public Health Emergencies
    - Snow and Ice Storms
    - Structure Fires
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - Unified agency training is needed
    - Fix bridges and update all power lines
    - More FBI to investigate terrorism
    - Need more police presence
    - Need more cellphone towers
    - Need public education

Mitigation Projects:
None

Attica Township

- 2018 Population: 4,746 (down 0.2% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Attica Township is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- No potential structures in the floodplain. However, there is one insurance policy
- No repetitive loss structures
- One warning siren
- No "302" sites but does have a hazardous materials transport route

Staff collected the following information from Attica Township officials in the previous plan update; see below. Staff requested information from Attica Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
    - Extreme Temperatures
    - Hazardous Materials Incidents (Transportation)
    - Hazardous Materials Incidents (Fixed Site)
    - Public Health Emergencies
    - Snow and Ice Storms

Staff sent out public input surveys to include citizens in the plan. The input from Attica Township showed the following:

- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster
- Attica Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Extreme Temperatures
    - Hazardous Materials Incidents (Fixed Site)
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Nuclear Attack
    - Public Health Emergencies
    - Snow and Ice Storms
    - Subsidence (Sinkholes)
    - Terrorism
    - Tornadoes
    - Wildfires
- Additional Public Comments:
    - Annual dam inspections are needed
    - Fix roads, add limestone to dirt roads
    - Public education and awareness is needed
    - Wear masks
    - More salt on roads is needed for ice

Mitigation Projects:

1. Project: Backup generator. Project description: Purchase of a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $45,000. Update: Not provided.

2. Project: Warning sirens. Project description: Install an early hazard warning system with 4 sirens at various locations in the township not covered by a warning system. Proposed timeframe for implementation: Unknown. Budget: $100,000. Update: Not provided.

Burlington Township

- 2018 Population: 1,578 (up 6.8% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Burlington Township is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- Two potential structures in the floodplain. However, there are no insurance policies
- No repetitive loss structures
- No warning sirens
- One "302" site and is near a hazardous materials transport route

Staff collected the following information from Burlington Township officials:

- Community has not been impacted by a natural or man-made disaster in the past five years
- Moderately concerned about the possibility of their community being impacted by a disaster
- Hazard Priorities:
    - Civil Disturbances
    - Hazardous Materials Incidents (Transportation)
    - Oil or Natural Gas Well Accidents
    - Public Health Emergencies
- Did not provide information about what has been done in the last five years to mitigate future hazards
- Willing to incorporate hazard mitigation into future community plans
- Existing policies or programs can be improved by holding trainings for the fire department
- The communities prioritized mitigation strategy was not provided
- Additional Local Official Comments:
    - None

Staff sent out public input surveys to include citizens in the plan. The input from Burlington Township showed the following:

- Citizens range from not concerned and moderately concerned about the possibility of their community being impacted by a disaster
- Burlington Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Public Health Emergencies
    - Snow and Ice Storms
    - Tornadoes
- Additional Public Comments:
    - Early warnings via text are needed

Mitigation Projects:
None

Burnside Township

- 2018 Population: 1,948 (up 4.5% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Burnside Township is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- No potential structures in the floodplain and no insurance policies
- No repetitive loss structures
- No warning sirens
- No "302" sites but does have a hazardous materials transport route

Staff collected the following information from Burnside Township officials in the previous plan update; see below. Staff requested information from Burnside Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
    - Drought
    - Oil or Gas Well Accidents
    - Snow and Ice Storms
    - Tornadoes
- Hazard Mitigation Strategies:
    - Willing to incorporate Hazard Mitigation into future community plans

Staff sent out public input surveys to include citizens in the plan. The input from Burnside Township showed the following:

- Citizens range from not concerned and moderately concerned about the possibility of their community being impacted by a disaster
- Burnside Township residents feel that the follow-

ing hazards could most impact their community:
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Snow and Ice Storms
    - Tornadoes
- Additional Public Comments:
    - Better regulation is needed

Mitigation Projects:
None

Village of Clifford

- 2018 Population: 298 (down 8% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- The Village of Clifford is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- No potential structures in the floodplain and no insurance policies
- No repetitive loss structures
- One warning siren
- No "302" sites but is near a hazardous materials transport route

Staff collected the following information from Village of Clifford officials in the previous plan update; see below. Staff requested information from Village of Clifford officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Mitigation Strategies:
    - Floodplain management

Staff sent out public input surveys to include citizens in the plan. The input from the Village of Clifford showed the following:

- Citizens are moderately concerned about the possibility of their community being impacted by a disaster
- The Village of Clifford residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Public Health Emergencies
    - Terrorism
- Additional Public Comments:
    - None

Mitigation Projects:
None

Village of Columbiaville

- 2018 Population: 946 (up 20.2% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- The Village of Columbiaville is a continuing participant in the updated plan.
- Not a NFIP Participant
- No dams
- One potential structures in the floodplain. However, there are no insurance policies
- No repetitive loss structures
- No warning sirens
- No "302" sites but is near a hazardous materials transport route

Staff collected the following information from Village of Columbiaville officials in the previous plan update; see below. Staff requested information from Village of Columbiaville officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
    - Flooding
    - Infrastructure Failure
    - Snow and Ice Storms
- Hazard Mitigation Strategies:
    - Improve storm drains
    - Purchase generators to maintain sewer and water systems during a power outage

Staff sent out public input surveys to include citizens in the plan. The input from the Village of Columbiaville showed the following:

- Citizens are moderately concerned about the possibility of their community being impacted by a disaster
- The Village of Columbiaville residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Dam Failure
    - Extreme Temperature

    - Inclement Weather
    - Infrastructure Failure
    - Public Health Emergencies
    - Snow and Ice Storms
    - Tornadoes
- Additional Public Comments:
    - Need tree trimming and road/bridge upkeep and repair
    - Better communication is needed
    - Need preparation

Mitigation Projects:
None

Deerfield Township

- 2018 Population: 5,702 (up 0.1% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Deerfield Township is a continuing participant in the updated plan.
- NFIP Participant
- One dam
- No potential structures in the floodplain. However, there is one insurance policy
- No repetitive loss structures
- One warning siren
- No "302" sites but does have a hazardous materials transport route

Staff collected the following information from Deerfield Township officials in the previous plan update; see below. Staff requested information from Deerfield Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
    - Dam Failure
    - Tornadoes

Staff sent out public input surveys to include citizens in the plan. The input from Deerfield Township showed the following:

- Citizens range from not concerned and moderately concerned about the possibility of their community being impacted by a disaster
- Deerfield Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Dam Failure
    - Drought
    - Extreme Temperatures
    - Hazardous Materials Incidents (Fixed Site)
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Nuclear Attack
    - Public Health Emergencies
    - Riverine Flooding
    - Snow and Ice Storms
    - Structure Fires
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - Need sufficient warning ahead of time if hazards occur
    - Maintain preparedness for hazardous events
    - Limit the transportation of hazardous materials on Dryden Road
    - Maintain drinking water infrastructure
    - More awareness is needed

Mitigation Projects:
None

Dryden Township

- 2018 Population: 4,756 (down 0.3% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Dryden Township is a continuing participant in the updated plan.
- Not a NFIP Participant
- Three dams
- Nine potential structures in the floodplain. However, there are no insurance policies
- No repetitive loss structures
- One warning siren
- One "302" site and is near a hazardous materials transport route

Staff collected the following information from Dryden Township officials:

- Community has not been impacted by a natural or man-made disaster in the past five years
- Moderately concerned about the possibility of their community being impacted by a disaster

- Hazard Priorities:
    - Inclement Weather
    - Public Health Emergencies
    - Snow and Ice Storms
    - Structure Fires
- In the last five years to mitigate future hazards, the Township has implemented a hazardous materials policy through the fire department
- Willing to incorporate hazard mitigation into future community plans
- Existing policies or programs can be improved by coordinating with different communities
- The communities prioritized mitigation strategy was not provided
- Additional Local Official Comments:
    - None

Staff sent out public input surveys to include citizens in the plan. The input from Dryden Township showed the following:

- Citizens range from not concerned and moderately concerned about the possibility of their community being impacted by a disaster
- Dryden Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Major Transportation Accidents
    - Public Health Emergencies
    - Snow and Ice Storms
    - Structure Fires
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - Support community health and safety services

Mitigation Projects:
None

Village of Dryden

- 2018 Population: 1,110 (up 16.7% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- The Village of Dryden is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- No potential structures in the floodplain and no insurance policies
- No repetitive loss structures
- One warning siren
- No “302” sites but is near a hazardous materials transport route

Staff collected the following information from the Village of Dryden officials:

- Community has been impacted by a natural or man-made disaster in the past five years - two flood events in the past 5 years
- Extremely concerned about the possibility of their community being impacted by a disaster
- Hazard Priorities:
    - Hazardous Materials Incidents (Transportation)
    - Infrastructure Failure
    - Riverine Flooding
    - Subsidence (Sinkholes)
- In the last five years to mitigate future hazards, the village completed a major drainage improvement to the village storm sewer drain
- Ways to improve existing policies or programs not provided
- The communities prioritized mitigation strategy is to develop an emergency response plan
- Additional Local Official Comments:
    - None

Staff sent out public input surveys to include citizens in the plan. The input from the Village of Dryden showed the following:

- Citizens are moderately concerned about the possibility of their community being impacted by a disaster
- The Village of Dryden residents feel that the following hazards could most impact their community:
    - Public Health Emergencies
    - Snow and Ice Storms
    - Tornadoes
- Additional Public Comments:
    - None

Mitigation Projects:

None

Elba Township

- 2018 Population: 5,246 (down 0.1% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Elba Township is a continuing participant in the updated plan.
- NFIP Participant
- Two dams
- 37 potential structures in the floodplain, only ten with insurance policies
- No repetitive loss structures
- Five warning sirens
- No "302" sites but does have a hazardous materials transport route

Staff collected the following information from Elba Township officials in the previous plan update; see below. Staff requested information from Elba Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
  - Hazardous Material Incidents (Fixed Site)
  - Hazardous Material Incidents (Transportation)
  - Inclement Weather
  - Structure Fires
  - Tornadoes
- Hazard Mitigation Strategies:
  - Disaster training
  - Public awareness

Staff sent out public input surveys to include citizens in the plan. The input from Elba Township showed the following:

- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster
- Elba Township residents feel that the following hazards could most impact their community:
  - Civil Disturbances
  - Dam Failure
  - Extreme Temperatures
  - Hazardous Materials Incidents (Fixed Site)
  - Hazardous Materials Incidents (Transportation)
  - Inclement Weather
  - Infrastructure Failure
  - Major Transportation Accidents
  - Nuclear Attack
  - Oil or Natural Gas Well Accidents
  - Public Health Emergencies
  - Riverine Flooding
  - Snow and Ice Storms
  - Structure Fires
  - Tornadoes
  - Wildfires
- Additional Public Comments:
  - Let the township decide if gravel can be removed from the township
  - Keep the rail road tracks and crossings in top condition
  - More salt trucks on the road
  - More information to residents
  - Prepare and have supplies to manage loss of power
  - Infrastructure maintenance
  - Electrical grid upgrade

Mitigation Projects:

1. Project: Shelter. Project description: Public tornado shelter in the township hall. Proposed timeframe for implementation: Unknown. Budget: Unknown. Update: Not provided.

Goodland Township

- 2018 Population: 1,817 (down 0.6% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Goodland Township is a continuing participant in the updated plan.
- NFIP Participant
- One dam
- Nine potential structures in the floodplain, only two with insurance policies
- No repetitive loss structures
- One warning siren
- One "302" site and has a hazardous materials transport route

Staff collected the following information from Goodland Township officials in the previous plan update; see below. Staff requested information from Goodland Township officials regarding their hazard mitiga-

tion efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
  - Inclement Weather
  - Major Transportation Accidents
- Hazard Mitigation Strategies:
  - More safety precautions on highways
  - Clearing of drains and rivers for less flooding
  - Continued emergency planning

Staff sent out public input surveys to include citizens in the plan. The input from Goodland City showed the following:

- Citizens are extremely concerned about the possibility of their community being impacted by a disaster
- Goodland Township residents feel that the following hazards could most impact their community:
  - Dam Failure
  - Hazardous Material Incidents (Transportation)
  - Snow and Ice Storms
- Additional Public Comments:
  - None

Mitigation Projects:
None

Hadley Township

- 2018 Population: 4,501 (down 0.6% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Hadley Township is a continuing participant in the updated plan.
- NFIP Participant
- Six dams
- No potential structures in the floodplain. However, there is one insurance policy
- No repetitive loss structures
- One warning siren
- No "302" sites but is near a hazardous materials transport route

Staff collected the following information from Hadley Township officials in the previous plan update; see below. Staff requested information from Hadley Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
  - Snow and Ice Storms
  - Tornadoes

Staff sent out public input surveys to include citizens in the plan. The input from Hadley Township showed the following:

- Citizens range from not concerned and moderately concerned about the possibility of their community being impacted by a disaster
- Hadley Township residents feel that the following hazards could most impact their community:
  - Civil Disturbances
  - Dam Failure
  - Extreme Temperatures
  - Hazardous Materials Incidents (Fixed Site)
  - Hazardous Materials Incidents (Transportation)
  - Inclement Weather
  - Infrastructure Failure
  - Public Health Emergencies
  - Riverine Flooding
  - Snow and Ice Storms
  - Structure Fires
  - Terrorism
  - Tornadoes
- Additional Public Comments:
  - Continue using and expand the use of social media to keep people informed
  - Upgrade Imlay City water mains along main streets
  - Make sure the police department is fully staffed

Mitigation Projects:
None

Imlay City

- 2018 Population: 3,581 (up 0.4% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Imlay City is a continuing participant in the updated plan.
- NFIP Participant
- No dams

- 60 potential structures in the floodplain, only four with insurance policies
- No repetitive loss structures
- Two warning sirens
- Three "302" sites and has a hazardous materials transport route

Staff collected the following information from Imlay City officials:

- Community has been impacted by a natural or man-made disaster in the past five years; hail storm in 2020 and COVID-19
- Moderately concerned about the possibility of their community being impacted by a disaster
- Hazard Priorities:
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Snow and Ice Storms
    - Tornadoes
- In the last five years to mitigate future hazards, the city has built a new firehall, held public safety trainings, and used Nixel for community alerts
- Willing to incorporate hazard mitigation into future community plans
- Existing policies or programs can be improved by rerouting railcar shipments so they don't go through the middle of the city
- The communities prioritized mitigation strategy is new sirens and alerts system for the public
- Additional Local Official Comments:
    - None

Staff sent out public input surveys to include citizens in the plan. The input from Imlay City showed the following:

- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster
- Imlay City residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Major Transportation Accidents
    - Nuclear Attack
    - Public Health Emergencies
    - Snow and Ice Storms
    - Structure Fires
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - Emergency broadcast or text service is needed
    - Have recycling of hazardous materials to keep ground water safe
    - Take better care of dirt roads or pave them
    - Citizens should be educated as to what disaster plans are in place
    - Our community desperately needs updated infrastructure

Mitigation Projects:

1. Project: Infrastructure improvements. Project description: Expand 18' concrete culvert at the corner of Blacks Corners Road and Attica Road. Proposed timeframe for implementation: Unknown. Budget: $246,141. Update: DPW Superintendent is trying to coordinate this project with both Imlay Township and the Lapeer County Road Commission.

2. Project: Bell River restoration. Project description: River restoration work such as removal of trees and debris from the river, erosion control measures and clearing obstructions; also, river reclamation work such as removal of sediment and installation of a sediment trap. Proposed timeframe for implementation: Unknown. Budget: $258,000. Update: Project is still ongoing.

3. Project: Warning Sirens. Project description: Install an early hazard warning systems with 4 sirens at various locations in the city and township not covered by a warning system. Proposed timeframe for implementation: Unknown. Budget: $95,000. Update: Project is still ongoing.

4. Project: Infrastructure Improvements. Project description: Two of the City's largest potential hazards are trains hauling unknown hazardous materials through downtown Imlay City and

trucks hauling unknown hazardous material down I-69 and along M-53. Both of these concerns come to a junction at the railroad overpass on M-53. The City has the concern of a potential derailment at the overpass and the potential of a truck crashing into an abutment of the underpass where M-53 drops from 5 lanes to 2 lanes. Mitigation would include CN railways, MDOT, and the Imlay City. Proposed timeframe for implementation: 1 - 5 years. Budget: Unknown. Update: None, this is a newly submitted project.

Imlay Township

- 2018 Population: 3,125 (down 0.1% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Imlay Township is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- 21 potential structures in the floodplain, only two with insurance policies
- No repetitive loss structures
- No warning sirens
- No "302" sites but does have a hazardous materials transport route

Staff collected the following information from Imlay Township officials in the previous plan update; see below. Staff requested information from Imlay Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
    - Riverine Flooding

Staff sent out public input surveys to include citizens in the plan. The input from Imlay Township showed the following:

- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster
- Imlay Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Drought
    - Extreme Temperatures
    - Hazardous Materials Incidents (Fixed Site)
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Major Transportation Accidents
    - Oil or Natural Gas Well Accidents
    - Public Health Emergencies
    - Riverine Flooding
    - Snow and Ice Storms
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - Better communication needed about hazards occurring
    - Control the gravel mine traffic
    - Pave dirt roads
    - Have preparation plans for natural events
    - Update the power grid
    - Restrictions on storage and transportation of hazardous materials

Mitigation Projects:

1. Project: Warning Sirens. Project description: Install an early hazard warning systems with 4 sirens at various locations in the city and township not covered by a warning system. Proposed timeframe for implementation: Unknown. Budget: $95,000. Update: Project is still ongoing.

City of Lapeer

- 2018 Population: 8,731 (down 1.2% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- The City of Lapeer is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- 145 potential structures in the floodplain, only eight with insurance policies
- No repetitive loss structures
- Six warning sirens
- Eight "302" sites and has a hazardous materials transport route

Staff collected the following information from City of Lapeer officials:

- Community has been impacted by a natural or man-made disaster in the past five years; COVID-

19, lead and copper rule changes, gasoline leak into public sewer system, and PFOS contamination
- Moderately concerned about the possibility of their community being impacted by a disaster
- Hazard Priorities:
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Major Transportation Accidents
- In the last five years to mitigate future hazards, the City has lined sewers, worked with County Drain Commissioner on flood mitigation, planned to file a FEMA grant for Hazard Mitigation with the County, eliminated private construction in the flood plain, and cleared and improved drainage
- Willing to incorporate hazard mitigation into future community plans
- Existing policies or programs can be improved by leveraging partnerships with SEMCOG and the local MPO for grants
- The communities prioritized mitigation strategy is to continue mapping floodplains, update emergency response plan and building codes
- Additional Local Official Comments:
    - Would like to have assistance from FEMA when creating and submitting grants for Hazard Mitigation projects

Staff sent out public input surveys to include citizens in the plan. The input from the City of Lapeer showed the following:
- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster
- City of Lapeer residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Dam Failure
    - Extreme Temperatures
    - Hazardous Materials Incidents (Fixed Sites)
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Major Transportation Accidents
    - Nuclear Attack
    - Public Health Emergencies
    - Scrap Tire Fires
    - Snow and Ice Storms
    - Structure Fires
    - Subsidence (Sinkholes)
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - Inspect and repair all dams in the county
    - Fix the roads; Goodland has no detour if a major accident happens on M-53
    - Education is needed
    - Sound emergency management planning is needed
    - Understanding of measures to mitigate climate change
    - Clear and concise notifications are needed
    - Support and fund local police
    - Tornado sirens are needed
    - Allow local ordinances to adopt amendments relevant to current situations

Mitigation Projects:

1. Project: Backup generator. Project description: Purchase of 1 large and 2 small (portable) backup generators to maintain sewage lift stations and traffic signals. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: This project is still ongoing.

2. Project: Warning sirens. Project description: Install an early hazard warning system with sirens at the corners of the city. This will provide coverage to residents in the city and surrounding communities not covered by a warning system. Proposed timeframe for implementation: Unknown. Budget: $80,000. Update: This project is still ongoing.

3. Project: Shelter. Project description: Tornado shelter at Crestview Manor Trailer Park. Proposed timeframe for implementation: Unknown. Budget: $50,000. Update: This project is no longer being pursued.

4. Project: Commercial/industrial inspections. Project description: Develop a commercial and industrial facility inspection inventory over a two-year period. Proposed timeframe for implementation: 1- 5 years. Budget: $85,000. Update: This project is no longer being pursued.

5. Project: Floodplain maps. Project description: New floodplain maps. Proposed timeframe for implementation: Unknown. Budget: $20,000. Update: This project is still ongoing.

6. Project: Critical drain repair and expansion. Project description: Drain is an 18 inch corrugated tin pipe that has collapsed over 17 years ago between 895 south Main and 877 south Main. Proposed timeframe for implementation: 1 - 5 years. Budget: $70,000. Update: None, this is a newly submitted project.

Lapeer Township

- 2018 Population: 5,043 (down 0.3% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Lapeer Township is a continuing participant in the updated plan.
- NFIP Participant
- Two dams
- 34 potential structures in the floodplain, only three with insurance policies
- No repetitive loss structures
- No warning sirens
- No “302” sites but does have a hazardous materials transport route

Staff collected the following information from Lapeer Township officials:

- Community has been impacted by a natural or man-made disaster in the past five years; COVID-19.
- Moderately concerned about the possibility of their community being impacted by a disaster
- Hazard Priorities:
    - Dam Failure
    - Drought
    - Public Health Emergencies
    - Riverine Flooding
    - Snow and Ice Storms
- In the last five years to mitigate future hazards, the Township has installed a generator at the township hall in case the facility is needed as an emergency center and is monitoring road and drainage issues
- Willing to incorporate hazard mitigation into future community plans
- Existing policies or programs can be improved by providing outreach, coordinating between communities, and additional training for emergency response teams
- The communities prioritized mitigation strategy is to map floodplains, update emergency response plans, and update building codes
- Additional Local Official Comments:
    - None

Staff sent out public input surveys to include citizens in the plan. The input from Lapeer Township showed the following:

- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster
- Lapeer Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Major Transportation Accidents
    - Public Health Emergencies
    - Snow and Ice Storms
    - Structure Fires
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - People should have supplies ready and be prepared for hazardous events
    - Increase the early warning time for residents
    - Higher taxes to improve infrastructure
    - Keep residents informed of any challenges to health
    - Continuously update emergency plans
    - Improve current electrical service

Mitigation Projects:
None

Marathon Township

- 2018 Population: 4,533 (down 0.8% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Marathon Township is a continuing participant in the updated plan.
- NFIP Participant
- Three dams
- Five potential structures in the floodplain, only three with insurance policies
- No repetitive loss structures
- Two warning sirens
- No "302" sites but is near a hazardous materials transport route

Staff collected the following information from Marathon Township officials in the previous plan update; see below. Staff requested information from Marathon Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Snow and Ice Storms
    - Tornadoes
- Hazard Mitigation Strategies:
    - Continued focus on alert systems for tornadoes

Staff sent out public input surveys to include citizens in the plan. The input from Marathon Township showed the following:

- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster
- Marathon Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Dam Failure
    - Hazardous Materials Incidents (Fixed Site)
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Major Transportation Accidents
    - Nuclear Attack
    - Public Health Emergencies
    - Snow and Ice Storms
    - Structure Fires
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - Train the local authorities on how to quickly respond to disasters - have them equipped with the resources to handle a disaster

Mitigation Projects:
None

Mayfield Township

- 2018 Population: 7,921 (down 0.4% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Mayfield Township is a continuing participant in the updated plan.
- NFIP Participant
- Four dams
- 27 potential structures in the floodplain, only eight with insurance policies
- No repetitive loss structures
- No warning sirens
- One "302" site and has a hazardous materials transport route

Staff collected the following information from Mayfield Township officials in the previous plan update; see below. Staff requested information from Mayfield Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
    - Flooding

Staff sent out public input surveys to include citizens in the plan. The input from Mayfield Township showed the following:

- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by

a disaster
- Mayfield Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Dam Failure
    - Drought
    - Hazardous Materials Incidents (Fixed Site)
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Major Transportation Accidents
    - Oil or Natural Gas Well Accidents
    - Public Health Emergencies
    - Riverine Flooding
    - Snow and Ice Storms
    - Structure Fires
    - Tornadoes
- Additional Public Comments:
    - Cell phone tower in the community needs to be repaired/replaced
    - Pretreat roads
    - Need preparation
    - I believe hazard mitigation is being handled properly

Mitigation Projects:
None

Metamora Township

- 2018 Population: 4,266 (up 0.4% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Metamora Township is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- Three potential structures in the floodplain. However, there are no insurance policies
- No repetitive loss structures
- Seven warning sirens
- Two "302" sites and has a hazardous materials transport route

Staff collected the following information from Metamora Township officials in the previous plan update; see below. Staff requested information from Metamora Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Snow and Ice Storms
    - Tornadoes
- Hazard Mitigation Strategies:
    - Provide warning sirens and preparedness for residents of the community

Staff sent out public input surveys to include citizens in the plan. The input from Metamora Township showed the following:

- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster
- Metamora Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Dam Failure
    - Drought
    - Hazardous Materials Incidents (Fixed Site)
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Major Transportation Accidents
    - Oil or Natural Gas Well Accidents
    - Public Health Emergencies
    - Snow and Ice Storms
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - Improve road crews or increase their funding
    - Need a plan in place
    - Government should furnish real information on the likelihood and ways to mitigate hazards in the community
    - Proper training for emergency responders is needed
    - More notifications and more help in knowing what to expect is needed
    - Increased participation in the NWS and

Skywarn programs
    - Dam inspections on Lake Metamora and Lake Lapper

Mitigation Projects:
None

Village of Metamora

- 2018 Population: 630 (up 11.5% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- The Village of Metamora is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- One potential structures in the floodplain. However, there are no insurance policies
- No repetitive loss structures
- Three warning sirens
- No "302" sites but is near a hazardous materials transport route

Staff did not collect information from Village of Metamora officials in the previous plan update. Staff also requested information from Village of Metamora officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

Staff sent out public input surveys to include citizens in the plan. The input from the Village of Metamora showed the following:

- Citizens are moderately concerned about the possibility of their community being impacted by a disaster
- The Village of Metamora residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Hazardous Materials Incidents (Fixed Site)
    - Snow and Ice Storms
- Additional Public Comments:
    - None

Mitigation Projects:
None

North Branch Township

- 2018 Population: 3,593 (down 1.4% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- North Branch Township is a continuing participant in the updated plan.
- NFIP Participant
- One dam
- Three potential structures in the floodplain. However, there are no insurance policies
- No repetitive loss structures
- Two warning sirens
- No "302" sites but is near a hazardous materials transport route

Staff collected the following information from North Branch Township officials in the previous plan update; see below. Staff requested information from North Branch Township officials regarding their hazard mitigation efforts since the last plan update. However, this information has not been submitted.

- Hazard Priorities:
    - Flooding

Staff sent out public input surveys to include citizens in the plan. The input from North Branch Township showed the following:

- Citizens range from not concerned and moderately concerned about the possibility of their community being impacted by a disaster
- North Branch Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Drought
    - Extreme Temperatures
    - Inclement Weather
    - Infrastructure Failure
    - Public Health Emergencies
    - Snow and Ice Storms
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - DTE needs to build a sub station
    - Need more communication
    - Teach the public how to prepared for hazardous events

Mitigation Projects:
None

Village of North Branch

- 2018 Population: 944 (down 8.6% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- The Village of North Branch is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- No potential structures in the floodplain and no insurance policies
- No repetitive loss structures
- One warning siren
- No "302" sites but has a hazardous materials transport route

Staff collected the following information from Village of North Branch officials:

- Community has not been impacted by a natural or man-made disaster in the past five years
- Moderately concerned about the possibility of their community being impacted by a disaster
- Hazard Priorities:
    - Hazardous Materials Incidents (Transportation)
    - Public Health Emergencies
    - Snow and Ice Storms
    - Tornadoes
- In the last five years to mitigate future hazards, the village has added standby power to all public utilities
- Willing to incorporate hazard mitigation into future community plans
- Existing policies or programs can be improved by coordinating efforts between the village, township and school district
- The communities prioritized mitigation strategy is to continue to update, repair and maintain public utilities
- Additional Local Official Comments:
    - None

Staff sent out public input surveys to include citizens in the plan. The input from the Village of North Branch showed the following:

- Citizens range from not concerned and moderately concerned about the possibility of their community being impacted by a disaster
- The Village of North Branch residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Inclement Weather
    - Infrastructure Failure
    - Nuclear Attack
    - Public Health Emergencies
    - Snow and Ice Storms
    - Terrorism
    - Tornadoes
- Additional Public Comments:
    - Need planning to mitigate hazards

Mitigation Projects:

1. Project: Lining sewer main. Project description: Lining project of sewer main below M-90 from manhole 017 to manhole 121. Interior of main showing excess erosion and fractures. Failure of the main would cause sinkholes and require open excavation of our primary state highway. Proposed timeframe for implementation: 1 - 5 years. Budget: $910,000. Update: None, this is a newly submitted project.

2. Project: Pump station upgrade. Project description: Pump station upgrade at sewage lagoon #1. The aging system may result in a failure which could cause backups in the western half of the village. Proposed timeframe for implementation: 1 - 5 years. Budget: $306,000. Update: None, this is a newly submitted project.

Oregon Township

- 2018 Population: 5,766 (down 0.4% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Oregon Township is a continuing participant in the updated plan.
- NFIP Participant
- One dam
- 38 potential structures in the floodplain, only one with insurance policy
- No repetitive loss structures
- No warning sirens
- One "302" site and is near a hazardous materials transport route

Staff collected the following information from Oregon Township officials:

- Community has not been impacted by a natural or man-made disaster in the past five years
- Moderately concerned about the possibility of their community being impacted by a disaster
- Hazard Priorities:
    - Inclement Weather
    - Public Health Emergencies
    - Snow and Ice Storms
    - Tornadoes
- Projects completed in the last five years to mitigate future hazards not provided
- Willing to incorporate hazard mitigation into future community plans
- Ways to improve existing policies or programs not provided
- The communities prioritized mitigation strategy was not provided
- Additional Local Official Comments:
    - None

Staff sent out public input surveys to include citizens in the plan. The input from Oregon Township showed the following:

- Citizens range from not concerned, moderately concerned, and extremely concerned about the possibility of their community being impacted by a disaster
- Oregon Township residents feel that the following hazards could most impact their community:
    - Civil Disturbances
    - Dam Failure
    - Drought
    - Extreme Temperatures
    - Hazardous Materials Incidents (Transportation)
    - Inclement Weather
    - Infrastructure Failure
    - Nuclear Attack
    - Oil or Natural Gas Well Accidents
    - Public Health Emergencies
    - Riverine Flooding
    - Scrap Tire Fires
    - Snow and Ice Storms
    - Structure Fires
    - Tornadoes
    - Wildfires
- Additional Public Comments:
    - Inform the community
    - A guide as to what residents should do is needed
    - Emergency procedures should be in place for various disasters
    - Ensure the integrity of the dam on the Holloway Reservoir
    - Monitor truck traffic on M-53
    - River clean up days are needed. Clear blocked areas and remove trash
    - Bury electrical power lines

Mitigation Projects:
None

Village of Otter Lake

- 2018 Population: 380 (down 17.9% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- The Village of Otter Lake is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- No potential structures in the floodplain and no insurance policies
- No repetitive loss structures
- No mobile home parks
- No warning sirens
- No “302” sites but is located near a hazardous materials transport route
- Emergency shelter not identified

Staff collected the following information from the Village of Otter Lake officials:

- Community has not been impacted by a natural or man-made disaster in the past five years
- Not concerned about the possibility of their community being impacted by a disaster
- Hazard Priorities:
    - Snow and Ice Storms
- Projects completed in the last five years to mitigate future hazards not provided
- Willing to incorporate hazard mitigation into future community plans
- Ways to improve existing policies or programs not provided
- The communities prioritized mitigation strategy was not provided
- Additional Local Official Comments:
    - None

Staff conducted a public survey to give residents an opportunity to provide input relevant to the Hazard Mitigation Plan update. However, no public surveys for the Village of Otter Lake were received.

Mitigation Projects:

1. Project: Backup generator. Project description: Purchase a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: Not provided.

2. Project: Warning Siren. Project description: Install early hazard warning systems with a siren. The village does not have a warning system currently. Proposed timeframe for implementation: Unknown. Budget: $22,000. Update: Not provided.

Rich Township

- 2018 Population: 1,435 (down 11.6% from 2010, U.S. Census Bureau, 2018 ACS 5-Year Estimates)
- Rich Township is a continuing participant in the updated plan.
- NFIP Participant
- No dams
- One potential structure in the floodplain. However, there are no insurance policies
- No repetitive loss structures
- No warning sirens
- No "302" sites but does have a hazardous materials transport route

Staff collected the following information from Rich Township officials:

- Community has not been impacted by a natural or man-made disaster in the past five years
- Moderately concerned about the possibility of their community being impacted by a disaster
- Hazard Priorities:
    - Snow and Ice Storms
- In the last five years to mitigate future hazards, the Township has continued the replacement of failed road culverts/bridges and purchased a backup generator
- Willing to incorporate hazard mitigation into future community plans
- Ways to improve existing policies or programs not provided
- The communities prioritized mitigation strategy was not provided
- Additional Local Official Comments:
    - None

Staff sent out public input surveys to include citizens in the plan. The input from Rich Township showed the following:

- Citizens range from not concerned and moderately concerned about the possibility of their community being impacted by a disaster
- Rich Township residents feel that the following hazards could most impact their community:
    - Extreme Temperatures
    - Inclement Weather
    - Infrastructure Failure
    - Public Health Emergencies
    - Snow and Ice Storms
    - Tornadoes
- Additional Public Comments:
    - Early warning systems and communication about hazards is needed

Mitigation Projects:
None

Lapeer County Hazard Summary

Hazard Assessment

Hazard assessment is a process that incorporates historical data, social factors, geographic and climatic factors, population data and public perception to determine a community's vulnerability to specific hazards. Each community must determine which hazards they consider to be a risk. The Emergency Management Division of the Michigan State Police has developed a summary of known hazards, which is found in the Michigan Hazard Analysis document. Staff used this hazard summary as a starting point to identify the hazards that can affect Lapeer County.

When reading the hazard rankings, please remember they are subjective. It is impossible to rate the likelihood of a hazard occurrence to an exact degree of accuracy. It is also important to remember that the local capability is a community rating, considering all facets of response and recovery, and is not limited solely to emergency response.

Meetings were held with the Lapeer County Emergency Management Advisory Council to further the development of the Lapeer County Hazard Mitigation Plan. A virtual public meeting was held on January 26, 2021 via Zoom. Staff presented an overview of the Hazard Mitigation Plan process to the public and provided information on the known hazards in Lapeer County.

During the development of the previous plan, staff developed a hazard matrix that assessed the impact each hazard had on the community. These hazards were then prioritized based on the calculated level of impact. The hazard matrix for Lapeer County used the following six variables:

1. Potential to Occur in Lapeer County - Has this hazard ever occurred in the past, or could it happen in the future?
2. Frequency of Occurrence - How often has this hazard happened before?
3. Number of People Affected - How many residents have been affected by this hazard in the past, or could be affected by it in the future?
4. Economic Impact - What types of damage did this hazard cause? What was the associated cost in property and lives?
5. Deaths - How many lives were taken by the hazard in past incidents?
6. Ability of Lapeer County to Mitigate the Hazard - What can Lapeer County do to reduce the hazard's effects the next time it happens?

A scoring system had to be determined for the hazard matrix. Staff developed a system that was simple to fill out and that allowed easy factoring of each variable. Based on these criteria, staff developed the following scoring system:

1. Potential to Occur in Lapeer County
   A ranking of 0-5 (5 = Great Potential, 0 = Little to No Potential)

2. Frequency of Occurrence
   A ranking of 0-5 (5 = Frequent, 0 = Rare or not Applicable)

3. Number of People Affected
   A ranking of 0-5 (5 = Large Number, 0 = Few People)

4. Economic Impact
   A ranking of 0-5 (5 = Lots of Damage, 0 = Little Damage)

5. Deaths
   A ranking of 0-5 (5 = Large Number of Deaths, 0 = No Deaths)

6. Ability of Lapeer County to Mitigate the Hazard
   A ranking of 0-5 (5 = Has Ability to Reduce or Mitigate Hazard, 0 = No Ability to Reduce or Mitigate Hazard)

At the January 13, 2021 meeting of the Emergency Management Advisory Council, the committee members reviewed information regarding the frequency

and costs associated with the identified Lapeer County hazards. After discussing the information, they scored the hazards based on the six variables mentioned above. While the matrix required that the committee members enter scores in the range of 0 to 5, staff calculated the final ranking by factoring each of the variables according to its level of importance in determining the level of impact for each hazard. The following factors were used to calculate rank:

1. Potential to Occur in Lapeer County
2. Frequency of Occurrence
3. Number of People Affected
4. Economic Impact
5. Deaths
6. Ability of Lapeer County to Mitigate the Hazard

Hazards for Lapeer County were selected for inclusion in this plan based upon records of historical occurrence, known risks, and guidance provided by the County Emergency Management Advisory Council and by the Michigan State Police Emergency Management and Homeland Security Division.

To rank the hazard from most severe threat to least threatening to the area, each of the hazards were assigned evaluation measures; a specific point value of multiplication of 1-6 based on each element's relative severity and negative impacts. The more severe the potential impact an event could have, the more points that hazard was assigned.

Each hazard evaluation measure was then assigned a "weight." The purpose of weighing the hazards was to stress measures that were deemed more important, and thus produce a more valid assessment of the relative significance of each hazard. When the point value of measure was multiplied by the weight, the measure received more emphasis (points) than measures that had not been assigned such a heavy weight.

The total hazard scores determined each hazard's ranking, with the highest scores for hazards posing the greatest threat to the most people in Lapeer County. The ranking process is not intended to discount the threat of any hazard, for those hazards elaborated upon in this hazard mitigation plan all present significant elements of threat to Lapeer County.

The final hazard rankings are as follows in Table 2-1.

Table 2-1 Hazard Rankings

Hazard	Final Ranking
Snow and Ice Storms	1
Structure Fire	2
Infrastructure Failure	3
Riverine Flooding	3
Tornadoes	4
Inclement Weather	5
Public Health Emergencies	6
Transportation Accidents (Bus, Plane, Train)	7
Extreme Temperatures	8
Hazardous Materials Incidents (Transportation)	9
Hazardous Materials Incidents (Fixed Sites)	10
Dam Failure	11
Wildfires	11
Civil Disturbances	12
Oil or Natural Gas Well/Pipeline Accidents	13
Drought	14
Terrorism	14
Nuclear Attack	15
Scrap Tire Fires	16
Subsidence (Sinkholes)	17
Earthquakes	18
Nuclear Power Plant Accidents	19

Source: Lapeer County Hazard Assessment

Each hazard in the above list is defined and described in the following sections, according to its ranking. Recorded incidents, if available, are documented to give the reader a sense of how often the hazard has occurred in Lapeer County, and what the estimated costs were for the hazard. Vulnerability assessments were developed for each hazard. However please note, it is not possible to accurately estimate costs associated with every hazard that affects Lapeer County.

Vulnerability Assessment

A vulnerability assessment provides a quantitative estimate of the persons and property in the County that are susceptible to each hazard. A basic method of determining vulnerability is to compare the susceptible area of the County with locations of population, infrastructure, and structures to see what kind of overlap will result. The overlap between the area where the hazard may happen, and the affected people and property, is the vulnerable area. Urban and rural areas of the County that experience the same hazard may have different types of damage, and different costs may be assessed accordingly. Also, some hazards, such as snowstorms, may be experienced by the whole county at once. Other hazards, such as riverine flooding will be very localized, determined by the presence of a nearby waterway.

Vulnerability assessments provide information that measures the threats associated with each hazard. Measures would include data such as how many injuries occurred, how many buildings were flooded, how many crops were damaged, the cost of clean-up afterwards, and so on. The vulnerability assessments, based on history, also gives the County an idea of what it can reasonably expect to experience when another hazard of that type occurs. Since the vulnerability assessments sometimes may give a monetary cost to the hazards, the hazards can be used for cost-benefit comparisons. These comparisons are helpful in justifying the expense of mitigation projects, land use restrictions and other policy decisions. However, it is important to remember that the vulnerability assessments are based on a series of assumptions and estimates, and they should be used as a guide only. Actual hazard events may incur greater losses than what has been developed in the vulnerability assessments. Also, there may be additional costs associated with a hazard event that have not been included in the assessments, as the costs presented are not exhaustive. Vulnerability assessments were developed for each hazard. However please note, it is not possible to accurately estimate costs associated with every hazard that affects Lapeer County.

Goals and Objectives

Clear goals and objectives are the foundation of a successful plan and will help to guide the plan development process. Goals are defined by the Local Hazard Mitigation Planning Workbook (PUB 207) as general guidelines that explain what you want to achieve in your community. Objectives are defined as strategies or implementation steps to attain the identified goals. At the Lapeer County Hazard Mitigation Advisory Committee meeting, the committee developed and approved the following plan goals and objectives. These goals were reviewed and reaffirmed in the update process:

Goals:

1. Reduce losses from man-made and natural disasters
2. Improve response to and recovery from man-made and natural hazards
3. Enhance early warning notification systems (i.e. Nixle/Alert Lapeer County)
4. Promote additional alert and notification systems (i.e. American Red Cross tornado app)
5. Maintain essential public services during and after a disaster
6. Enhance public education/awareness with an emphasis on natural disasters (i.e. flooding and severe weather)
7. Protect public health, welfare, and safety

Objectives

1. Amend zoning to limit new development in flood plains
2. Increase warning siren coverage and wireless emergency alerts use
3. Provide resources to ensure provision of essential services
4. Provide opportunity for public education

Mitigation Strategy

The above goals and objectives can be met by various methods called mitigation strategies. Mitigation strategies reduce or eliminate the amount of harm that could be caused in the future by a hazard. There are five basic hazard mitigation approaches:

Approach #1 Modify the Hazard - This approach removes or eliminates the hazard, such as widening a stream to improve water flow and stop flooding.

Approach #2 Segregating the Hazard - This approach keeps the hazard away from people, such as building a floodwall to retain high water levels.

Approach #3 Preventing or Eliminating Development - This approach keeps people away from the hazard, by various land use planning and zoning techniques.

Approach #4 Altering Design or Construction - This approach provides engineering solutions for at-risk structures, such as elevating buildings above the flood level.

Approach #5 Early Warning and Public Education - This approach keeps the public informed of potential hazard and makes sure that early warning/ communication systems are available.

Suggested mitigation strategies are included in each hazard section. While some of the previous Plan's mitigation activities were completed, others were deferred by the local governments because of cost. Due to changes in officials of the communities in charge of maintaining the Plan between updates, some information was not readily available.

Staff reviewed and collected data from the National Oceanic and Atmospheric Administration (NOAA) and the Michigan Department of Licensing and Regulatory Affairs (LARA) as well as contacting other State and local agencies to attain the necessary information for the Plan Update.

Expansion of Existing Authorities, Policies, Programs, and Resources

The following information identifies existing programs, mitigation efforts and response efforts implemented within Lapeer County communities, some since the last Hazard Mitigation Plan was developed. In addition, information about future project ideas and implementation are discussed. For existing authorities, policies, programs, and resources for individual communities, as well as how they can be expanded upon, please see the Community Profiles section of the plan. The goal of hazard mitigation is to reduce future impacts to property and residents and lessen disruption to local services. Mitigation efforts should be ongoing to adapt to the needs of the communities and residents. In addition, efforts should include efficiencies in which residents can benefit during times of emergency.

National Flood Insurance Program (NFIP) – Of the 27 local units that make up Lapeer County, 25 participate in the National Flood Insurance Program. Those who participate are Almont Township, Almont Village, Arcadia Township, Attica Township, Burlington Township, Burnside Township, Clifford Village, Deerfield Township, Dryden Village, Elba Township, Goodland Township, Hadley Township, Imlay City, Imlay Township, Lapeer City, Lapeer Township, Marathon Township, Mayfield Township, Metamora Township, Metamora Village, North Branch Township, North Branch Village, Oregon Township, Otter Lake Village, and Rich Township. Those who do not participate are Columbiaville Village and Dryden Township. The local units that participate in the National Flood Insurance Program follow the necessary steps for continued NFIP compliance. Making sure that new development is not occurring in floodplains and making residents aware of the floodplain maps are the focus of the local floodplain management programs in Lapeer County. Within the County, there are approximately 526 structures located in a flood hazard area. According to FEMA, Lapeer County does not have any repetitive loss structures. Over the next five years, communities who have experienced recent flooding may want to consider having Community Rating System (CRS) coordinator to act as the local contact and expert when a flooding event occurs. In addition, jurisdictions should continue to consider changes to make insurance premiums lower.

Soil Erosion Management – The Lapeer County Drain Commission is the responsible agency for issuing Soil Erosion and Sedimentation Control Permits.

Storm Water Management – The Lapeer County Drain Commission maintains the drainage systems,

as included under Act 40 Public Acts of 1956 (Drain Code).

Zoning Management – Communities within the County have locally adopted zoning ordinances. As communities update portions of their ordinances, they will be encouraged to consider hazard mitigation in the decisions they make regarding any zoning changes.

Master Planning – Many municipalities within Lapeer County agreed to consider including Hazard Mitigation in their next Master Plan update, as well as incorporating Hazard Mitigation Planning into other important guiding documents.

Building Codes – Many of the Lapeer County communities have adopted building codes that are enforced. The codes were developed based upon international and State of Michigan building codes. Mitigation activities, such as a continued emphasis on no development in flood prone areas, will continue to be a focus in the local communities.

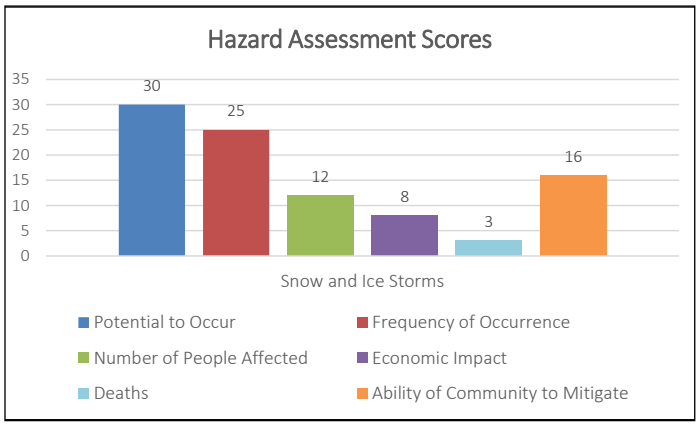
Mass Notification System – Lapeer County has recently upgraded to a wireless mass notification system which allows residents added security and information when an incident occurs. Areas in which an incident might be isolated can be targeted to receive specific information.

Mutual Aid Agreements – Lapeer County fire departments throughout the county, and state, worked together to create and organize a system for locating needed equipment from other departments with only one call. This will assist during possible large-scale emergencies to be better prepared and organized.

Additional Tornado Sirens – All local units of government hold responsibility for the warning sirens in their communities. In addition, maintenance of these systems is taken care of by each local unit.

Hazards

#1 - Snow and Ice Storms



Snow and Ice Storms

Snow and ice storms are a period of rapid accumulation of snow often accompanied by high winds, cold temperatures, and low visibility.

Hazard Description

Snow and ice storms are ranked as the number one hazard for Lapeer County. Snow and ice storms can last anywhere from an hour to a couple of days. The average annual snowfall in Lapeer County is 40 inches and the County has averaged 2.3 snow/ice storms per year over the last 27 years. The average cost per storm is $3.1 million according to the National Center for Environmental Information.

Snow and ice accumulation can create slippery conditions on roads and sidewalks, resulting in car accidents and pedestrian slip and fall accidents. The weight of snow and ice accumulation can cause trees and structures to collapse. Overloaded tree branches often fall on telephone and power lines disrupting telephone and electrical service to homes and businesses. Businesses may have to shut down for the duration of an outage, and homes may not have access to the essentials such as heat and/or emergency services.

The effects of a snow or ice storm are especially dangerous to the elderly. Each year there are many instances where elderly persons are hospitalized from overexertion while shoveling snow, or from falling while walking to the mailbox or to the store. The elderly are especially susceptible to illness resulting from cold living conditions caused by a power outage. If there is a medical emergency, an elderly person living alone may not be able to call for help.

The economic impact of snowstorms can be estimated by totaling the damage to structures and personal property, the cost of materials and labor required to repair damaged utilities, the cost of salt and labor required to apply salt to roads, the cost of labor to plow roads, costs associated with persons injured or fatally wounded as a result of storm conditions, and profit loss due to business closure. Please see the vulnerability determination for more detailed costs associated with snow and ice storm events.

Lapeer County Perspective and Vulnerability

Recent Snow and Ice Storm Events in Lapeer County

Lapeer County had 62 recorded snowstorm incidents from 1993 to 2019 and based on those numbers the county is likely to have 2.3 snowstorms per year. See **Table 2-2** for a detailed list of recorded incidents during recent years.

Table 2-2 Lapeer County Snow and Ice Storms (1993-2019)				
Date	Type	Deaths	Injuries	Property Damage
1/12/1993	Heavy Snow	0	0	$50,000
4/1/1993	Heavy Snow	0	0	$50,000
4/19/1993	Heavy Snow	0	0	$0
1/27/1994	Heavy Snow	0	0	$5,000,000
2/7/1994	Snow	0	0	$0
1/20/1995	Heavy Snow	0	0	$0
3/6/1995	Ice Storm	0	0	$0
12/13/1995	Ice Storm	0	0	$0
3/19/1996	Heavy Snow	0	0	$0
1/9/1997	Heavy Snow	0	0	$0
3/13/1997	Ice Storm	0	0	$19,000,000
10/26/1997	Heavy Snow	0	0	$0
12/10/1997	Heavy Snow	0	0	$0
3/13/1998	Heavy Snow	0	0	$0
1/2/1999	Heavy Snow	0	0	$50,000
1/12/1999	Heavy Snow	0	0	$0
1/12/1999	Snow	0	3	$1,800,000
3/5/1999	Heavy Snow	0	0	$0
10/7/2000	Snow	0	0	$0
12/5/2000	Snow	0	0	$0
12/11/2000	Heavy Snow	0	1	$1,100,000
12/13/2000	Snow	0	0	$25,000
1/30/2002	Winter Storm	0	0	$0
2/25/2002	Winter Storm	0	0	$0
3/4/2003	Heavy Snow	0	0	$0
4/3/2003	Ice Storm	1	2	$161,100,000
1/14/2004	Heavy Snow	0	0	$0
1/26/2004	Winter Storm	0	0	$0
2/20/2005	Heavy Snow	0	0	$0
4/23/2005	Winter Storm	0	0	$0
12/9/2005	Heavy Snow	0	0	$0
12/15/2005	Heavy Snow	0	0	$0
1/20/2006	Winter Storm	0	0	$0
2/5/2006	Winter Storm	0	0	$0
1/14/2007	Ice Storm	0	0	$0
12/16/2007	Winter Storm	0	0	$0
1/1/2008	Winter Storm	0	0	$0
1/14/2008	Heavy Snow	0	0	$0
2/6/2008	Winter Storm	0	3	$0
12/19/2008	Winter Storm	0	0	$0
4/5/2009	Winter Storm	0	0	$0
2/9/2010	Heavy Snow	0	0	$0
12/22/2010	Heavy Snow	0	1	$0
12/12/2010	Winter Storm	0	0	$0
2/1/2011	Winter Storm	0	0	$0
2/20/2011	Heavy Snow	0	0	$0
3/22/2011	Winter Storm	0	0	$0
12/21/2013	Ice Storm	0	0	$3,000,000
1/5/2014	Heavy Snow	0	0	$0
3/12/2014	Winter Storm	0	0	$0
2/1/2015	Heavy Snow	0	0	$0
3/31/2015	Heavy Snow	0	0	$0
11/21/2015	Heavy Snow	0	0	$0
2/24/2016	Heavy Snow	0	0	$0
3/1/2016	Heavy Snow	0	0	$0
12/11/2016	Heavy Snow	0	0	$0
12/13/2017	Heavy Snow	0	0	$0
1/29/2018	Heavy Snow	0	0	$0
4/14/2018	Winter Storm	0	0	$1,000,000
1/28/2019	Winter Storm	0	0	$0
11/11/2019	Heavy Snow	0	0	$0

Total	$192,175,000
Average Cost Per Event	$3,099,597

Source: National Oceanic and Atmospheric Administration

November 11, 2019:
A long duration heavy snow event impacted southeastern Michigan on Veterans Day 2019. The storm peaked during the noon/early afternoon timeframe when 1 inch per hour snowfall occurred over the western and northern suburbs of Detroit. (Excerpts from NOAA storm summary)

January 28, 2019:
Strong low-pressure tracked through southeastern Michigan, leading to a wide range in snowfall amounts, with the least amounts south of I-94 and the highest amounts occurring north of I-69. Snowfall amounts ranged from around 2 inches in Monroe to 10 inches over Bay and Huron Counties. (Excerpts from NOAA storm summary)

April 14, 2018:
A large and complex low-pressure system impacted the Great Lakes Region. Southeastern Michigan saw heavy rain, snow, sleet, and freezing rain that began on April 13th and lasted through April 15th. This system brought 2 main periods of precipitation, with a short break in between on Saturday. Total rainfall of 1 – 2 inches was common with 2 – 3 inches of snow and sleet north of I-69. (Excerpts from NOAA storm summary)

January 29, 2018:
A low-pressure system moving across the region brought heavy snow to parts of southeastern Michigan. The snow began around midnight and lasted through most of the day. A very narrow swath of heavy snow occurred along the I-69 corridor from Lansing up through Flint. These areas received 7 – 11 inches. Flint Bishop Airport received 10 inches, which is a top 20 all time snowstorm. (Excerpts from NOAA storm summary)

December 13, 2017:
A strong clipper system tracked across southern lower Michigan. Snowfall totals ranged between 3 – 9 inches across southeast Michigan. Travel was significantly impacted as the heaviest snow fell during the evening rush hour. (Excerpts from NOAA storm summary)

December 11, 2016:
A low-pressure system over the Central Plains moved northeast over lower Michigan, bringing good moisture to the region. With cold air in place, the precipitation fell as all snow through the entire event. Snow began as a dry and fluffy type with temperatures in the lower 20s during the morning hours. Temperatures then slowly rose into the lower 30s during the afternoon and evening, causing the snow to become wetter. Total snowfall accumulations ranged from 7 – 11 inches. (Excerpts from NOAA storm summary)

March 1, 2016:
Low-pressure took shape out in the southern plains and quickly deepened as it moved northeast across the Ohio Valley. This system brought a mixed bag of precipitation to the area including rain and freezing rain to locations around the Detroit area and points south while areas north saw all snow. Areas that saw snow had upwards of a foot of snow in some locations. (Excerpts from NOAA storm summary)

February 24, 2016
A strong low-pressure system with copious moisture moved northeastward from the southern plains to Lake Erie. The snowfall was heavy at times during the afternoon and evening hours north of a line from roughly Ann Arbor to Port Huron, with 1 inch per hour rates common. (Excerpts from NOAA storm summary)

November 21, 2015:
Snowfall reports of 12 inches were reported over parts of southern Wisconsin and northern Illinois. The system then took aim at Michigan, bringing with it 10 – 16 inches of snowfall. (Excerpts from NOAA storm summary)

March 31, 2015:
An intense west to east aligned snow band set up across Tuscola, Lapeer, and Sanilac Counties, with 4 – 8 inches falling in 6 hours or less. Snowfall accumulations quickly tapered off farther south and north. (Excerpts from NOAA storm summary)

February 1, 2015:
A strong and slowly moving low pressure system tracked through the Ohio Valley delivering 8 – 17 inches of snow along and south of the I-69 corridor,

with 4 – 8 inches north of I-69. Highest amounts were in and around southern Wayne County as Detroit Metro Airport recorded 16.7 inches, the third highest snowfall on record in Detroit. (Excerpts from NOAA storm summary)

March 12, 2014:

A low-pressure system tracked across the Ohio Valley on March 12th. A tremendous amount of moisture lifted north of the low track and into southern Michigan. This moisture combined with artic air plunging into the Great Lakes quickly turned light rain into all snow. Intensification of this storm system during the morning of the 12th lead to the development of heavy wet snow. The strength of the storm system and instability in the atmosphere also triggered some thunder snow. During the morning, northerly winds gusted between 35 to 45 mph, which caused a significant amount of blowing and drifting of the snow. (Excerpts from NOAA storm summary)

January 5, 2014:

A massive snowstorm hit the region and Lapeer County received about 16.5 inches of snow, with snow drifts making roads nearly impassable. Temperatures dropped and with the wind-chill, it felt like negative 45 degrees. Lapeer County offices were closed except for essential services. All schools were closed and people were urged to stay off of the roads unless it was an emergency. Road crews worked around the clock trying to clear the snow, but over a week later, some schools were still closed and back roads remained impassable. (Excerpts from NOAA storm summary)

December 21 and 22, 2013:

Freezing rain came through the County, causing extensive freezing of tree limbs, power lines, and roadways. The storm left more than 527,000 Michigan residents without electricity. The storm hit Lapeer County extremely hard. Even with crews working around the clock, many people did not regain power for more than a week. The ice made roads very dangerous and there were numerous downed and arcing power lines. (Excerpts from NOAA storm summary)

February 1-2, 2011:

From February 1-2, 2011 a major winter storm occurred throughout much of Lower Michigan. The storm brought 10 to 15 inches of snow and blizzard conditions to much of southern Lower Michigan. Wind gusts more than 40 M.P.H. combined with heavy snow to produce whiteout conditions and snowdrifts of 3 to 5 feet. Thunder accompanied the snow in some areas, with snowfall rates exceeding two inches per hour. Many businesses, schools (including major universities), and some government offices were closed the next day. Most main roads were plowed by the next day but some side streets were not cleared for a couple more days. (Excerpts from NOAA storm summary)

February 21, 2011:

A powerful winter storm hit Michigan as part of a large system that came from the Western United States. Over a foot of snow fell in Lapeer County, causing road closures or treacherous roads for more than two days. During the peak of the storm, snow was falling at a rate of more than one inch per hour. The storm did cause one death of a motorist who lost control on a Goodland Township roadway. There were some property damage incidents due to the heavy snow, as well as several minor car accidents. (Excerpts from NOAA storm summary)

Vulnerability

The vulnerability calculation for snow and ice storm events considers many factors described in the hazard description section including property damage, injuries, lost wages, and cost associated with improving road conditions. The variables identified in the calculation were derived from historic storm information and a 2003 Salt Institute study detailing the costs associated with a snow or ice storm event. The vulnerability determination concludes that Lapeer County will average 2.3 snow and ice storm events a year resulting in an annual cost of over $9,655,945.10; see **Table 2-3** for details.

Mitigation Strategies for Snow and Ice Storms

The following strategies are suggested to minimize the effects of Lapeer County's number one hazard, snow and ice storms:

Table 2-3 Breakdown of Costs for Lapeer County Snow and Ice Storms	
Activation of Emergency Management	$25,000
Response (plowing, tree removal, etc.)	$575,661
Infrastructure Failure (road closure, car delays, etc.)	$322,300
Wages/Salaries Lost	$1,462,318
State/Local Taxes Lost	$77,392
Federal Taxes Lost	$114,099
Retail Sales Lost	$632,406
Minor Injuries $1,560 per person (6)	$9,360
Major Injuries $15,600 per person (2)	$31,200
Deaths @ $2,710,000 per person (0.35) car accident or physical exertion	$948,500
Number of Expected Snowstorms each Year:	2.3
Total Estimated Annual Cost of Snowstorms:	$4,198,237

Activation of Emergency Management - temporary shelter, activation/running EOC, evacuation, rescue operations Response (plowing, trees) - Based on 1727 miles x $333.33 per mile cost - Oakland Co. Road Commission factored for Lapeer County
Infrastructure failure (i.e. Road closure, car delay) - Based on 1 hr delay of morning traffic on I-69 - 10,000 cars x $32.23 cost of delay -FEMA
Wages Salaries Lost - 2003 Salt Institute Study factored for Lapeer Co. Population
State/Local Taxes Lost - 2003 Salt Institute Study factored for Lapeer Co. Population
Federal Taxes Lost - 2003 Salt Institute Study factored for Lapeer Co. Population Retail Sales Lost - 2003 Salt Institute Study factored for Lapeer Co. Population
Minor Injuries $1,560 per person - FEMA
Major Injuries $15,600 per person - FEMA Death $2,710,000 per person - FEMA

- Emergency generators
- Enhance storm warning systems
- Utilize wireless emergency alerts
- Public education for disaster preparedness
- Tree trimming program - county and utility company
- Warning stations
- Update disaster response plan
- County hazard mitigation project manager
- Elderly assistance programs

New Mitigation Projects

Almont Township

Project: Warning sirens. Project description: Install an early hazard warning system with 4 sirens at various locations in the Township not covered by a warning system. Proposed timeframe for implementation: 1 - 5 years. Budget: $110,000 - $120,000. Update: None, this is a newly submitted project.

Previously Included Mitigation Projects

Attica Township

Project: Backup generator. Project description: Purchase of a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $45,000. Update: Not provided.

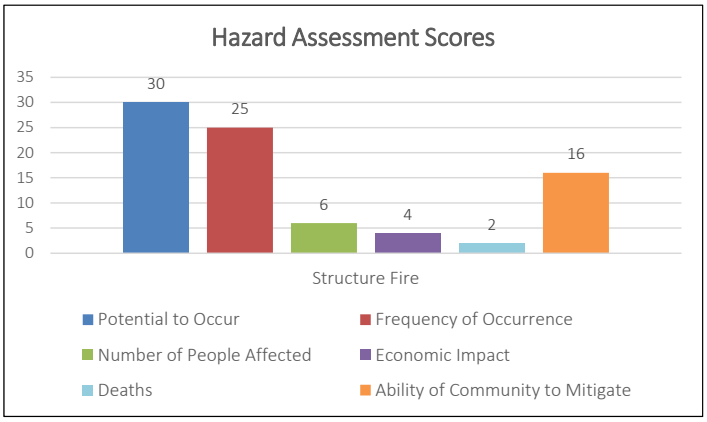
City of Lapeer

Project: Backup generator. Project description: Purchase of 1 large and 2 small (portable) backup generators to maintain sewage lift stations and traffic signals. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: This project is still ongoing.

Village of Otter Lake

Project: Backup generator. Project description: Purchase a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: Not provided.

#2 - Structure Fires



Structure Fire

Structure fires are of any origin, that ignites one or more structures, causing loss of life and/or property.

Hazard Description

Structure fires are ranked as the number two hazard for Lapeer County. In terms of average annual loss of life and property, structure fires, often referred to as the "universal hazard" because they occur in virtually every community, are by far the biggest hazard facing most communities in Michigan and across the country. Each year in the United States, fires result in approximately 2,790 structure fire deaths and 11,525 injuries requiring medical treatment (FEMA). According to some sources, structure fires cause more loss of life and property damage than all types of natural disasters combined. Direct property losses due to fire are $8.2 billion per year and much of that figure is the result of structure fire.

Ironically, while the United States has made great strides in lessening deaths and injuries caused by other types of disasters, structural fires are a worse problem in this country than in many other industrialized countries (even those with a more densely-developed population pattern). The United States Centers for Disease Control (CDC) figures indicate that fire-associated mortality rates in the United States are approximately 2-3 times greater than those in many other developed countries.

The population and government units of Lapeer County depend on 16 separate volunteer fire departments. The Lapeer County Firefighter's Association has over 448 members. The City of Lapeer has one full-time Chief and Inspector. An enhanced 911 (E911) facility is located on Genesee Street, directly behind the City of Lapeer Public Safety building. The facility was built in 1997, and is also the location of the Lapeer County Emergency Operations Center. The dispatching service utilizes state-of- the-art computer systems to receive emergency calls and to direct fire, police and ambulance units to the emergency scene. A 911 Authority Board was established in 1994 and is made up of representatives from the Michigan State Police, Lapeer County Sheriff's Department, City of Lapeer, City of Imlay City, County Board of Commissioners, Township Association, Lapeer County Firefighter's Association and a citizen-at-large. Please see the Emergency Facilities map in the Lapeer County Community Profile section.

Lapeer County Perspective and Vulnerability

According to statistics compiled by the Fire Marshal Division, Michigan Department of State Police for 2003 (the last year for which statewide statistics are available), nearly 19,000 structural fires occurred in Michigan, resulting in 161 deaths and 624 injuries. The financial impact of these structural fires was estimated to be about $230 million. This data estimated that a structural fire occurred in Michigan every 28 minutes in 2003. Michigan's fire death rates in 2007 of about 15 persons per million puts it in the upper third compared to all other states in the nation.

Structure fires are ranked as the number two hazard

in Lapeer County. Over a four-year period (2000-2003) Lapeer County averaged 221 fires per year and $3,490,404 worth of damage per year. Each year at least 13% of the fires in the County are confirmed to be arson or are suspected to be arson fires. Arson is estimated to cause an average of $1,029,524 in damage annually in Lapeer County.

According to the Michigan Department of Licensing and Regulatory Affairs (LARA) National Fire Incident Reporting System (NFIRS), in the last 10 years there have been 1,927 structure fires in Lapeer County. The number of injuries, deaths and dollar loss related to specifically structure fires was not provided. However, data for these statistics was found for all fire related incidents in Lapper County. For all fire related incidents in the county over the past 10 years, there were 51 injuries and nine deaths. The total property loss from fires in Lapeer County is $1,100,329,446. Using the data provided, it can be assumed that each structure fire that occurs in Lapeer County could cost approximately $571,006 with a 2.5 percent chance of injury and a 0.5 percent chance of death.

Mitigation Strategies for Structure Fires

The following strategies are suggested to minimize the effects of Lapeer County's number two hazard, structure fires:

- Enhance emergency response system
- Enforce fire code
- Public education for fire safety
- Training for responders
- Arson education
- Maintain mutual aid agreements
- Update fire fighting equipment
- County hazard mitigation project manager

New Mitigation Projects

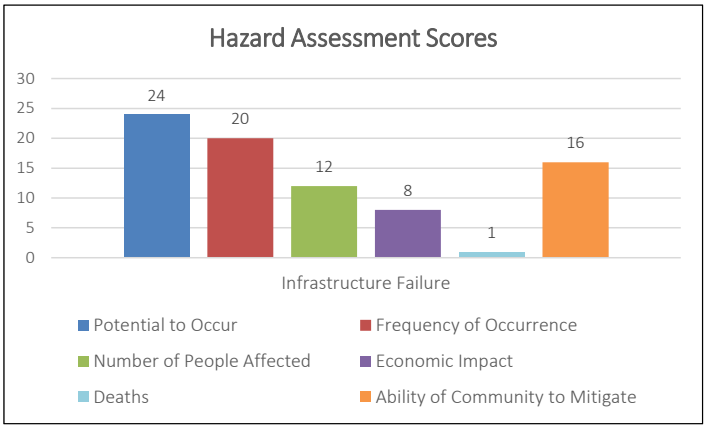
None

Previously Included Mitigation Projects

City of Lapeer

Project: Commercial/industrial inspections. Project description: Develop a commercial and industrial facility inspection inventory over a two-year period. Proposed timeframe for implementation: 1- 5 years. Budget: $85,000. Update: This project is no longer being pursued.

#3 - Infrastructure Failure



Infrastructure Failure

Infrastructure failure is the failure of critical public or private utility infrastructure resulting in a temporary loss of essential functions and/or services.

Hazard Description

Infrastructure failure is ranked as the number three hazard for Lapeer County. Michigan's citizens are dependent on the public and private utility infrastructure to provide essential life supporting services, such as electric power, heating and air conditioning, water, sewage disposal and treatment, and storm drainage. When one or more of these independent, yet interrelated systems fail due to infrastructure failures, there can be severe consequences. For example, when power is lost during periods of extreme heat or cold, people can die in their homes if immediate mitigation action is not taken. When the water or wastewater treatment systems in a community are inoperable, serious public health problems arise that must be addressed immediately to prevent outbreaks of disease. When storm drainage systems fail due to damage or an overload of capacity, serious flooding can occur. These are just some examples of the types of infrastructure failures that can occur, and all of these situations can lead to disastrous public health and safety consequences if immediate mitigation actions are not taken. Typically, it is the most vulnerable members of society (i.e., the elderly, children, impoverished individuals, and people in poor health) that are the most heavily impacted by an infrastructure failure. If the failure involves more than one system, or is large enough in scope and magnitude, whole communities and possibly even regions can be severely impacted. There are 35 dams in Lapeer County with one of these dams listed as a high hazard risk. There are 161 bridges in Lapeer County with 15 of these bridges rated in poor condition. Please see **Figure 2-1** for a map of Dams and **Figure 2-2** for a map of Bridges in Lapeer County.

Lapeer County Perspective and Vulnerability

See below for a description of some infrastructure failure events that have occurred in Lapeer County.

November 2019

It was discovered through testing that some homes in the county were above the federal threshold for lead, mainly caused by the lead service lines connected to the homes. Lead service lines are planned to be replaced starting in 2020. This accounts for around 1 percent of all of the water lines in the community. Although the number of homes effected was minimal, the community distributed water filters to any homes thought to be impacted.

March 7, 2012

Tropical storm-force winds roared across Lapeer County leaving downed wires and trees in their wake Saturday. Imlay City firefighters secured areas and guarded wires for nearly ten hours total. In Imlay City, a utility pole had snapped at the base and telephone wires hanging about six feet off the roadway. In Deerfield Township, a Meadows Breeze Street resident told the Lapeer County Sheriff's Dept. Across the county there were several reports of trees down across the road and in Arcadia Township the Lapeer County Sheriff's Dept. reported a vehicle hit a tree while a road commission crew was in the process of removing it. This event caused many residents to lose power across the county.

August 14 –August 17, 2003 (Billions of dollars of damage in the affected areas):

The August 14, 2003 blackout was the largest in U.S. History, causing a widespread power outage throughout the northeastern United States and portions of Canada. While the initial cause of the outage is still under investigation, the damage was compounded by outdated infrastructure.

Schools, businesses, and public facilities were forced

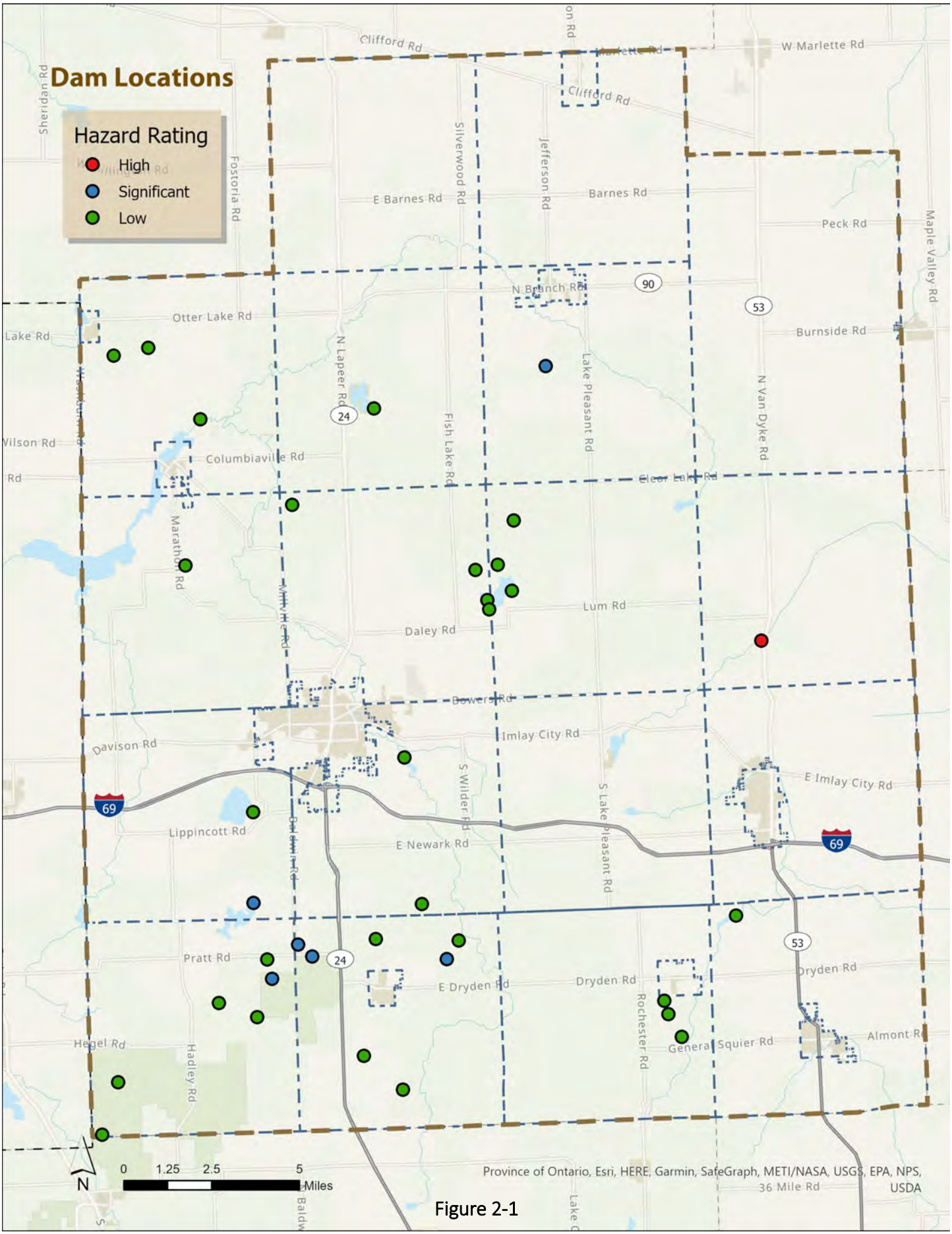


Figure 2-1

Source: Genesee County GIS

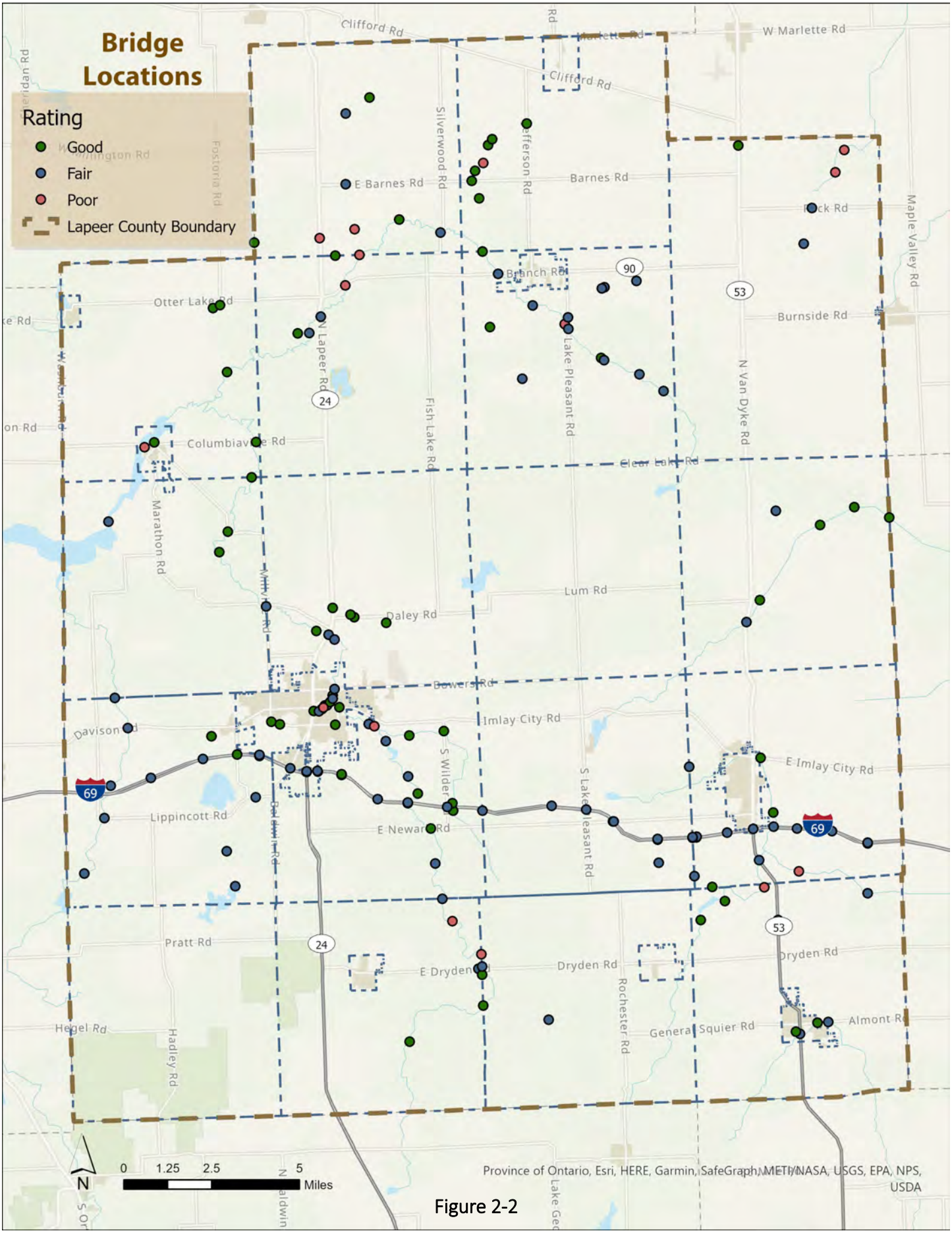


Figure 2-2

Source: Genesee County GIS

to close. Public water service was disrupted while officials tested for possible contamination. Only a few traffic signals were operational, causing dangerous driving conditions. Damages from this event are estimated to be in the billions of dollars. A federal disaster was declared, and Lapeer County was included as a community covered by this declaration.

April 3 – April 5, 2003 (estimated damage of $161.1 Million in affected areas):

The ice accumulations led to considerable tree damage and widespread power outages across the entire area. Locations hardest hit, with around an inch of ice reported on the trees, were across northern Oakland County, northern Macomb County, and throughout Lapeer, St. Clair, Sanilac and Huron Counties. In these areas, the tree damage was so severe that dozens of roads were blocked by trees and damage occurred to hundreds of homes, businesses and automobiles as tree limbs, or in many cases, large trees themselves, were brought to the ground under the weight of the ice. It was estimated that 450,000 homes and businesses lost power during the storm. In fact, nearly 50,000 people were without power for up to a week as persistent cold temperatures kept the heavy ice on the trees for 4 days after the storm. Crews came from four different states to help local utility companies restore power and remove hundreds of broken tree branches away from power lines. A 74-year old man in Troy (Oakland County) was killed when he was struck in the head by a falling tree branch (direct). Three other people died due to carbon monoxide poisoning as a result of poorly ventilated generators (indirect). Two women were injured in Orion (Oakland County) when a large tree fell onto the car they were in (direct). Five house fires were said to have started by electrical lines being brought down onto the homes. Hundreds of traffic accidents were reported during the storm as well, most of which were in the Saginaw Valley where sleet had slickened the roadways. An estimated two dozen people were injured in traffic accidents (indirect). A 59-year old Bay County man died when his car slid into a ditch filled with water (indirect). A 47-year old Deerfield Township (Lapeer County) man was also killed when he fell from a 40-foot tall bucket truck trying to trim an ice-covered tree limb before it fell onto his house (indirect). Statements were made by several long-time residents that this was the worst ice storm to hit the area since the 1970s. (Excerpts from NOAA storm summary)

April 3, 1993:

A State of Emergency was declared in Lapeer County when 400 miles of roadway was closed due to widespread road surface deterioration. An extraordinary amount of frost beneath the roadway and heavy rains caused further deterioration.

Other infrastructure failure events that have occurred in Lapeer County over the last ten years include several local bridge failures/closures, flooding causing washed out roads, a critical infrastructure threat at the Lapeer County Courthouse in 2010, and a 197 foot tall cellphone tower fire that occurred in 2020. The events mentioned above have the potential to cost the affected areas hundreds of millions of dollars in damages. While it is hard to calculate the specific damages to Lapeer County, a single event can easily cause the county $1 million due to infrastructure damages, lost wages, and lost profit.

Mitigation Strategies for Infrastructure Failures

The following strategies are suggested to minimize the effects of Lapeer County's number three hazard, infrastructure failure:

- Emergency generators
- Tree trimming program - county and utility company
- Infrastructure preventative maintenance program
- Community shelters
- Analysis of infrastructure
- Repair of critical infrastructure
- Public education for disaster preparedness
- Update disaster response plan
- County hazard mitigation project manager

New Mitigation Projects:

City of Imlay City

Project: Infrastructure Improvements. Project description: Two of the City's largest potential hazards are trains hauling unknown hazardous materials through downtown Imlay City and trucks hauling un-

known hazardous material down I-69 and along M-53. Both of these concerns come to a junction at the railroad overpass on M-53. The City has the concern of a potential derailment at the overpass and the potential of a truck crashing into an abutment of the underpass where M-53 drops from 5 lanes to 2 lanes. Mitigation would include CN railways, MDOT, and the Imlay City. Proposed timeframe for implementation: 1 - 5 years. Budget: Unknown. Update: None, this is a newly submitted project.

City of Lapeer

Project: Critical drain repair and expansion. Project description: Drain is an 18 inch corrugated tin pipe that has collapsed over 17 years ago between 895 south Main and 877 south Main. Proposed timeframe for implementation: 1 - 5 years. Budget: $70,000. Update: None, this is a newly submitted project.

Village of North Branch

Project: Lining sewer main. Project description: Lining project of sewer main below M-90 from manhole 017 to manhole 121. Interior of main showing excess erosion and fractures. Failure of the main would cause sinkholes and require open excavation of our primary state highway. Proposed timeframe for implementation: 1 - 5 years. Budget: $910,000. Update: None, this is a newly submitted project.

Project: Pump station upgrade. Project description: Pump station upgrade at sewage lagoon #1. The aging system may result in a failure which could cause backups in the western half of the village. Proposed timeframe for implementation: 1 - 5 years. Budget: $306,000. Update: None, this is a newly submitted project.

<u>Previously Included Mitigation Projects:</u>

Village of Almont

Project: Infrastructure improvements. Project description: Retrofit existing sanitary sewer lift stations and/or general infrastructure components to be more resistant to natural disasters. Proposed timeframe for implementation: Unknown. Budget: $35,000-$75,000. Update: Not provided.

Attica Township

1. Project: Backup generator. Project description: Purchase of a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $45,000. Update: Not provided.

Imlay City

Project: Infrastructure improvements. Project description: Expand 18’ concrete culvert at the corner of Blacks Corners Road and Attica Road. Proposed timeframe for implementation: Unknown. Budget: $246,141. Update: DPW Superintendent is trying to coordinate this project with both Imlay Township and the Lapeer County Road Commission.

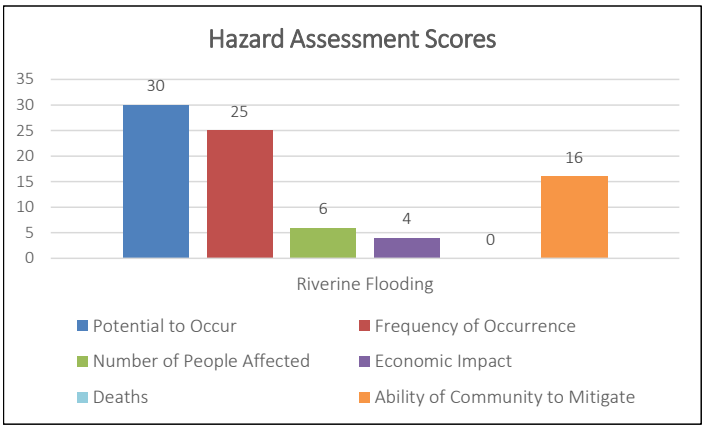
City of Lapeer

Project: Backup generator. Project description: Purchase of 1 large and 2 small (portable) backup generators to maintain sewage lift stations and traffic signals. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: This project is still ongoing.

Village of Otter Lake

Project: Backup generator. Project description: Purchase a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: Not provided.

#3 - Riverine Flooding



Riverine Flooding

Riverine flooding is the overflowing of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt or ice.

Hazard Description

Riverine flooding is ranked as the number three hazard for Lapeer County. Flooding of land adjoining the normal course of a stream or river has been a natural occurrence since the beginning of time. If these floodplain areas were left in their natural state, floods would not cause significant damage. Development has increased the potential for serious flooding because rainfall that used to soak into the ground, or take several days to reach a river or stream via a natural drainage basin, now quickly runs off streets, parking lots, and rooftops, and through man-made channels and pipes.

Floods can damage or destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services and result in fatalities. People may be stranded in their homes for several days without power or heat, or they may be unable to reach their homes at all. Long-term collateral dangers include the outbreak of disease, widespread animal death, broken sewer lines causing water supply pollution, downed power lines, broken gas lines, fires and the release of hazardous materials.

Flood prone areas are found throughout the state, as every lake, river, stream and county drain has a floodplain. The type of development that exists within the floodplain will determine whether flooding will cause damage. The Michigan Department of Environmental Quality estimates that about 6% of Michigan's land is flood-prone, including about 200,000 buildings.

Floodplain areas are identified based on hydrological and topographical surveys, as well as, soil studies and land cover characteristics. The result of this research is a statistical model that indicates an area vulnerable to the "100-year" flood. The term "100-year flood" is often used incorrectly and can be misleading. It does not refer to a certain flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1% chance of being equaled or exceeded each year. So, the 100-year flood could occur more than once in a relatively short period of time. It is also referred to as the "1% annual chance flood."

The 100-year flood, which is the standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. The 100-year flood only has a 1% chance of occurring in any given year, but structures located in the flood hazard area have a 26% chance of suffering flood damage during the term of a 30-year mortgage. This means a home in the mapped flood hazard area is five times more likely to be damaged by flood than to have a major fire.

The southern half of the Lower Peninsula contains the areas with the most flood damage potential. The

primary flooding sources include the Great Lakes and connecting waters (Detroit River, St. Clair River, and St. Mary's River), thousands of miles of rivers, streams and hundreds of inland lakes. Michigan is divided into 63 major watersheds. All of these watersheds experience flooding, although the following watersheds have experienced the most extensive flooding problems or have significant damage potential: 1) Clinton River; 2) Ecorse River; 3) Grand River; 4) Huron River; 5) Kalamazoo River; 6) Muskegon River; 7) Saginaw River; 8) Rifle River; 9) River Raisin; 10) Rouge River; 11) St. Joseph River; and 12) Whitefish River. The flooding is not restricted to the main branches of these rivers. Most riverine flooding occurs in early spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Ice jams also cause flooding in winter and early spring.

Severe thunderstorms may cause flooding during the summer or fall, although these are normally localized and have more impact on watercourses with smaller drainage areas. Oftentimes, flooding may not necessarily be directly attributable to a river, stream or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall and/or snowmelt, saturated ground and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. That type of flooding is becoming increasingly prevalent in Michigan, as development outstrips the ability of the drainage infrastructure to properly carry and disburse the water flow. Flooding also occurs due to combined storm and sanitary sewers that cannot handle the tremendous flow of water that often accompanies storm events. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns.

Lapeer County Perspective and Vulnerability

From 1975-2020, Michigan experienced seven flood disasters that resulted in both a Presidential Major Disaster Declaration and a Governor's Disaster Declaration, and seven that resulted only in a Governor's Disaster Declaration. Combined, these flood disasters have caused hundreds of millions of dollars in damage to homes, businesses, personal property, and agriculture.

See **Table 2-4** for a list of recent Lapeer County floods. During the last 24 years, Lapeer County has had 16 flood events. Based on these numbers, the county can expect 1.5 flood events per year at an average cost of $601,250 per event.

Table 2-4 Lapeer County Flood and Flash Flood Events 1996-2020

Location	Date	Type	Property Damage
NRN 1/2 OF CO.	6/21/1996	Flash Flood	$5,800,000
CLIFFORD	6/21/1997	Flash Flood	$0
LAPEER CO.	4/20/2000	Flood	$0
METAMORA	7/28/2000	Flash Flood	$50,000
METAMORA	9/22/2000	Flash Flood	$125,000
LAPEER (ZONE)	5/23/2004	Flood	$0
IMLAY CITY	9/22/2005	Flash Flood	$0
COLUBIAVILLE	8/2/2006	Flash Flood	$300,000
ELBA	7/16/2008	Flash Flood	$20,000
HADLEY	9/14/2008	Flood	$125,000
HOLLOWAY RES	6/17/2009	Flood	$100,000
HOLLOWAY RES	8/9/2009	Flood	$3,000,000
ATTICA	5/15/2011	Flood	$0
OTTER LAKE	4/10/2013	Flood	$100,000
HADLEY	7/13/2017	Flash Flood	$0
OTTER LAKE	1/11/2020	Flood	$0

Source: National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) Storm Event Database

There are several major ravines running thru Lapeer County that have caused some severe problems in the past. The Flint River, which is a tributary to the Saginaw River and Lake Huron, being the largest. The Clinton River, Belle River and Farmers Creek are some other rivers that flow through the County in some very vulnerable locations (Downtown Almont, City of Lapeer, City of Imlay City). The Flint River and Clinton River also cross two of our major thoroughfares in the County (M53 & M24).

Staff estimates that there are approximately 526 known structures in Lapeer County in the 100-year flood plain (this estimate is limited to areas where the flood plain has been delineated and mapped). See **Figure 2-3** for a map of floodplains, **Figure 2-4** for a map of structures in the floodplain, **Figure 2-5** for a map of the floodplains with critical facilities, and **Figure 2-6** for a map of communities that participate in

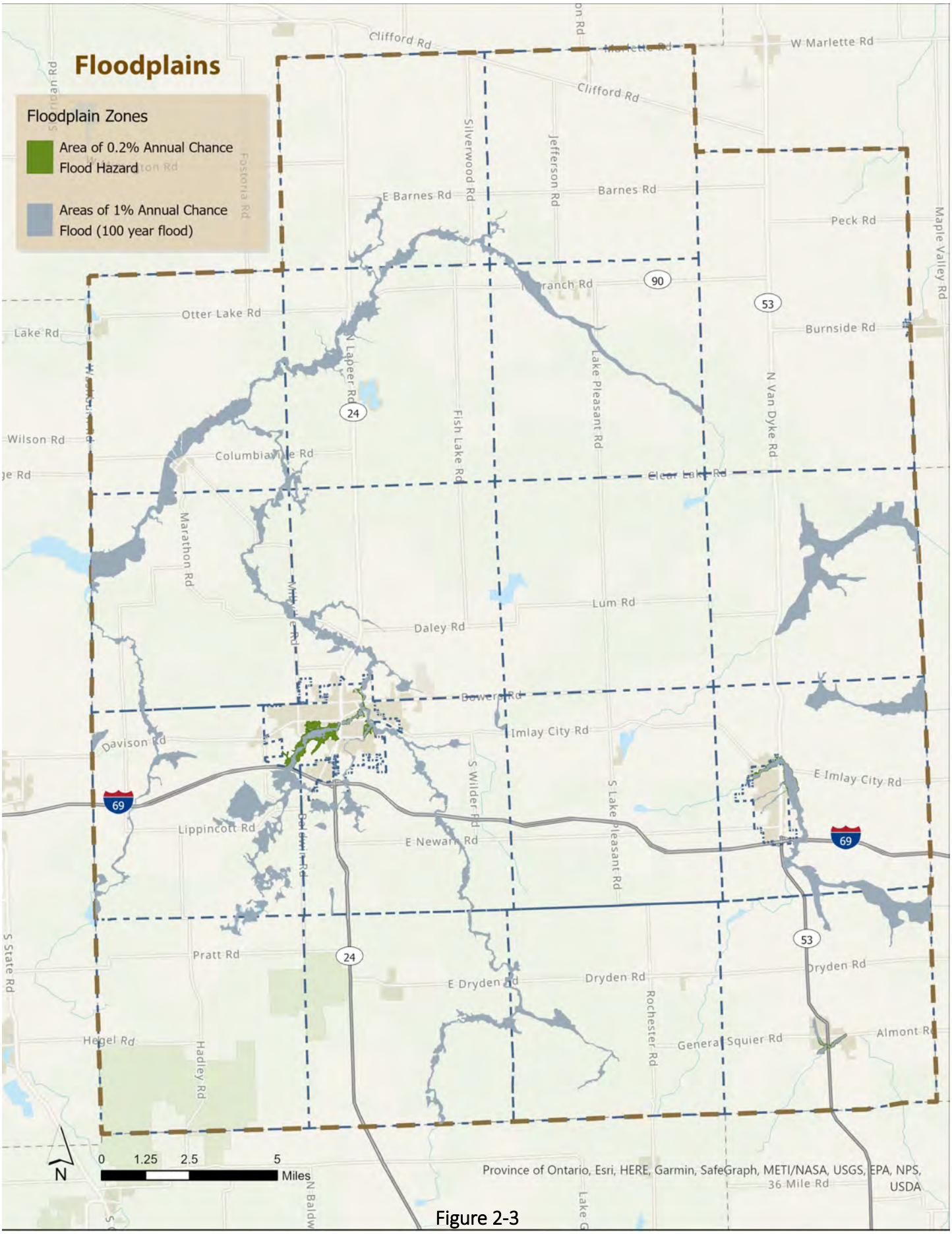


Figure 2-3

Source: Genesee County GIS and FEMA

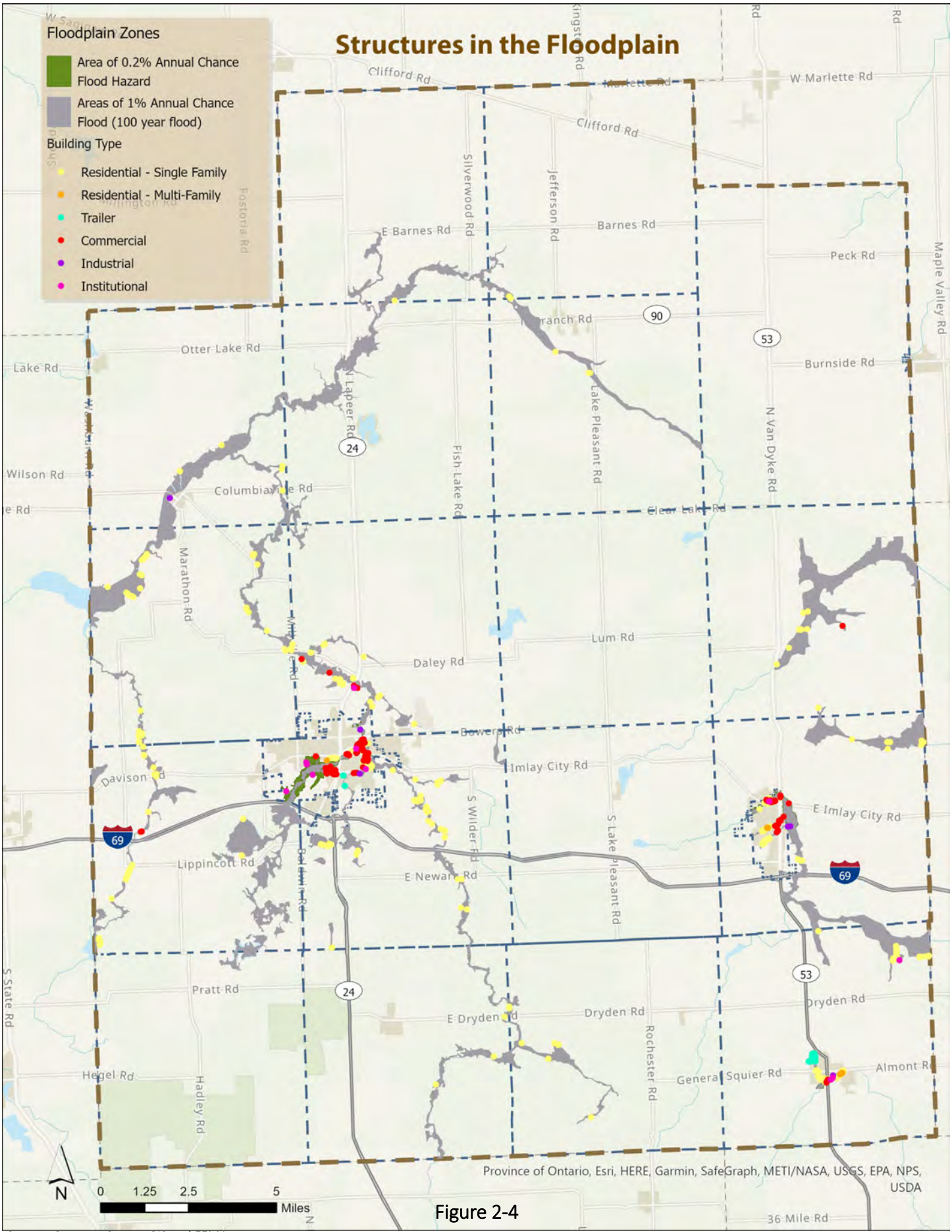


Figure 2-4

Source: Genesee County GIS and FEMA

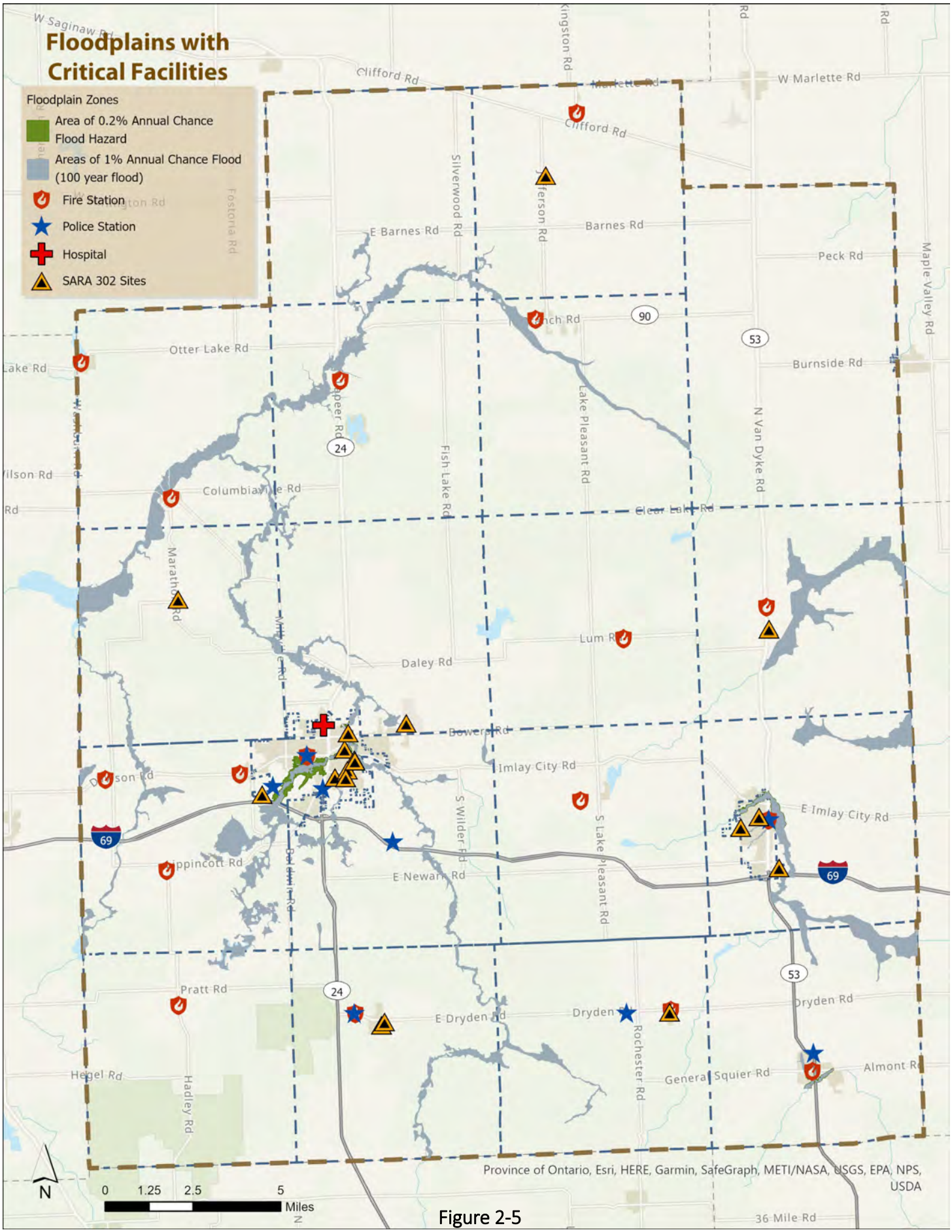


Figure 2-5

Source: Genesee County GIS and FEMA

Figure 2-6

Source: Genesee County GIS and FEMA

the flood insurance program. Some communities in Lapeer County do not have mapped floodplains. Available floodplain data is limited to municipalities that have at least one structure covered by the FEMA National Flood Insurance Program. FEMA floodplain maps are the only data source currently available to identify the 100-year floodplain in Lapeer County. Table 2-5 shows the approximate number of structures in the floodplain for each municipality below. To identify flood prone areas, staff estimated the 100 - year flood plain by comparing FEMA flood plain maps and Department of Natural Resource digital aerials. Only 51 (10%) of the identified structures have flood insurance policies. Further study of the floodplain areas in Lapeer County is necessary to mitigate the potential hazards.

See below for details on flood events that have occurred in Lapeer County over the last 20 years.

Table 2-5 Lapeer County Structures in the Floodplain

Municipality	Structures in Floodplain
Almont Township	20
Almont Village	111
Burlington Township	2
Columbiaville Village	1
Dryden Township	9
Elba Township	37
Goodland Township	9
Imlay City	60
Imlay Township	21
Lapeer City	145
Lapeer Township	34
Marathon Township	5
Mayfield Township.	27
Metamora Township.	3
North Branch Township	3
Oregon Township	38
Rich Township	1
Total known structures	526

Source: Genesee County GIS and FEMA

January 11, 2020

A winter storm tracking through southeast Michigan brought heavy rain and freezing rain, with about a quarter of an inch ice from US-10 south to about M-57. Many accidents and spin outs occurred across the Tri-Cities region and Flint vicinity due to the icy roads. In addition, strong northeast winds lead to high water levels and large waves causing significant lakeshore flooding and erosion along Bay, Tuscola, and Huron county shorelines, as well as Sanilac and St. Clair. The water level at Essexville reached 79.5 inches above LWD, a new record high since records being in August 1977. Finally, 2 to 4 inches of heavy rain along and south of the I-69 corridor lead to areas of flooded basements and 1 to 2 feet of water on low lying roads and fields. (Excerpts from NOAA storm summary)

April 10, 2013:

A frontal boundary stalled over Michigan dropping 3 to 6 inches of rain. This resulted in the flooding of some rivers, streams and low-lying areas. Dozens of roads were closed across the following counties: Midland, Bay, Saginaw, Tuscola, Lapeer, and St. Clair. Several roads were also reported to be damaged. Hundreds of basements were flooded, with some property damage also reported. (Excerpts from NOAA storm summary)

August 11, 2009:

Heavy rains hit Lapeer County over a two-day period causing a Local State of Emergency declaration. The Flint River, running through Lapeer overflowed its banks causing several basements to collapse and additional damage to 15 homes and 19 road closures. The Village of Almont had power outages and flood damage. The Lapeer Regional Medical Center also sustained water damage. (Excerpts from NOAA storm summary)

September 15, 2008:

Heavy rain fell over southeast Michigan from September 12th-14th, with widespread 3 to 6 inches reported. Isolated amounts around 8 inches were even reported across northwest Genesee County. A slow moving cold front interacting with the remnants of two tropical systems, one being Lowell from the Pacific and the other being Ike from the Atlantic, led to the extreme rainfall totals. This heavy rain did cause some widespread flooding across much of southeast Michigan, but mostly minor flooding was reported, such as large pools of water on roads, road closures, along with some basement flooding. One of the most significant reported flooding occurred in Farmington Hills, were residents of the Manor of Farmington Hills had to be evacuated as water flowed through the

patient's rooms. A Clinton Township woman also had to be rescued as her car became submerged at Millar and Utica Roads. In addition to the heavy rain, the remnants of Ike did cause some strong winds which caused small tree limbs to fall and power outages to around 15,000 customers spread across Macomb, St. Clair, and Oakland Counties. (Excerpts from NOAA storm summary)

May 23 – May 24, 2004 (estimated damage of $100 Million in affected areas):

A stationary front over Iowa, Wisconsin, and Michigan over the weekend brought with it severe thunderstorms and heavy rains, which caused widespread flooding over Southeast Michigan. Much of the rainfall occurred in saturated areas that had experienced well-above average precipitation for the month of May. In fact, May 2004 will go down as the wettest May on record at Flint and Detroit. Over a 36-hour period (12 am May 22nd to 8 am May 23rd), 2 to 6 inches of rain fell across Southeast Michigan. A trained weather spotter in Armada reported the highest total, 5.8 inches. Lapeer County was one of the communities affected by this event. (Excerpts from NOAA storm summary)

September 22 – September 23, 2000 (estimated damage of $125,000 in affected areas):

Gravel roads were washed out in Almont and Dryden Townships. Roads were also flooded to the west, in Deerfield and Metamora Townships. Some culverts were displaced where the gravel had washed out. Annrook Park in the city of Lapeer was flooded by the Flint River. Fields were flooded and driveways washed out in Imlay City. Thunderstorms developed on the evening of the 22nd, north of a warm front that was moving north into southern Michigan. These storms produced very heavy rain in northern Oakland and southern Lapeer Counties. Holly measured 4.7 inches of rain, while Almont had 3.5 inches. Just to the south, the National Weather Service Office in White Lake had just 1.6 inches of rain. Runoff from the heavy rain resulted in localized flooding in northwest Oakland County, but flooding problems were more widespread and severe in southern Lapeer County. (Excerpts from NOAA storm summary)

July 28, 2000 (estimated damage of $50,000 in affected areas):

An upper level low-pressure system was entrenched in the western Great Lakes, maintaining cool air aloft across the region. Thunderstorms developed in the heat of the day, with the most widespread activity developing along the Lake Michigan lake breeze boundary in western Lower Michigan. These storms organized as they moved slowly but steadily eastward, evolving into a squall line that crossed southeast Michigan in the late afternoon and early evening hours. Several of the thunderstorms became severe. Only a couple of storms produced damaging wind; large hail was the most common type of severe weather. An isolated storm ahead of the squall line produced silver dollar sized hail in Shelby Township (Macomb County); this was the largest hail report of the day. The same storm downed trees in that area. Trees were also downed in Bancroft due to severe thunderstorm winds composed of dime to quarter sized hail events. For some parts of southeast Michigan - particularly metro Detroit - this was the third straight day of thunderstorm activity. As mentioned above, the storms tended to move slowly, and thus dumped very heavy rain. Macomb County had seen another batch of storms earlier on the 28th; rainfall totals in the central part of county were as high as five and a half inches. Another nearly stationary cluster of storms produced 4 to 5 inches of rain near Saline and Milan. Runoff from these downpours produced flash flooding across parts of the area. Interstate 94 was closed near Chelsea due to flooding. Many streets in and around Saline flooded, and the Saline River rose out of its banks. Urban flooding was widespread in Detroit, with many freeways closed, and some industrial facilities flooded. In Novi, a stranded family was rescued by a boat after their car stalled in floodwaters. Davison Lake Road in Lapeer County was washed out south of Metamora, while water was several feet deep across roads in Almont and Imlay City. In Almont, the floodwaters approached the front doors of homes and businesses. (Excerpts from NOAA storm summary)

<u>Mitigation Strategies for Riverine Flooding</u>

The following strategies are suggested to minimize the effects of Lapeer County's number three hazard, riverine flooding:

- 100% Participation in FEMA Flood Insurance Program – Map The Flood Plain
- Emergency Generators

- Amend Zoning Regulations To Prohibit New Development In The Flood Plain
- Identify Structures In The Flood Plain
- River Flood Control Measures
- Enforce Zoning Regulations Regarding The Flood Plain
- Public Education for Disaster Preparedness
- Mitigation Assistance Program For Structures In The Flood Plain
- Update Disaster Response Plan
- Promote hazard mitigation grant opportunities such as the FEMA Flood Mitigation Assistance program to local governments
- County Hazard Mitigation Project Manager

New Mitigation Projects

City of Lapeer

Project: Critical drain repair and expansion. Project description: Drain is an 18 inch corrugated tin pipe that has collapsed over 17 years ago between 895 south Main and 877 south Main. Proposed timeframe for implementation: 1 - 5 years. Budget: $70,000. Update: None, this is a newly submitted project.

Village of North Branch

Project: Lining sewer main. Project description: Lining project of sewer main below M-90 from manhole 017 to manhole 121. Interior of main showing excess erosion and fractures. Failure of the main would cause sinkholes and require open excavation of our primary state highway. Proposed timeframe for implementation: 1 - 5 years. Budget: $910,000. Update: None, this is a newly submitted project.

Project: Pump station upgrade. Project description: Pump station upgrade at sewage lagoon #1. The aging system may result in a failure which could cause backups in the western half of the village. Proposed timeframe for implementation: 1 - 5 years. Budget: $306,000. Update: None, this is a newly submitted project.

Previously Included Mitigation Projects

Village of Almont

Project: Soil stabilization. Project description: Complete soil stabilization projects along the Clinton River. Install geotextiles, buffer strips, decrease slope angles. Areas for improvements would be all properties that border the Clinton River or the Farnum Drain. Proposed timeframe for implementation: 1-5 years. Budget: $100,000-$150,000. Update: Not provided.

Project: Culvert improvements. Project description: Analyze culverts throughout the village and make necessary improvements to protect residents from flooding. The work could also include installing retention basins. Proposed timeframe for implementation: 1-5 years. Budget: $100,000-$150,000. Update: Not provided.

Attica Township

Project: Backup generator. Project description: Purchase of a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $45,000. Update: Not provided.

Imlay City

Project: Bell River restoration. Project description: River restoration work such as removal of trees and debris from the river, erosion control measures and clearing obstructions; also, river reclamation work such as removal of sediment and installation of a sediment trap. Proposed timeframe for implementation: Unknown. Budget: $258,000. Update: Project is still ongoing.

City of Lapeer

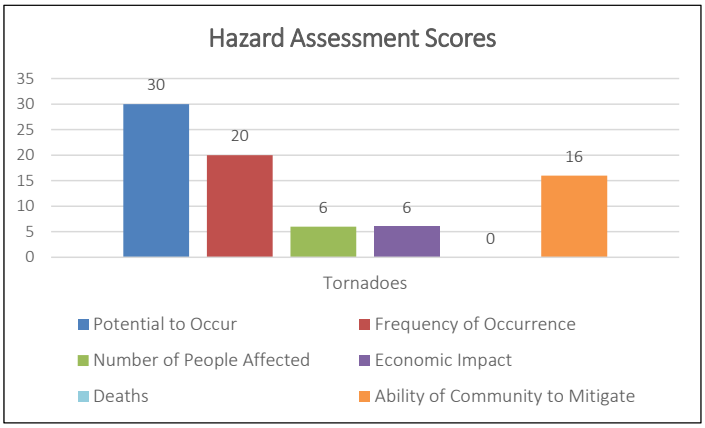
Project: Floodplain maps. Project description: New floodplain maps. Proposed timeframe for implementation: Unknown. Budget: $20,000. Update: This project is still ongoing.

Project: Backup generator. Project description: Purchase of 1 large and 2 small (portable) backup generators to maintain sewage lift stations and traffic signals. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: This project is still ongoing.

Village of Otter Lake

Project: Backup generator. Project description: Purchase a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: Not provided.

#4 - Tornadoes



Tornadoes

Tornadoes are an intense rotating column of wind that extends from the base of a severe thunderstorm to the ground.

Hazard Description

Tornadoes are ranked as the number four hazard in Lapeer County. Tornadoes in Michigan are most frequent in the spring and early summer when warm, moist air from the Gulf of Mexico collides with cold air from the Polar Regions to generate severe thunderstorms. These thunderstorms often produce the violently rotating columns of wind that are called tornadoes.

Michigan lies at the northeastern edge of the nation's primary tornado belt, which extends from Texas and Oklahoma through Missouri, Illinois, Indiana, and Ohio. Most of a tornado's destructive force is exerted by the powerful winds that knock down walls and lift roofs from buildings in the storm's path. The violently rotating winds then carry debris that can be blown through the air, becoming dangerous missiles.

A tornado may have winds up to 300 miles per hour and an interior air pressure that is 10-20% below that of the surrounding atmosphere. The typical tornado damage path is about one or two miles, with a width of around 50 yards, but paths much longer than that – even up to 200 miles – have been reported. Tornado path widths are generally less than one-quarter mile wide.

Typically, tornadoes last only a few minutes on the ground, but those few minutes can result in tremendous damage and devastation. Historically, tornadoes have resulted in loss of life, with the mean national annual death toll being 70 persons. Property damage from tornadoes is in the hundreds of millions of dollars every year.

Table 2-6 Fujita Tornado Intensity Scale

Magnitude	Description	Wind Speeds
FO	Gale Tornado	42-77 mph
F1	Moderate Tornado	78-112 mph
F2	Significant Tornado	113-157 mph
F3	Severe Tornado	158-206 mph
F4	Devastating Tornado	207-260 mph
F5	Incredible Tornado	261-318 mph

Source: National Oceanic and Atmospheric Administration

Tornado intensity is measured on the Fujita Scale, which examines the damage caused by a tornado on homes, commercial buildings, and other man-made structures. See **Table 2-6** for the Fujita Tornado Scale. The Fujita Scale rates the intensity of a tornado based on damaged caused, not by its size. It is important to remember that the size of a tornado is not necessarily an indication of its intensity. Large tornadoes can be weak, and small tornadoes can be extremely strong, and vice versa. It is very difficult to judge the intensity and power of a tornado while it is occurring. Generally, that can only be done after the tornado has passed, using the Fujita Scale as the measuring stick. According to the National Weather Service (NWS), since 1950, the vast majority of tornadoes that occurred in the United States (approximately 74%) were classified as weak torna-

does (F0 or F1 intensity).

Approximately 25% were classified as strong tornadoes (F2 or F3 intensity), and only 1% was classified as violent tornadoes (F4 or F5 intensity). Unfortunately, those violent tornadoes, while few in number, caused 67% of all tornado-related deaths nationally. Strong tornadoes accounted for another 29% of tornado-related deaths, while weak tornadoes caused only 4% of tornado-related deaths. If the data prior to 1950 is examined, the percentage of deaths attributable to violent tornadoes climbs drastically. That is largely due to the fact that tornado forecasting and awareness programs were not yet established. As a result, it was not uncommon for death tolls from a single tornado to reach several hundred.

Lapeer County Perspective and Vulnerability

Below is a summary of significant tornado events that have occurred in Lapeer County dating back to 1953. According to the National Oceanic and Atmospheric Administration database, 2012 is the last time Lapeer County experienced a significant tornado event.

March 15, 2012:

Tornadoes ripped through several southeast and mid-Michigan communities causing downed trees and power lines, and flooding neighborhood roads. The slow-moving storm caused high winds, heavy rain, and large hail. Northwest Lapeer County's Columbiaville area had a confirmed report of a funnel touching down in that area with 70 M.P.H. wind gusts and 2-inch hail (Excerpts from NOAA storm summary).

August 24, 2007:

The tornado tracked for several miles through Hadley Township, narrowly missing the town of Hadley. The initial tornado damage was observed one-half mile southwest of the Gregory and Brigham road intersection in Hadley Township. Significant damage to homes, outbuildings, and garages was observed at the intersection of Gregory and Brigham roads, and farther east along Brigham road. Damage to homes in this area was consistent with EF1 scale damage and maximum winds of roughly 110 mph. In addition, hundreds of trees were uprooted and/or snapped along Gregory Road and along Brigham road to near Hadley road. Lighter tree damage consistent with EF0 scale damage and winds around 70 mph occurred from the Hadley and Brigham road intersection northeastward to Pratt road (just west of Herd road). The average path width was 150 yards.

May 21, 2001:

Though the tornado originated in Genesee County, it did most of its damage in Lapeer County. It moved northeast from near Hegal and Washburn Roads, finally dissipating near Lippincott Road, southwest of the City of Lapeer. Two barns were destroyed by the tornado, one of which was 150 years old. A house and garage were moved off their foundations. A camper trailer was tipped over, and a storage silo was tossed. Shingles were lost off of one home. A warm front moved slowly north into southeast Michigan, ushering in warmer and more humid air. Scattered thunderstorms developed south of the warm front around midday. The storms also moved north, at a faster pace than the warm front. A few of these storms produced tornados when they caught up to the warm front (Excerpts from NOAA storm summary).

May 23, 1999:

A low-pressure system moved northeast across northern Lower Michigan late in the day. An associated cold front moved across southeast Michigan in the evening. Numerous showers developed ahead of the cold front in Lower Michigan. Even though there was little, if any, thunder, these showers managed to produce two tornados in southeast Michigan. In Lenawee County, a tornado moved northeast across Rome Township. This tornado produced F0 damage along most of its path, but briefly reached F1 intensity about 2 miles northeast of Rome Center. At this point, the tornado destroyed a large metal shed, blowing debris up to a quarter mile away. The tornado also damaged an antique gas pump at the same site. Along the rest of its path, the tornado snapped off a number of trees, and damaged siding and rain gutters to a farmhouse. Just before it lifted, the tornado shifted a barn off its foundation, and partially unroofed two barns. As an historical note, the path

of this tornado coincided almost exactly with a segment of the paths of the Palm Sunday tornadoes of April 11 1965 - which were the strongest tornados in Lenawee County since 1950. In fact, local property owners commented that the structures that were damaged by the 1999 tornado were also damaged (much more heavily) back in 1965! The second tornado of the day affected Imlay and Goodland Townships in eastern Lapeer County.

Just after touchdown, the tornado moved a two-story home along Bowers Road off its foundation, resulting in serious structural damage. A barn across the street was partially unroofed, and portions of the walls collapsed. A livestock trailer and a dog pen were also moved, and a large tree was downed nearby. Damage was comparatively slight in the middle portion of the track. Just before it lifted, however, the tornado struck another home, this one along Shaw Road. This two-year-old home was largely unroofed, with pieces of the roof found a quarter mile away. Several windows were blown out, and substantial tree damage occurred on the property. The damage near the beginning and the end of the track are both consistent with an F1 tornado (Excerpts from NOAA storm summary).

June 8, 1953:

On June 8, 1953, 116 people lost their lives in the Flint-Beecher community, and 844 people suffered injuries. The Flint-Beecher Tornado was just one of eight tornadoes that occurred that horrible evening across the eastern portion of the Lower Peninsula. Those other seven tornadoes resulted in an additional 9 deaths, 52 injures, and damage stretching from Alpena to Erie.

The Flint-Beecher tornado was rated as an F5, the highest rating on the Fujita scale of damage. Winds were likely in excess of 200 M.P.H. as the 800-yard wide tornado moved on its 27-mile path through Genesee and Lapeer Counties. Approximately 340 homes were destroyed, 107 homes had "major damage", and 153 homes had "minor damage". In addition farms, businesses and other buildings were destroyed and had damage. These totaled another 50 buildings destroyed and 16 with damage. The damage was estimated around $19 million (about $125 million adjusted for inflation) (Excerpts from NOAA storm summary).

Vulnerability

There have been 18 tornado events in Lapeer County since 1953 of various magnitudes. The most devastating tornado was the Flint-Beecher Tornado (an F5 magnitude tornado) that caused $125 million dollars' worth of damage, injured 844 people, and killed 116 people in the Lapeer and Genesee County area. This tornado is still one of the top ten deadliest tornadoes in United States history. See **Figure 2-7** for touchdown locations of tornadoes. See **Figure 2-8** for a map of tornadoes in comparison to population density. See **Table 2-7** for a detailed list of recorded incidents from 1953 - 2020.

One factor that contributed to the great number of lives lost in the Flint-Beecher tornado was that the population was unaware of the tornado until it was too late. After this event, and similar events across the country, warning systems were developed to notify the population of dangerous weather conditions. Today Lapeer County has 39 warning sirens, each with an approximate 1-mile radius coverage area. Approximately 34,818 people are within the Lapeer County siren coverage area. See **Figure 2-9** for the locations of warning sirens and their approximate coverage area.

To calculate the average annual damage caused by tornadoes in Lapeer County, staff gathered historic tornado data, identified population density characteristics for the affected areas, and assessed the annual probability that a tornado will occur in any given year. The analysis estimates a 26% chance that there will be a tornado in Lapeer County during any given year, and that tornadoes cost Lapeer County $195,538 dollars in damages annually. See **Table 2-8** for details on this analysis.

Mitigation Strategies for Tornadoes

The following strategies are suggested to minimize the effects of Lapeer County's number four hazard, tornadoes:

- Emergency Generators
- Enhance Storm Warning System

Table 2-7 Lapeer County Tornadoes (1953-2020)					
Location	Date	Magnitude	Deaths	Injuries	Property Damage
LAPEER CO.	06/08/1953	F5	0	59	$25,250,000
LAPEER CO.	08/07/1968	F1	0	0	$25,000
LAPEER CO.	04/01/1973	F1	0	0	$250
LAPEER CO.	07/04/1977	F1	0	0	$250,000
LAPEER CO.	04/11/1978	F0	0	0	$0
LAPEER CO.	06/12/1978	F0	0	0	$30
LAPEER CO.	06/26/1983	F1	0	0	$250,000
LAPEER CO.	07/19/1986	F1	0	0	$2,500
LAPEER CO.	07/25/1988	F0	0	0	$0
IMLAY CITY	06/21/1996	F1	0	0	$0
COLUMBIAVILLE	07/02/1997	F1	0	0	$200,000
CLIFFORD	05/06/1999	F0	0	0	$0
IMLAY CITY	05/23/1999	F1	0	0	$45,000
HADLEY	05/21/2001	F0	0	0	$135,000
LAPEER	06/08/2003	F0	0	0	$0
CLIFFORD	05/14/2004	F0	0	0	$0
HADLEY	08/24/2007	EF1	0	0	$1,000,000
COLUMBIAVILLE	03/15/2012	EF2	0	0	$500,000
Total					$27,658,000

Source: National Oceanic and Atmospheric Administration

Table 2-8 Breakdown of Costs for Lapeer County Tornadoes				
Population Density Categories (per square mile)	Average Number of Tornadoes Per Year	Average Amount of Damage	Percent of County Land in each Population Density Category	Estimated Annual Damage by Population Density Category
Population Density 0-500	0.26	$751,439	97.3%	$190,099
Population Density 501-1,000	0.26	$509,640	1.6%	$2,120
Population Density 1,001-3,000	0.26	$839,265	0.9%	$1,963
Population Density 3,000-13,351	0.26	$5,217,736	0.1%	$1,356
Total Estimated Damage for Lapeer County Tornadoes				$195,538

Source: Lapeer County Tornado Vulnerability Assessment using Data from NOAA

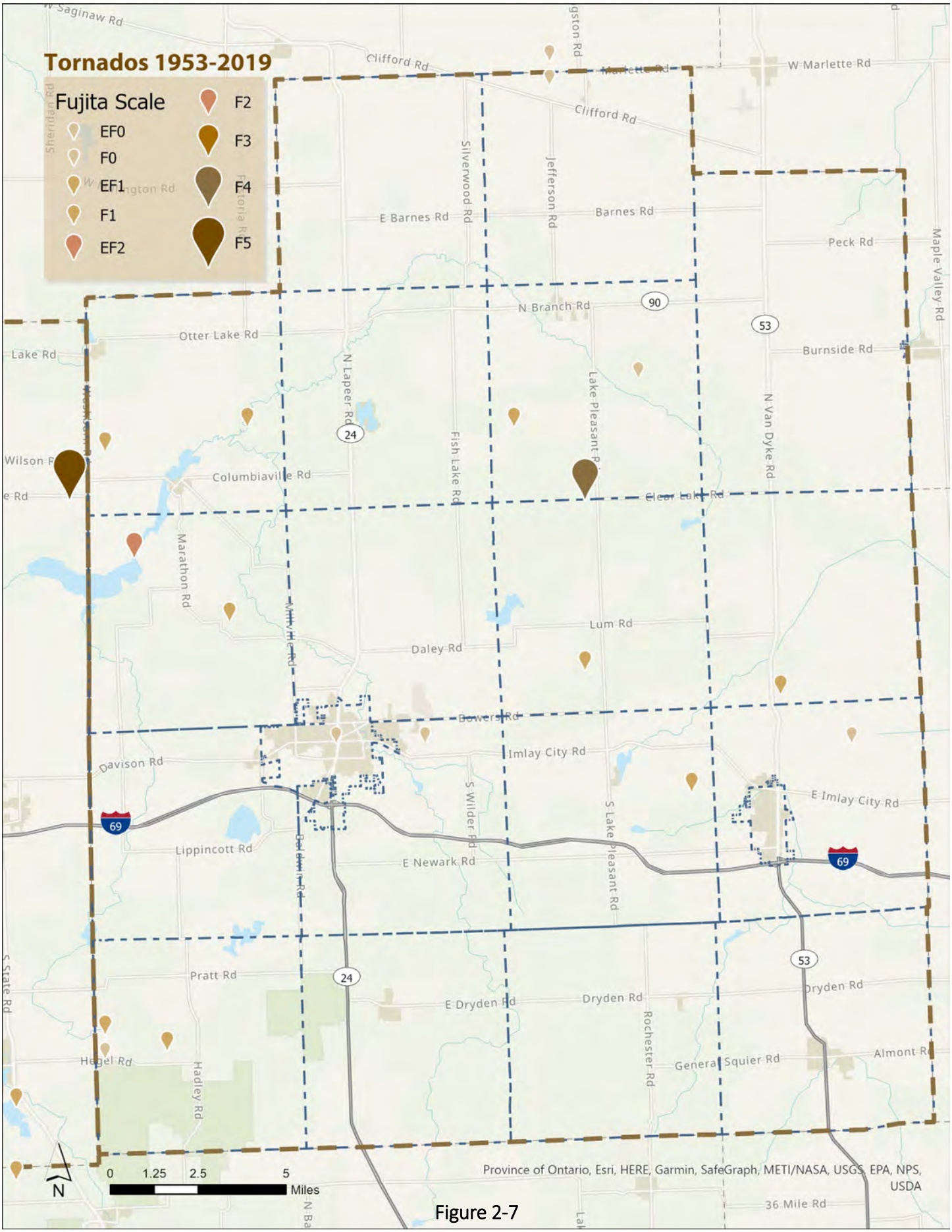


Figure 2-7

Source: Genesee County GIS and National Oceanic and Atmospheric Administration

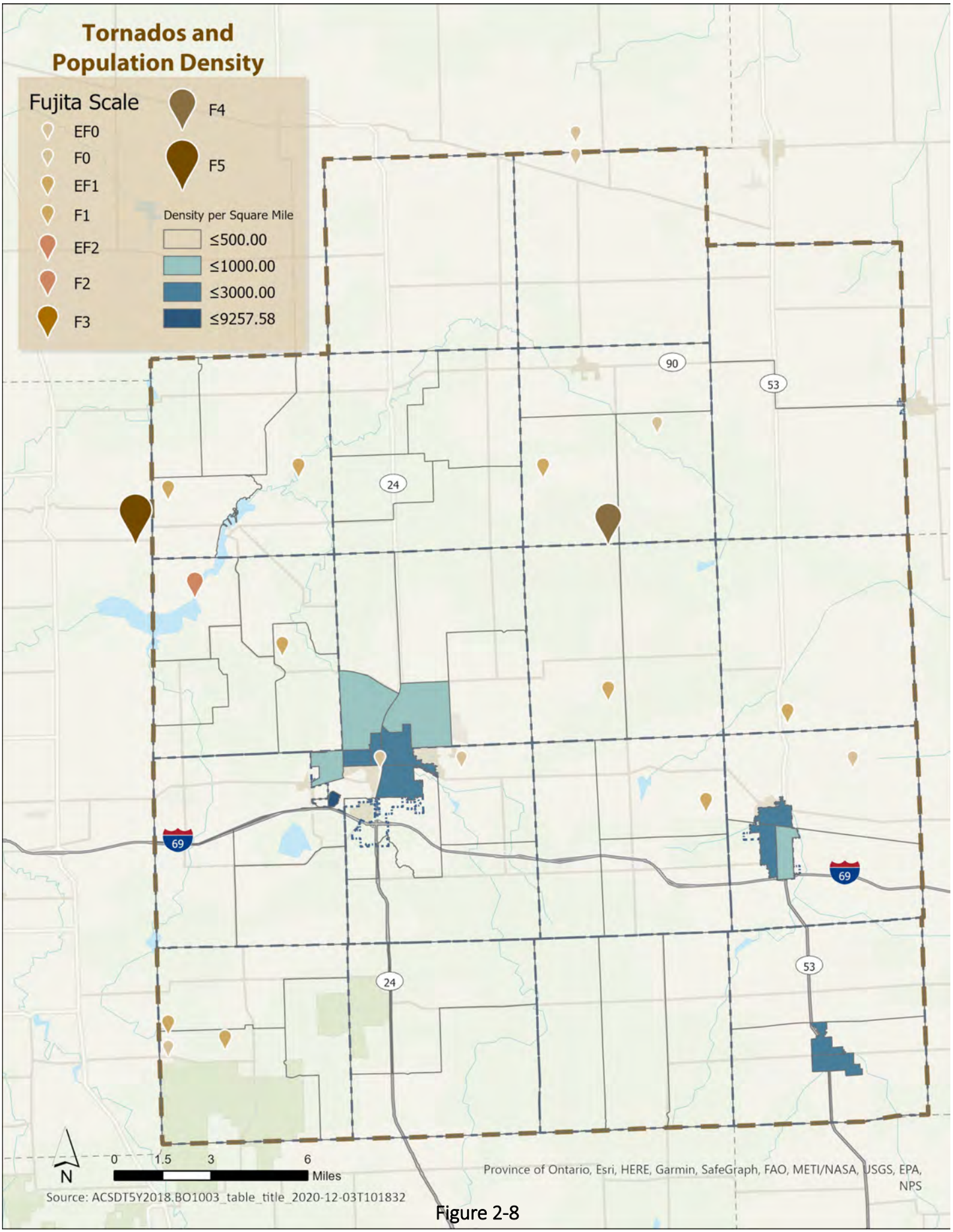


Figure 2-8

Source: Genesee County GIS and National Oceanic and Atmospheric Administration

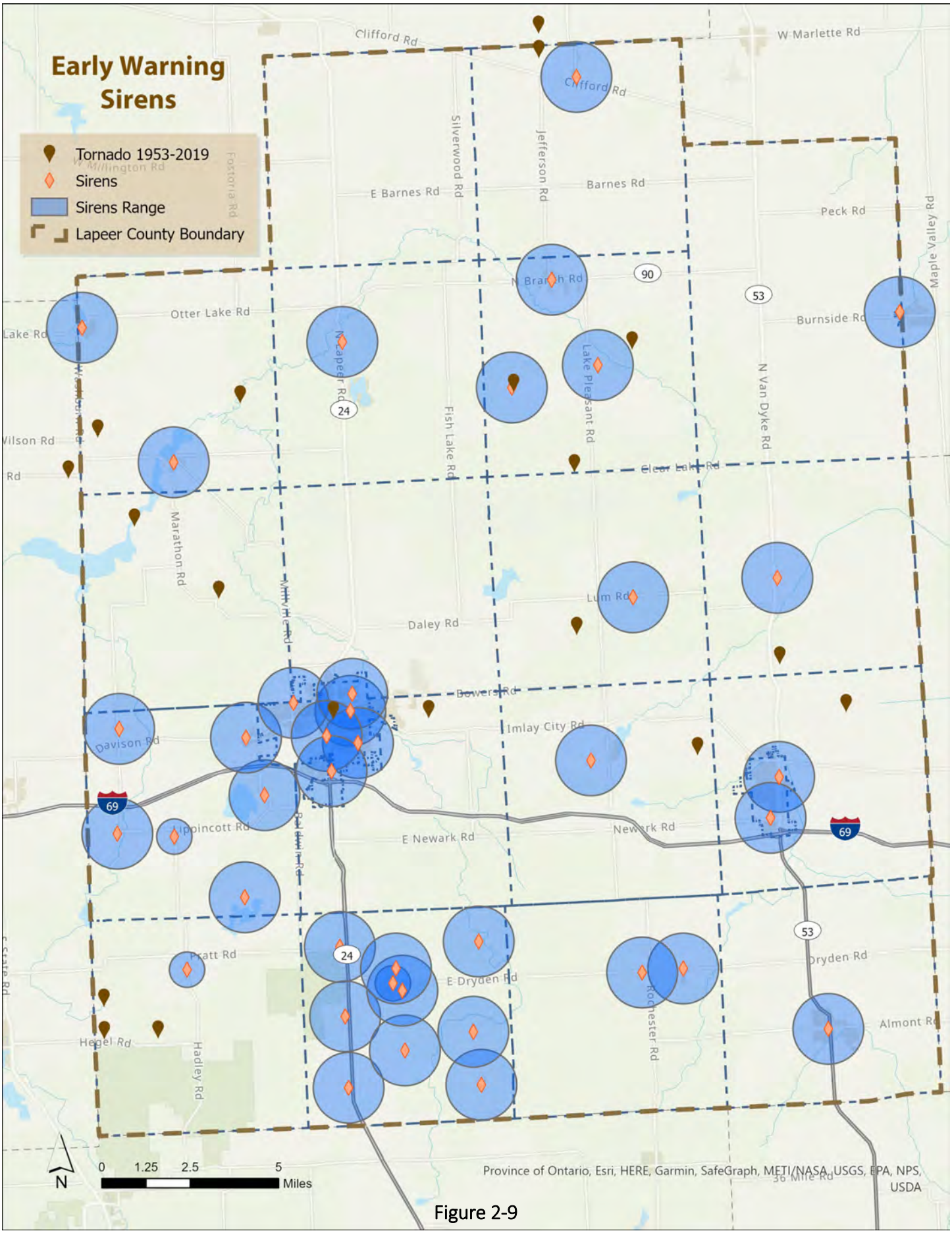


Figure 2-9

Source: Genesee County GIS and National Oceanic and Atmospheric Administration

- Utilize wireless emergency alerts
- Tree Trimming Program – County and Utility Company
- Storm Shelters For Mobile Home Communities
- Updated Disaster Response Plan
- Weather Spotter Training
- Public Education for Disaster Preparedness
- Enforce Building Codes
- County Hazard Mitigation Project Manager

New Mitigation Projects

Almont Township

Project: Warning sirens. Project description: Install an early hazard warning system with 4 sirens at various locations in the Township not covered by a warning system. Proposed timeframe for implementation: 1 - 5 years. Budget: $110,000 - $120,000. Update: None, this is a newly submitted project.

Previously Included Mitigation Projects

Village of Almont

Project: Shelter. Project description: Construction of a safe room for use during emergencies, such as tornadoes. A stand-alone building that is constructed on municipal property. Proposed timeline for implementation: 1-5 years. Budget: $75,000-$100,000. Update: Not provided.

Project: Warning Sirens. Project description: Install warning sirens in the village. Proposed timeframe for implementation: 1-5 years. Budget: $50,000-$100,000. Update: Not provided.

Attica Township

Project: Warning sirens. Project description: Install an early hazard warning system with 4 sirens at various locations in the township not covered by a warning system. Proposed timeframe for implementation: Unknown. Budget: $100,000. Update: Not provided.

Project: Backup generator. Project description: Purchase of a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $45,000. Update: Not provided.

Elba Township

Project: Shelter. Project description: Public tornado shelter in the township hall. Proposed timeframe for implementation: Unknown. Budget: Unknown. Update: Not provided.

Imlay City and Township

Project: Warning Sirens. Project description: Install an early hazard warning system with 4 sirens at various locations in the city and township not covered by a warning system. Proposed timeframe for implementation: Unknown. Budget: $95,000. Update: Project is still ongoing.

City of Lapeer

Project: Warning sirens. Project description: Install an early hazard warning system with sirens at the corners of the city. This will provide coverage to residents in the city and surrounding communities not covered by a warning system. Proposed timeframe for implementation: Unknown. Budget: $80,000. Update: This project is still ongoing.

Project: Backup generator. Project description: Purchase of 1 large and 2 small (portable) backup generators to maintain sewage lift stations and traffic signals. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: This project is still ongoing.

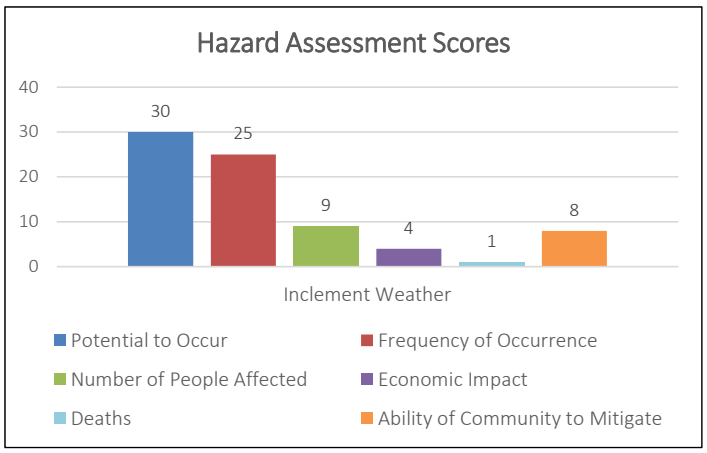
Project: Shelter. Project description: Tornado shelter at Crestview Manor Trailer Park. Proposed timeframe for implementation: Unknown. Budget: $50,000. Update: This project is no longer being pursued.

Village of Otter Lake

Project: Warning Siren. Project description: Install early hazard warning systems with a siren. The village does not have a warning system currently. Proposed timeframe for implementation: Unknown. Budget: $22,000. Update: Not provided.

Project: Backup generator. Project description: Purchase a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: Not provided.

#5 - Inclement Weather



Inclement weather is ranked as the number five hazard for Lapeer County. Thunderstorms, severe winds, lightning, and hail have been grouped together, for the purposes of this plan, as inclement weather. A single weather storm can have a combination of these attributes and are typically labeled a thunderstorm (these attributes may also be associated with a tornado). Lapeer County averages 30-40 thunderstorms a year of varying magnitudes.

Since 1956, thunderstorms and high winds have caused an average of $79,156 of damage per event (Average of NOAA summaries for 76 thunderstorms and high wind events from 1956 to present that caused property damage) for the affected area.

A summary of recent inclement weather events has been included following descriptions for thunderstorms, severe winds, lightning, and hail.

Thunderstorms

Severe thunderstorms are weather systems accompanied by strong winds, lightning, heavy rain, and possibly hail and tornadoes. Severe thunderstorms can occur at any time in Michigan, although they are most frequent during the warm spring and summer months from May through September. The potential thunderstorm threat is often measured by the number of "thunderstorm days" - defined as days in which thunderstorms are observed. Michigan is, on average, subject to 30-40 thunderstorm days per year. The Upper Peninsula experiences approximately 20-30 thunderstorm days per year and lower Michigan experiences 40-50 thunderstorm days per year. The National Weather Service (NWS) in Michigan has further refined that statewide average figure and found that the southern two tiers of counties of the Lower Peninsula (roughly the area south of Interstate 94) is subject to 40-60 thunderstorm days per year. The Lower Peninsula, in general, is subject to approximately 40 thunderstorm days per year, while the Upper Peninsula average is closer to 30 thunderstorm days per year. Thunderstorms form when a shallow layer of warm, moist air is overrun by a deeper layer of cool, dry air. Cumulonimbus clouds, frequently called "thunder heads", are formed in these conditions. These clouds are often enormous (up to six miles or more across and 40,000 to 50,000 feet high) and may contain tremendous amounts of water and energy. That energy is often released in the form of high winds, excessive rains, lightning, and possibly hail and tornadoes. Thunderstorms are typically short-lived (often lasting no more than 30-40 minutes) and fast moving (30-50 miles per hour). Strong frontal systems, however, may spawn one squall line after another composed of many individual thunderstorm cells. The following storm attributes address in greater detail these specific thunderstorm hazards: 1) severe winds; 2) lightning; and 3) hail.

Severe Winds

Severe winds are winds of 58 miles per hour or greater. Severe winds spawned by thunderstorms or other storm events have had devastating effects on Michigan in terms of loss of life, injuries and property damage. According to data compiled by the National Weather Service for the period 1970-1996, Michigan experienced over 8,300 severe wind events (does **not** include tornadoes), which resulted in 98 deaths

and millions of dollars in damage. It is important to note that the high number of severe wind events is due in part to the fact that the data was compiled by county; thus, multi-county storms are counted more than once. Severe wind events are characterized by wind velocities of 58 miles per hour or greater, with gusts sometimes exceeding 74 miles per hour (hurricane velocity).

Lightning

Lightning is the discharge of electricity from within a thunderstorm. Lightning is a random and unpredictable product of a thunderstorm's tremendous energy. The energy in the storm produces an intense electrical field like a giant battery, with the positive charge concentrated at the top and the negative charge concentrated at the bottom. Lightning strikes when a thunderstorm's electrical potential (the difference between its positive and negative charges) becomes great enough to overcome the resistance of the surrounding air. Bridging that difference, lightning can jump from cloud to cloud, cloud to ground, ground to cloud, or even from the cloud to the air surrounding the thunderstorm. Lightning strikes can generate current levels of 30,000 to 40,000 amperes, with air temperatures often superheated to higher than 50,000 degrees Fahrenheit (hotter than the surface of the sun) and speeds approaching one-third the speed of light. Globally, there are about 2,000 thunderstorms occurring at any given time, and those thunderstorms cause approximately 100 lightning strikes to earth each second. In the United States, approximately 100,000 thunderstorms occur each year, and every one of those storms generates lightning. It is not uncommon for a single thunderstorm to produce hundreds or even thousands of lightning strikes. However, to most of the general public, lightning is perceived as a minor hazard. That perception lingers even though lightning damages many structures and kills and injures more people in the United States per year, on average, than tornadoes or hurricanes. Many lightning deaths and injuries could be avoided if people would have more respect for the threat lightning presents to their safety. Lightning deaths are usually caused by the electrical force shocking the heart into cardiac arrest or throwing the heartbeat out of its usual rhythm. Lightning can also cut off breathing by paralyzing the chest muscles or damaging the respiratory center in the brain stem. It takes only about one-hundredth of an ampere of electric current to stop the human heartbeat or send it into ventricular fibrillation. Lightning can also cause severe skin burns that can lead to death if complications from infection set in. Statistics compiled by the National Oceanic and Atmospheric Administration (NOAA) and the National Lightning Safety Institute (NLSI) for the period 1959-1994 revealed the following about lightning fatalities, injuries and damage in the United States:

Location of Lightning Strikes

- 40% are at unspecified locations
- 27% occur in open fields and recreation areas (not golf courses)
- 14% occur to someone under a tree (not on golf courses)
- 8% are water-related (boating, fishing, swimming, etc.)
- 5% are golf-related (on golf course or under tree on golf course)
- 3% are related to heavy equipment and machinery
- 2.4% are telephone-related
- 0.7% are radio, transmitter and antenna-related

Gender of Victims

84% are male; 16% are female

Months of Most Strikes

- July (30%); August (22%); June (21%)

Days of Most Strikes

- #1 – Sunday; #2 – Wednesday; #3 – Saturday

Time of Most Strikes

- 2:00 PM – 6:00 PM

Number of Victims

- One victim (91%); two or more victims (9%)

The NLSI estimates that 85% of lightning victims are children and young men (ages 10-35) engaged in recreation or work-related activities. Approximately 20% of lightning strike victims die, and 70% of survivors suffer serious long-term after effects such as memory and attention deficits, sleep disturbance, fatigue, dizziness, and numbness.

In terms of property losses from lightning, statistics vary widely according to source. The Insurance Information Institute (a national clearinghouse of insurance industry information) estimates that lightning damage amounts to nearly 5% of all paid insurance claims, with residential claims alone exceeding one billion dollars. Information from insurance companies shows one homeowner's damage claim for every 57 lightning strikes. It is estimated that lightning causes more than 22,600 fires annually, with damage to property exceeding $451 million per year. These estimates are based on data from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual fire department experience survey. Electric utility companies across the country estimate as much as one billion dollars per year in damaged equipment and lost revenue from lightning.

The Federal Aviation Administration (FAA) reports approximately $2 billion per year in airline industry operating costs and passenger delays from lightning. Because lightning-related damage information is compiled by so many different sources, using widely varying collection methods and criteria, it is difficult to determine a collective damage figure for the U.S. from lightning. However, suffice it to say that annual lightning-related property damages are conservatively estimated at several billion dollars per year, and those losses are expected to continue to grow as the use of computers and other lightning-sensitive electronic components becomes more prevalent.

Hail

Hail is a condition where atmospheric water particles from thunderstorms form into rounded or irregular lumps of ice that fall to the earth. Hail is another product of the strong thunderstorms that frequently move across the state. As one of these thunderstorms passes over, hail usually falls near the center of the storm, along with the heaviest rain. Sometimes, strong winds occurring at high altitudes in the thunderstorm can blow the hailstones away from the storm center, causing an unexpected hazard at places that otherwise might not appear threatened. Most hailstones range in size from a pea to a golf ball, but hailstones larger than baseballs have occurred with the most severe thunderstorms. Hail is formed when strong updrafts within the storm carry water droplets above the freezing level, where they remain suspended and continue to grow larger until their weight can no longer be supported by the winds. They finally fall to the ground, battering crops, denting autos, and injuring wildlife and people. Large hail is a characteristic of severe thunderstorms, and it may precede the occurrence of a tornado.

Lapeer County Perspective and Vulnerability

See below for a description of significant inclement weather events that have occurred in Lapeer County over the last 20 years. See Table 2-9 for a list of thunderstorm and high wind events, see Table 2-10 for a list of lightning events, and see Table 2-11 for a list of hail events.

April 7, 2020

A warm front lifted into lower Michigan as low pressure tracked through the State during the evening. Temperatures shot up into the upper 60s to lower 70s with dew points rising into the upper 50s. Scattered severe thunderstorms developed over southeast Michigan, with large hail being the overwhelming hazard. Several reports of golf ball size hail were observed (Excerpts from NOAA storm summary).

March 8, 2017:

A non-thunderstorm event took place over the state on Wednesday, March 8, 2017, as high winds brought wind gusts more than 60 mph! The high winds took out power lines and trees, along with nu-

merous reports of structural damage to buildings. There were also reports of brush fires and tractor-trailers flipped over around the area. Due to the extensive damage, many areas were without power for several days. Approximately 800,000 DTE customers and approximately 300,000 Consumers Energy customers were affected. The highest wind gust reported across Southeast Michigan was 68 mph at both Saginaw and Detroit Metro Airport (Excerpts from NOAA storm summary).

November 17, 2013:
A storm system packing heavy rains and winds gusting to 60 M.P.H. swept through Lower Michigan, felling trees and power lines and causing at least two deaths. Around 200,000 Consumers Energy customers, including many residents in Lapeer County, lost power for up to three days. Winds gusting up to 40 M.P.H. the day following the storm hampered the restoration efforts to restore power to many homes and businesses. In terms of outages, this storm was one of the worst throughout the state (Excerpts from NOAA storm summary).

March 15, 2012:
An amplified, upper level weather pattern allowed for an unseasonably warm and humid air mass to infiltrate the southern Great Lakes region which was highly unusual for the month of March. High moisture, combined with an upper level disturbance, tracking northward through Lower Michigan to fuel a long duration severe thunderstorm event across southeastern Michigan. The primary severe weather type observed with these storms was very large hail, along with 3 tornadoes (Excerpts from NOAA storm summary).

November 12, 2004 (estimated damage of $21 Million in affected areas):
A strong low-pressure system moved across the straits on the evening of the 12th, moving into Ontario overnight as it deepened to 974 mb. Strong cold advection and a tight pressure gradient over Lower Michigan produced wind gusts between 50 and 60 M.P.H. across all of southeast Michigan. In addition, there were even a few wind gusts reported between 60 and 88 M.P.H. The highest wind gust was reported by a spotter in Dexter who recorded an 88 M.P.H. gust. An estimated 250,000 customers lost power in southeast Michigan, as widespread trees and power lines were blown down (Excerpts from NOAA storm summary).

March 10, 2002 (estimated damage of $780,000 in affected areas):
Wind gusts measured between 60 and 70 M.P.H. affected southeast Michigan during the passage of the cold front. Winds as high as 50 to 60 M.P.H. continued into the night. Hundreds of trees, power lines and utility poles were blown down across southeast Michigan. Falling trees caused damage to several homes throughout the region. High winds also tore roofing material and siding off of many homes and businesses. Falling trees and branches also struck a few cars. An estimated 180,000 homes and businesses across southeast Michigan lost power due to many powers lines being blown down. In addition to the winds, temperatures dropped from readings in the 50s during the early afternoon of the 9th, to the 20s by late evening (Excerpts from NOAA storm summary).

July 27, 2000 (estimated damage of $650,000 in affected areas):
Lightning struck a staircase manufacturing company. The building was destroyed in the resulting fire and a neighboring flooring company was damaged. Thunderstorms developed along the lake breeze fronts as they moved inland off Lakes Huron and St. Clair. Several of these became marginally severe, producing hail up to the size of quarters. The largest hail fell in Washington Township in Macomb County. A couple of storms produced wind gusts approaching 60 M.P.H., downing large tree limbs in Washington Township and near Deckerville. The storms were also slow movers, producing locally heavy rain. Flash flooding covered roads in Macomb Township to 18 inches deep. Six roads were washed out in northern Sanilac County, and water was two feet deep over M -53 (Excerpts from NOAA storm summary).

June 23, 1999 (estimated damage of $95,000 in affected areas):
This was a hot and extremely humid day in southeast Michigan. Temperatures approached 90 degrees during the afternoon, with dew points as high as 80.

This resulted in a very unstable air mass across the area. A trough of low pressure moved east into the western Great Lakes by late morning, and thunderstorms ignited along the trough. These storms moved southeast into Michigan, and many of them became severe. The first severe report was dime sized hail in southwest Midland County. That would be the only severe hail event; the rest of the day was filled with damaging wind gusts. A 66 M.P.H. gust was measured at the National Weather Service office in White Lake, while a spotter estimated 70 M.P.H. winds near downtown Detroit. Most of the damage caused by the wind involved downed trees and power lines. Trees were downed onto homes in the city of Midland, White Lake, Lake Orion, Pontiac, and Deerfield Township (Lapeer County). Deerfield Township was especially hard hit, as some roads were closed for several days due to tree debris. A number of tents at the Ann Arbor Art Fair were demolished. Vehicles were destroyed in White Lake and Port Huron when trees fell on them. A large awning was blown off the roof of a Canton strip mall, and the roof of a hangar at the Oakland County International Airport in Waterford was displaced by the wind. Paneling was torn off the press box at Tiger Stadium in Detroit. In St. Clair Shores, a garage collapsed, moored sailboats were tipped over, and part of an aluminum roof was peeled off a warehouse. Locally heavy rainfall occurred with some of the thunderstorms, especially in metro Detroit. Freeway underpasses were flooded in Detroit, as were fifty basements in Dearborn. The thunderstorm hazard resulted in over a hundred flights at Detroit Metropolitan Airport being either delayed or cancelled. The Reform Party national convention in Dearborn was seriously disrupted, as several scheduled speakers – including Minnesota Governor Jesse Ventura – could not fly into Detroit (Excerpts from NOAA storm summary).

Vulnerability

For this hazard staff focused its analysis on thunderstorm events, as lightning, severe winds and hail often occur simultaneously with thunderstorm events. Since 2010, Lapeer County averages 7.5 thunderstorms a year of varying magnitudes. Approximately 2.9 storms per year are severe enough to cause damage (average number of thunderstorm wind and high wind events that caused property damage from 1994-2000). Severe thunderstorm events cause, on average, approximately $79,156 in damage for the affected area. Even though a single thunderstorm affects multiple counties, the bulk of the damage is typically localized where the storm reached its peak. Given the frequency (2.9 severe storms on average) and severity ($79,156) of thunderstorms in the Lapeer County area, staff estimates that Lapeer County should plan for $229,552 in damage annually related to inclement weather events.

Mitigation Strategies for Inclement Weather

The following strategies are suggested to minimize the effects of Lapeer County's number five hazard, inclement weather:

- Enhance Storm Warning System
- Emergency Generators
- Storm Shelters
- Utilize Wireless Emergency Alerts
- Public Education for Disaster Preparedness
- Weather Spotter Training
- Updated Disaster Response Plan
- County Hazard Mitigation Project Manager
- Tree Trimming Program
- Elderly Assistance Programs

New Mitigation Projects

Almont Township

Project: Warning sirens. Project description: Install an early hazard warning system with 4 sirens at various locations in the Township not covered by a warning system. Proposed timeframe for implementation: 1 - 5 years. Budget: $110,000 - $120,000. Update: None, this is a newly submitted project.

Previously Included Mitigation Projects

Village of Almont

Project: Warning Sirens. Project description: Install warning sirens in the village. Proposed timeframe for implementation: 1-5 years. Budget: $50,000-$100,000. Update: Not provided.

Attica Township

Project: Warning sirens. Project description: Install an early hazard warning system with 4 sirens at various locations in the township not covered by a warn-

ing system. Proposed timeframe for implementation: Unknown. Budget: $100,000. Update: Not provided.

Project: Backup generator. Project description: Purchase of a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $45,000. Update: Not provided.

Elba Township

Project: Shelter. Project description: Public tornado shelter in the township hall. Proposed timeframe for implementation: Unknown. Budget: Unknown. Update: Not provided.

Imlay City and Township

Project: Warning Sirens. Project description: Install an early hazard warning system with 4 sirens at various locations in the city and township not covered by a warning system. Proposed timeframe for implementation: Unknown. Budget: $95,000. Update: Project is still ongoing.

City of Lapeer

Project: Backup generator. Project description: Purchase of 1 large and 2 small (portable) backup generators to maintain sewage lift stations and traffic signals. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: This project is still ongoing.

Project: Warning sirens. Project description: Install an early hazard warning system with sirens at the corners of the city. This will provide coverage to residents in the city and surrounding communities not covered by a warning system. Proposed timeframe for implementation: Unknown. Budget: $80,000. Update: This project is still ongoing.

Project: Shelter. Project description: Tornado shelter at Crestview Manor Trailer Park. Proposed timeframe for implementation: Unknown. Budget: $50,000. Update: This project is no longer being pursued.

Village of Otter Lake

Project: Warning Siren. Project description: Install early hazard warning systems with a siren. The village does not have a warning system currently. Proposed timeframe for implementation: Unknown. Budget: $22,000. Update: Not provided.

Project: Backup generator. Project description: Purchase a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: Not provided.

Table 2-9 Lapeer County Thunderstorms and High Wind Events from 1956-2020						
Location	Date	Type	Miles/Hour	Deaths	Injuries	Damage
LAPEER CO.	7/13/1956	Thunderstorm Wind	77	0	0	$0
LAPEER CO.	7/4/1974	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	3/20/1976	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	5/2/1976	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	7/9/1976	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	6/28/1977	Thunderstorm Wind	52	0	0	$0
LAPEER CO.	7/8/1977	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	7/20/1980	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	6/26/1983	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	7/4/1983	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	7/21/1983	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	7/21/1983	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	7/29/1983	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	7/31/1983	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	5/26/1985	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	7/5/1985	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	6/11/1986	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	5/14/1987	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	8/14/1989	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	11/27/1989	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	9/14/1990	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	3/27/1991	Thunderstorm Wind	0	0	1	$0
LAPEER CO.	6/15/1991	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	6/15/1991	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	7/6/1991	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	7/7/1991	Thunderstorm Wind	0	0	1	$0
LAPEER CO.	8/17/1991	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	6/17/1992	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	10/8/1992	Thunderstorm Wind	0	0	0	$0
LAPEER CO.	10/8/1992	Thunderstorm Wind	0	0	0	$0
LAPEER	8/27/1993	Thunderstorm Wind	0	0	0	$0
ALMONT	8/27/1993	Thunderstorm Wind	0	0	0	$0
IMLAY CITY	4/15/1994	Thunderstorm Wind	0	0	0	$0
LAPEER	4/26/1994	Thunderstorm Wind	52	0	0	$0
LAPEER	6/28/1994	Thunderstorm Wind	85	0	0	$500,000
IMLAY CITY	6/28/1994	Thunderstorm Wind	0	0	0	$0
MILLINGTON	7/6/1994	Thunderstorm Wind	0	0	0	$0
LAPEER	7/6/1994	Thunderstorm Wind	0	0	0	$0

Location	Date	Type	Miles/Hour	Deaths	Injuries	Damage
HADLEY	7/20/1994	Thunderstorm Wind	0	0	0	$0
LAPEER	7/20/1994	Thunderstorm Wind	0	0	0	$0
LAPEER	7/20/1994	Thunderstorm Wind	0	0	0	$0
METAMORA	7/22/1994	Thunderstorm Wind	78	0	0	$500,000
SCHOOLCRAFT	7/23/1994	Thunderstorm Wind	0	0	0	$0
LAPEER	4/18/1995	Thunderstorm Wind	60	0	0	$0
COLUMBIAVILLE	7/13/1995	Thunderstorm Wind	0	0	0	$0
LAPEER (ZONE)	3/25/1996	High Wind	50	0	0	$0
COLUMBIAVILLE	6/21/1996	Thunderstorm Wind	60	0	0	$0
LAPEER	6/22/1996	Thunderstorm Wind	60	0	0	$0
ALMONT	7/18/1996	Thunderstorm Wind	60	0	0	$10,000
LAPEER	7/19/1996	Thunderstorm Wind	55	0	0	$0
METAMORA	7/19/1996	Thunderstorm Wind	50	0	0	$0
IMLAY CITY	7/19/1996	Thunderstorm Wind	50	0	0	$0
LAPEER	7/30/1996	Thunderstorm Wind	50	0	0	$0
NORTH BRANCH	8/7/1996	Thunderstorm Wind	55	0	0	$0
LAPEER (ZONE)	10/30/1996	High Wind	60	0	0	$0
LAPEER (ZONE)	2/27/1997	High Wind	55	0	0	$0
LAPEER (ZONE)	4/6/1997	High Wind	70	0	0	$50,000
ALMONT	6/21/1997	Thunderstorm Wind	55	0	0	$0
COLUMBIAVILLE	7/2/1997	Thunderstorm Wind	70	0	0	$0
NORTH BRANCH	5/29/1998	Thunderstorm Wind	52	0	0	$0
COLUMBIAVILLE	5/31/1998	Thunderstorm Wind	52	0	0	$0
CLIFFORD	5/31/1998	Thunderstorm Wind	52	0	0	$0
LAPEER	5/31/1998	Thunderstorm Wind	55	0	0	$25,000
LAPEER	5/31/1998	Thunderstorm Wind	52	0	0	$2,000
ATTICA	5/31/1998	Thunderstorm Wind	55	0	0	$75,000
LAPEER (ZONE)	6/2/1998	High Wind	35	0	0	$0
METAMORA	11/10/1998	Thunderstorm Wind	52	0	0	$8,000
LAPEER (ZONE)	11/10/1998	High Wind	52	0	0	$12,000
LAPEER	12/6/1998	Thunderstorm Wind	50	0	0	$2,000
METAMORA	5/17/1999	Thunderstorm Wind	52	0	0	$3,000
ATTICA	5/17/1999	Thunderstorm Wind	52	0	0	$8,000
LAPEER	6/9/1999	Thunderstorm Wind	55	0	0	$5,000
LAPEER	7/17/1999	Thunderstorm Wind	52	0	0	$5,000
LAPEER	7/23/1999	Thunderstorm Wind	65	0	0	$95,000
IMLAY CITY	7/23/1999	Thunderstorm Wind	52	0	0	$8,000
LAPEER	7/24/1999	Thunderstorm Wind	52	0	0	$10,000
METAMORA	7/31/1999	Thunderstorm Wind	51	0	0	$7,000

Location	Date	Type	Miles/Hour	Deaths	Injuries	Damage
METAMORA	6/1/2000	Thunderstorm Wind	55	0	0	$8,000
LAPEER	7/28/2000	Thunderstorm Wind	52	0	0	$5,000
NORTH BRANCH	8/9/2000	Thunderstorm Wind	52	0	0	$6,000
HADLEY	8/9/2000	Thunderstorm Wind	61	0	0	$25,000
DRYDEN	8/9/2000	Thunderstorm Wind	60	0	0	$50,000
LAPEER (ZONE)	4/12/2001	High Wind	50	0	0	$20,000
ATTICA	8/7/2001	Thunderstorm Wind	54	0	0	$0
LAPEER	9/8/2001	Thunderstorm Wind	50	0	0	$0
LAPEER (ZONE)	10/16/2001	High Wind	40	0	0	$0
LAPEER	10/24/2001	Thunderstorm Wind	87	0	0	$100,000
LAPEER (ZONE)	2/1/2002	High Wind	40	0	0	$0
LAPEER (ZONE)	3/9/2002	High Wind	50	0	0	$10,000
LAPEER	4/19/2002	Thunderstorm Wind	50	0	0	$0
HADLEY	4/19/2002	Thunderstorm Wind	50	0	0	$0
LAPEER	5/31/2002	Thunderstorm Wind	50	0	0	$0
ALMONT	7/22/2002	Thunderstorm Wind	52	0	0	$0
DRYDEN	7/28/2002	Thunderstorm Wind	52	0	0	$0
LAPEER	9/10/2002	Thunderstorm Wind	50	0	0	$0
LAPEER	3/28/2003	Thunderstorm Wind	50	0	0	$1,000
HADLEY	4/20/2003	Thunderstorm Wind	50	0	0	$1,000
DRYDEN	7/4/2003	Thunderstorm Wind	50	0	0	$0
NORTH BRANCH	7/6/2003	Thunderstorm Wind	52	0	0	$0
ALMONT	7/21/2003	Thunderstorm Wind	55	0	0	$0
LAPEER	8/21/2003	Thunderstorm Wind	54	0	0	$0
METAMORA	11/12/2003	Thunderstorm Wind	52	0	0	$0
LAPEER (ZONE)	11/12/2003	High Wind	52	0	0	$1,000,000
LAPEER (ZONE)	3/5/2004	High Wind	50	0	0	$0
OTTER LAKE	5/14/2004	Thunderstorm Wind	52	0	0	$0
ELBA	5/23/2004	Thunderstorm Wind	70	0	0	$0
LAPEER	5/23/2004	Thunderstorm Wind	52	0	0	$0
KINGS MILL	5/23/2004	Thunderstorm Wind	70	0	0	$0
NORTH BRANCH	6/9/2004	Thunderstorm Wind	52	0	0	$0
IMLAY CITY	6/23/2004	Thunderstorm Wind	56	0	0	$0
LAPEER	7/6/2004	Thunderstorm Wind	50	0	0	$0
LAPEER	7/13/2004	Thunderstorm Wind	52	0	0	$0
ALMONT	7/17/2004	Thunderstorm Wind	52	0	0	$0
IMLAY CITY	7/17/2004	Thunderstorm Wind	52	0	0	$0
LAPEER (ZONE)	10/30/2004	High Wind	54	0	0	$200,000
LAPEER	6/5/2005	Thunderstorm Wind	54	0	0	$0

Location	Date	Type	Miles/Hour	Deaths	Injuries	Damage
CLIFFORD	6/5/2005	Thunderstorm Wind	55	0	0	$0
HADLEY	6/5/2005	Thunderstorm Wind	52	0	0	$0
IMLAY CITY	6/5/2005	Thunderstorm Wind	60	0	0	$0
DRYDEN	6/5/2005	Thunderstorm Wind	61	0	0	$0
COLUMBIAVILLE	6/9/2005	Thunderstorm Wind	54	0	0	$0
DRYDEN	6/10/2005	Thunderstorm Wind	52	0	0	$0
CLIFFORD	6/14/2005	Thunderstorm Wind	56	0	0	$0
OTTER LAKE	7/24/2005	Thunderstorm Wind	55	0	0	$250,000
LAPEER	7/24/2005	Thunderstorm Wind	55	0	0	$0
IMLAY CITY	7/24/2005	Thunderstorm Wind	56	0	0	$0
ALMONT	9/22/2005	Thunderstorm Wind	52	0	0	$0
LAPEER (ZONE)	11/6/2005	High Wind	52	0	0	$0
LAPEER (ZONE)	3/13/2006	High Wind	52	0	0	$0
ELBA	5/25/2006	Thunderstorm Wind	52	0	0	$1,000
LAPEER	5/25/2006	Thunderstorm Wind	52	0	0	$17,500
ATTICA	5/25/2006	Thunderstorm Wind	52	0	0	$1,000
NORTH BRANCH	5/25/2006	Thunderstorm Wind	52	0	0	$1,000
BURNSIDE	6/19/2006	Thunderstorm Wind	51	0	0	$7,500
OTTER LAKE	7/17/2006	Thunderstorm Wind	54	0	0	$0
BURNSIDE	8/2/2006	Thunderstorm Wind	52	0	0	$0
MILLVILLE	8/2/2006	Thunderstorm Wind	52	0	0	$0
IMLAY CITY	8/2/2006	Thunderstorm Wind	55	0	0	$0
ALMONT	5/15/2007	Thunderstorm Wind	56	0	1	$10,000
ALMONT	6/27/2007	Thunderstorm Wind	52	0	0	$0
COLUMBIAVILLE	7/10/2007	Thunderstorm Wind	55	0	0	$0
HADLEY	7/18/2007	Thunderstorm Wind	52	0	0	$0
LAPEER	8/22/2007	Thunderstorm Wind	55	0	0	$0
ATTICA	8/22/2007	Thunderstorm Wind	55	0	0	$0
IMLAY CITY	8/22/2007	Thunderstorm Wind	55	0	0	$0
IMLAY CITY	8/22/2007	Thunderstorm Wind	55	0	0	$5,000
LAPEER	8/24/2007	Thunderstorm Wind	55	0	0	$0
LAPEER	8/24/2007	Thunderstorm Wind	56	0	0	$0
ALMONT	8/24/2007	Thunderstorm Wind	56	0	0	$0
LAPEER	8/29/2007	Thunderstorm Wind	56	0	0	$0
IMLAY CITY	8/29/2007	Thunderstorm Wind	52	0	0	$0
NORTH BRANCH	8/29/2007	Thunderstorm Wind	52	0	0	$0
NORTH BRANCH	10/19/2007	Thunderstorm Wind	56	0	0	$0
LAPEER (ZONE)	12/23/2007	High Wind	50	0	0	$35,000
LAPEER (ZONE)	1/30/2008	High Wind	52	0	0	$0

Location	Date	Type	Miles/Hour	Deaths	Injuries	Damage
FARMERS CREEK	6/8/2008	Thunderstorm Wind	52	0	0	$2,000
ALMONT	6/8/2008	Thunderstorm Wind	61	0	0	$20,000
LAPEER (ZONE)	12/28/2008	High Wind	56	0	0	$500,000
DRYDEN	4/25/2009	Thunderstorm Wind	56	0	0	$3,000
ALMONT	4/25/2009	Thunderstorm Wind	56	0	0	$30,000
ALMONT	4/25/2009	Thunderstorm Wind	56	0	0	$6,000
ATTICA	4/25/2009	Thunderstorm Wind	52	0	0	$0
GOODLAND	6/14/2009	Thunderstorm Wind	52	0	0	$0
LAPEER	6/25/2009	Thunderstorm Wind	56	0	0	$3,000
IMLAY CITY	8/9/2009	Thunderstorm Wind	56	0	0	$100,000
IMLAY CITY	8/16/2009	Thunderstorm Wind	52	0	0	$15,000
LAPEER (ZONE)	10/7/2009	High Wind	50	0	0	$100,000
ALMONT	6/18/2010	Thunderstorm Wind	52	0	0	$2,000
ELBA	7/15/2010	Thunderstorm Wind	54	0	0	$0
IMLAY CITY	7/15/2010	Thunderstorm Wind	50	0	0	$0
LAPEER	8/19/2010	Thunderstorm Wind	56	0	0	$0
ELBA	8/19/2010	Thunderstorm Wind	65	0	0	$50,000
FARMERS CREEK	8/19/2010	Thunderstorm Wind	56	0	0	$0
METAMORA	8/19/2010	Thunderstorm Wind	65	0	0	$75,000
LAPEER	9/21/2010	Thunderstorm Wind	54	0	0	$10,000
ATTICA	9/21/2010	Thunderstorm Wind	52	0	0	$0
LAPEER (ZONE)	10/27/2010	High Wind	52	0	0	$5,000
LAPEER	5/29/2011	Thunderstorm Wind	65	0	0	$50,000
LAPEER	5/29/2011	Thunderstorm Wind	61	0	0	$0
IMLAY CITY	6/21/2011	Thunderstorm Wind	52	0	0	$0
MILLVILLE	6/21/2011	Thunderstorm Wind	52	0	0	$0
HUNTERS CREEK	6/22/2011	Thunderstorm Wind	61	0	0	$10,000
ALMONT	6/22/2011	Thunderstorm Wind	54	0	0	$0
COLUMBIAVILLE	7/2/2011	Thunderstorm Wind	54	0	0	$0
NORTH LAKE	7/2/2011	Thunderstorm Wind	56	0	0	$0
FIVE LAKES	7/2/2011	Thunderstorm Wind	54	0	0	$10,000
GOODLAND	7/2/2011	Thunderstorm Wind	56	0	0	$0
ATTICA	7/2/2011	Thunderstorm Wind	65	0	0	$10,000
ALMONT	7/2/2011	Thunderstorm Wind	59	0	0	$0
MILLVILLE	9/3/2011	Thunderstorm Wind	54	0	0	$0
ELBA	3/15/2012	Thunderstorm Wind	61	0	0	$0
HADLEY	7/5/2012	Thunderstorm Wind	58	0	0	$10,000
DRYDEN	7/5/2012	Thunderstorm Wind	52	0	0	$0
LAPEER (ZONE)	1/19/2013	High Wind	53	0	0	$750,000

Location	Date	Type	Miles/Hour	Deaths	Injuries	Damage
LAPEER	4/18/2013	Thunderstorm Wind	52	0	0	$0
LAPEER	4/18/2013	Thunderstorm Wind	52	0	0	$0
LAKE NEPESSING	4/18/2013	Thunderstorm Wind	52	0	0	$0
SILVERWOOD	5/20/2013	Thunderstorm Wind	52	0	0	$0
NORTH BRANCH	5/20/2013	Thunderstorm Wind	50	0	0	$3,000
ELBA	6/17/2013	Thunderstorm Wind	61	0	0	$10,000
LAPEER	6/17/2013	Thunderstorm Wind	50	0	0	$0
ELBA	6/17/2013	Thunderstorm Wind	56	0	0	$0
FARMERS CREEK	6/17/2013	Thunderstorm Wind	50	0	0	$0
LAPEER	7/23/2013	Thunderstorm Wind	50	0	0	$3,000
NORTH LAKE	8/7/2013	Thunderstorm Wind	56	0	0	$0
ELBA	8/7/2013	Thunderstorm Wind	56	0	0	$0
DRYDEN	8/7/2013	Thunderstorm Wind	52	0	0	$0
NORTH LAKE	11/17/2013	Thunderstorm Wind	56	0	0	$10,000
LAPEER (ZONE)	11/17/2013	High Wind	50	0	0	$1,000,000
LAPEER DUPONT ARPT	4/29/2014	Thunderstorm Wind	52	0	0	$0
ATTICA	7/1/2014	Thunderstorm Wind	52	0	0	$0
FIVE LAKES	9/5/2014	Thunderstorm Wind	54	0	0	$0
FIVE LAKES	9/5/2014	Thunderstorm Wind	52	0	0	$0
HOLLOWAY RES	9/5/2014	Thunderstorm Wind	56	0	0	$0
IMLAY CITY	9/5/2014	Thunderstorm Wind	56	0	0	$5,000
HADLEY	9/5/2014	Thunderstorm Wind	52	0	0	$0
ALMONT	6/22/2015	Thunderstorm Wind	56	0	0	$0
IMLAY CITY	8/2/2015	Thunderstorm Wind	52	0	0	$3,000
HUNTERS CREEK	8/19/2015	Thunderstorm Wind	52	0	0	$0
LAPEER	11/6/2015	Thunderstorm Wind	65	0	0	$25,000
KERR HILL	3/31/2016	Thunderstorm Wind	61	0	0	$5,000
COLUMBIAVILLE	7/13/2016	Thunderstorm Wind	50	0	0	$0
FIVE LAKES	7/13/2016	Thunderstorm Wind	56	0	0	$0
LAPEER	9/10/2016	Thunderstorm Wind	50	0	0	$0
LAPEER	11/18/2016	Thunderstorm Wind	52	0	0	$20,000
LAPEER (ZONE)	1/10/2017	High Wind	50	0	0	$10,000
LAPEER (ZONE)	3/8/2017	High Wind	56	0	0	$10,000,000
THORNVILLE	7/7/2017	Thunderstorm Wind	52	0	0	$0
HADLEY	7/7/2017	Thunderstorm Wind	54	0	0	$0
ALMONT	7/7/2017	Thunderstorm Wind	54	0	0	$0
COLUMBIAVILLE	7/23/2017	Thunderstorm Wind	54	0	0	$0
LAPEER DUPONT ARPT	10/7/2017	Thunderstorm Wind	52	0	0	$0
DRYDEN	10/7/2017	Thunderstorm Wind	52	0	0	$0

Location	Date	Type	Miles/Hour	Deaths	Injuries	Damage
GOODLAND	10/7/2017	Thunderstorm Wind	52	0	0	$0
LAPEER (ZONE)	5/4/2018	High Wind	52	0	0	$1,000,000
LAPEER (ZONE)	2/24/2019	High Wind	52	0	0	$500
IMLAY CITY	6/28/2019	Thunderstorm Wind	50	0	0	$2,000
COLUMBIAVILLE	7/20/2019	Thunderstorm Wind	50	0	0	$0
FIVE LAKES	7/20/2019	Thunderstorm Wind	63	0	0	$0
CLIFFORD	7/20/2019	Thunderstorm Wind	50	0	0	$0
LAPEER	7/20/2019	Thunderstorm Wind	50	0	0	$0
LAPEER	7/20/2019	Thunderstorm Wind	50	0	0	$0
ATTICA	7/20/2019	Thunderstorm Wind	61	0	0	$0
NORTH BRANCH	7/20/2019	Thunderstorm Wind	52	0	0	$0
KINGS MILL	9/10/2019	Thunderstorm Wind	61	0	0	$0
NORTH BRANCH	6/10/2020	Thunderstorm Wind	50	0	0	$0
ATTICA	6/10/2020	Thunderstorm Wind	50	0	0	$0
DRYDEN	6/10/2020	Thunderstorm Wind	50	0	0	$3,000
HADLEY	7/19/2020	Thunderstorm Wind	55	0	0	$0
METAMORA	7/19/2020	Thunderstorm Wind	55	0	0	$0
Total				0	3	$16,939,500

Source: National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center Storm Event Database

Table 2-10 Lapeer County Lightning Events from 2000-2020

Location	Date	Type	Deaths	Injuries	Damage
DRYDEN	7/27/2000	Lightning	0	0	$650,000
LAPEER	7/22/2002	Lightning	0	3	$0
IMLAY CITY	7/22/2002	Lightning	0	0	$25,000
LAPEER	5/13/2004	Lightning	0	0	$0
MILLVILLE	5/25/2006	Lightning	0	0	$75,000
NORTH BRANCH	8/26/2006	Lightning	0	0	$2,500
NORTH BRANCH	8/26/2006	Lightning	0	1	$0
BURNSIDE	8/26/2006	Lightning	0	0	$400,000
LUM	8/29/2007	Lightning	0	0	$175,000
KERR HILL	5/16/2017	Lightning	0	0	$40,000
Total			0	1	$1,367,500

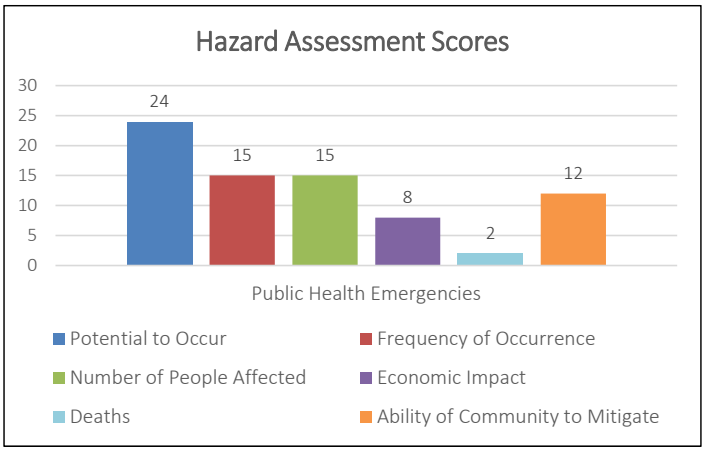
Source: National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center Storm Event Database

Table 2-11 Lapeer County Hail Events from 1956-2020			
Location	Date	Type	Magnitude
LAPEER CO.	7/13/1956	Hail	1.75
LAPEER CO.	7/5/1968	Hail	1.75
LAPEER CO.	6/12/1971	Hail	1.75
LAPEER CO.	9/2/1984	Hail	2.5
LAPEER CO.	7/25/1988	Hail	0.75
LAPEER CO.	8/17/1991	Hail	1.75
LAPEER CO.	5/2/1992	Hail	0.75
LAPEER CO.	5/2/1992	Hail	0.75
METAMORA	4/15/1994	Hail	0.75
NORTH BRANCH	4/15/1994	Hail	0.75
LAPEER CO.	4/18/1995	Hail	0.75
COLUMBIAVILLE	4/12/1996	Hail	0.75
LAPEER	4/16/1998	Hail	0.75
LAPEER	6/30/1998	Hail	0.75
LAPEER	7/24/1999	Hail	1
OTTER LAKE	6/1/2000	Hail	1.75
LAPEER	7/14/2000	Hail	0.75
IMLAY CITY	7/14/2000	Hail	0.75
LAPEER	7/27/2000	Hail	0.75
OTTER LAKE	7/27/2000	Hail	0.75
ALMONT	7/28/2000	Hail	1
NORTH BRANCH	8/9/2000	Hail	0.88
LAPEER	5/28/2001	Hail	0.75
OTTER LAKE	7/4/2001	Hail	0.75
NORTH BRANCH	7/4/2001	Hail	0.75
NORTH BRANCH	8/19/2001	Hail	0.75
LAPEER	5/31/2002	Hail	0.75
NORTH BRANCH	6/17/2002	Hail	0.75
NORTH BRANCH	6/17/2002	Hail	0.75
METAMORA	5/5/2003	Hail	1
ALMONT	5/5/2003	Hail	1
HADLEY	7/21/2003	Hail	0.75
ALMONT	7/21/2003	Hail	1
LAPEER	8/1/2003	Hail	1
LAPEER	8/21/2003	Hail	0.88
LAPEER	8/21/2003	Hail	0.88
LAPEER	6/23/2004	Hail	0.75
LAPEER	3/31/2006	Hail	0.88
LAPEER	5/25/2006	Hail	1
LAPEER	5/25/2006	Hail	1

Location	Date	Type	Magnitude
OTTER LAKE	6/28/2006	Hail	0.75
ALMONT	9/27/2006	Hail	0.75
COLUMBIAVILLE	10/4/2006	Hail	0.88
NORTH BRANCH	4/11/2008	Hail	0.75
COLUMBIAVILLE	4/11/2008	Hail	0.75
LAPEER	4/11/2008	Hail	0.75
IMLAY CITY	4/11/2008	Hail	1
NORTH BRANCH	6/27/2008	Hail	0.75
LAPEER	7/16/2008	Hail	0.88
ELBA	7/16/2008	Hail	1
LAPEER	7/16/2008	Hail	1
ELBA	7/16/2008	Hail	1
ELBA	7/16/2008	Hail	1
NORTH BRANCH	7/16/2008	Hail	0.75
ALMONT	7/16/2008	Hail	0.75
SILVERWOOD	6/14/2009	Hail	0.88
ELBA	6/25/2009	Hail	0.75
LAPEER	6/25/2009	Hail	0.75
LAKE NEPESSING	6/25/2009	Hail	1.25
METAMORA	7/17/2010	Hail	0.75
ATTICA	7/2/2011	Hail	0.75
HADLEY	7/2/2011	Hail	0.75
OTTER LAKE	3/15/2012	Hail	1.5
MILLVILLE	3/15/2012	Hail	1.5
ELBA	3/15/2012	Hail	1.5
LAPEER	3/15/2012	Hail	0.88
IMLAY CITY	3/15/2012	Hail	1.5
ELBA	6/17/2013	Hail	1
KERR HILL	6/17/2013	Hail	0.75
LAKE NEPESSING	7/19/2013	Hail	0.75
NORTH BRANCH	7/27/2014	Hail	1.25
NORTH LAKE	7/27/2014	Hail	0.88
KERR HILL	8/3/2017	Hail	0.75
FIVE LAKES	4/7/2020	Hail	1.5
NORTH BRANCH	4/7/2020	Hail	2
ATTICA	4/7/2020	Hail	1.5
LAPEER	4/7/2020	Hail	2
LAPEER DUPONT ARPT	4/7/2020	Hail	1
IMLAY CITY	4/7/2020	Hail	1.75

Source: National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center Storm Event Database

#6 - Public Health Emergencies



Public Health Emergencies

A public health emergency is anything that causes or could cause injuries or illness to a large number of people. Public health emergencies include the following:

- Infectious disease outbreaks/pandemics
- Health-endangering effects of severe weather, natural disasters, and power outages
- Incidents resulting in mass casualties
- Toxic chemical or radiological releases
- Acts of bioterrorism

Hazard Description

Public health emergencies are ranked as the number six hazard for Lapeer County. Public health emergencies can take many forms including disease epidemics, large-scale incidents of food or water contamination, 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. Public health emergencies can occur as primary events by themselves, or they may be secondary events to another disaster or emergency such as a flood, tornado, or hazardous material incident. The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, many people. Public health emergencies can be statewide, regional, or localized in scope and magnitude. Perhaps the greatest emerging public health hazard would be the intentional release of a radiological, chemical, or biological agent to adversely impact many people. Such a release would most likely be an act of sabotage aimed at the government or a specific organization or segment of the population. Fortunately to date, Michigan has not yet experienced such a release aimed at mass destruction. However, there is always potential for an incident of that nature and magnitude to occur. If it does, the public health implications (under the right set of circumstances) could be staggering.

Lapeer County Perspective and Vulnerability

When it comes to public health emergencies, there are many factors that are unclear including the unexpected development of new diseases such as pandemic influenza, chemical and biological terrorism, and more. Like the rest of the United States and the world, Lapeer County has had outbreaks of diseases like foodborne illness, measles, and influenza. The Lapeer County Health Department has made it clear they would have serious staffing problems if a health epidemic of large proportions were to occur in the area.

In early 2020, the coronavirus (COVID-19) reached pandemic proportions as it reached American soil. This resulted in many states, including Michigan, calling for a state-wide temporary closure of non-essential businesses, thereby resulting in the closure of schools, businesses, and parks. The full impact of this pandemic, which is still ongoing while this document is being written, may not be known for several years. As of December 2020, Lapeer County has 2,723 confirmed cases and 63 confirmed deaths due to COVID-19 according to the MDHHS. Although the initial statewide shutdown was lifted in June 2020, a second measure of closures across Michigan were implemented in November 2020 as cases and deaths began to rise dramatically again. The pandemic has resulted in unprecedented economic turmoil for not only Lapeer County, but the entire United Sates.

In November 2019, the City of Lapeer issued an advisory to water customers saying that three of 20 homes with lead service lines tested above 15 parts per billion, the action level of the U.S. Environmental Protection Agency (EPA). As a result, Lapeer's 90th percentile for lead was 19 ppb in testing that was done. This meant that more than 10 percent of sample sites had elevated lead levels. The City of Lapeer had to conduct a survey of homes and businesses in the City for lead service lines as those were the sites

with elevated lead levels. The City acted by beginning the process of replacing these lead service lines as well as distributing water filters for those who were affected.

In September 2019, Michigan including Lapeer County dealt with the Eastern Equine Encephalitis (EEE) virus. According to the CDC, EEE is a rare cause of brain infections which is spread to people by infected mosquitos. Across the state, there were 10 human cases as well as 6 deaths and 40 cases in animals reported by the Michigan Department of Health and Human Services (MDHHS). Residents were urged to avoid being bitten by a mosquito as this could potentially spread the deadly virus.

Costs associated with public health emergencies include deaths, hospitalizations, doctors' visits, mass immunization programs, lost wages, and lost productivity. There are not enough documented incidents of recent public health emergencies in Lapeer County to estimate an average cost. However, national estimates put the total annual cost to employers for lost productive time for all health conditions at approximately $2,000 per worker per year. According to 2018 ACS 5-Year Estimates, Lapeer County has about 43,114 workers in the labor force. Based on this data, Lapeer County already suffers $92,228,000 in lost worker productivity each year. A public health emergency such as a wide-spread flu epidemic would raise that estimate, which does not even include the non-labor force population.

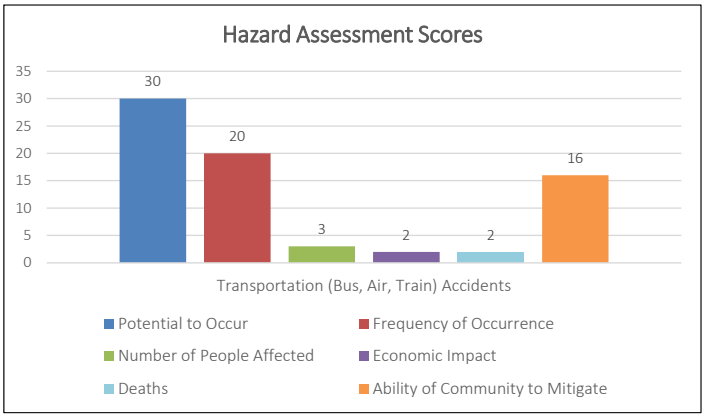
Mitigation Strategies for Public Health Emergencies
The following strategies are suggested to minimize the effects of Lapeer County's number six hazard, public health emergencies:

- Training For Responders
- Public Education for Disaster Preparedness
- Immunization Programs
- County Hazard Mitigation Project Manager

New Mitigation Projects
None

Previously Included Mitigation Projects
None

#7 - Transportation Accidents (Bus, Airplane, Train)



Transportation Accidents (Bus, Airplane, Train)

Transportation accidents are a crash or accident involving an air, land or water-based commercial passenger carrier resulting in death or serious injury.

Hazard Description

Transportation accidents are ranked as the number seven hazard in Lapeer County. In terms of commercial passenger transportation service, Michigan has approximately: 1) 19 airports that offer commercial air passenger service; 2) 130 certified intercity passenger bus carriers providing service to 220 communities; 3) 72 local bus transit systems serving 85 million passengers; 4) 19 marine passenger ferry services; and 5) 3 intercity rail passenger routes operating on 568 miles of track, along 3 corridors, serving 22 communities.

Air Transportation Accidents

There are four circumstances that can result in an air transportation accident: 1) an airliner colliding with another aircraft in the air; 2) an airliner crashing while in the cruise phase of a flight due to mechanical problems, sabotage, or other cause; 3) an airliner crashing while in the takeoff or landing phase of a flight; or 4) two or more airlines colliding with one another on the ground during staging or taxi operations. When responding to any of these types of air transportation accidents, emergency personnel may be confronted with a number of problems, such as: 1) suppressing fires; 2) rescuing and providing emergency first aid for survivors; 3) establishing mortuary facilities for victims; 4) detecting the presence of explosive or radioactive materials; 5) providing crash site security, crowd and traffic control, and protection of evidence.

Land Transportation Accidents

A land transportation accident in Michigan could involve a commercial intercity passenger bus, a local public transit bus, a school bus, or an intercity passenger train. Although these modes of land transportation have a good safety record, accidents do occur. Typically, bus accidents are caused by the bus slipping off the roadway in inclement weather or colliding with another vehicle. Intercity passenger train accidents usually involve a collision with a vehicle attempting to cross the railroad tracks before the train arrives at the crossing. Unless the train accident results in a major derailment, serious injuries are usually kept to a minimum. Bus accidents, on the other hand, can be quite serious, especially if the bus has tipped over. Numerous injuries are a very real possibility in these types of situations.

Lapeer County Perspective and Vulnerability

Over the last 10 years, there have been 110 crashes that involved school buses. These crashes resulted in 21 injuries and one death. During this same period, there have been 885 crashes that involved a truck or bus. Of these crashes, 65 resulted in injuries and 6 resulted in deaths. Over the last 10 years, there have been four crashes involving a train in Lapeer County; see below for a description of those train accidents. (Michigan Crash Facts)

January 17, 2013:

The train was traveling west bound over Lake Nepessing Road. The car was traveling north bound on Lake Nepessing Road. The person in the car was switching stations on the radio and realized there was a train, lost control, crossed the center line into the south bound lane and struck the train. The car rotated 180 degrees and struck the train again. The car then struck a train related light device, coming to a rest.

December 27, 2012:

A vehicle was traveling eastbound on McCormick Street when the driver attempted to stop for a passing train engine. The vehicle slid on the snowy/icy roadway and ran off the roadway to the right. The vehicle was then struck by the train engine.

September 24, 2010:
A vehicle was traveling southbound on Graham Road and went around the railroad crossing gates and was struck by an Amtrak passenger train. Driver of the vehicle stated that the gates were not down, and he did not see the train.

June 18, 2010:
The driver of a vehicle advised that he was North Bound on Lake Nepessing Road. He was traveling approx. 35 mph. He looked down to light a cigarette, looked back up and saw the red lights flashing at the Railroad Crossing. He slowed down; the train hit him. He did not see the crossing arms down. The train engineer advised that he was traveling on the rail West Bound and watched the vehicle drive around the crossing arms. He could not stop and struck the vehicle. The train engineer advised that he had 70 passengers on board and was headed for Chicago.

According to the Michigan State Police Office of Highway Safety Planning - 2019 Michigan Traffic Crash Facts, there were approximately 2,970 traffic accidents in Lapeer County. These accidents resulted in nine fatalities and 413 injuries.

The Flint Amtrak Terminal served 27,881 passengers for 2019. The Amtrak Blue Water route travels across Lapeer County on its voyages to and from Port Huron. With the amount of passenger trains traveling through the County each year, and the fact that there have been multiple freight train derailments in Lapeer County since 1975, it would be reasonable to assume that Lapeer County may have a passenger train derailment in the future.

Bishop International Airport (BIA) had 301,534 passengers and 24 million pounds of cargo in 2019. With Lapeer County being in the flight path of the airport, it is reasonable to assume that there could be a plane crash in the future.

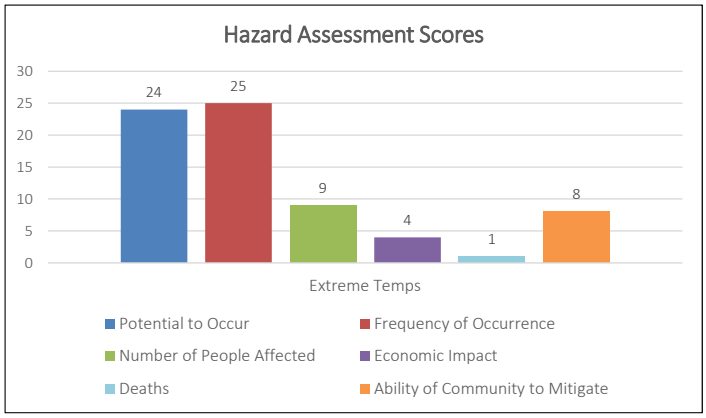
Mitigation Strategies for Transportation Accidents (Bus, Airplane, Train)
The following strategies are suggested to minimize the effects of Lapeer County's number seven hazard, transportation accidents (bus, airplane, train):

- Training For Responders
- Update Disaster Response Plan
- Simulated Response Exercise
- Safety Training For Transit Operators
- Public Education
- County Hazard Mitigation Project Manager

New Mitigation Projects
City of Imlay City
Project: Infrastructure Improvements. Project description: Two of the City's largest potential hazards are trains hauling unknown hazardous materials through downtown Imlay City and trucks hauling unknown hazardous material down I-69 and along M-53. Both of these concerns come to a junction at the railroad overpass on M-53. The City has the concern of a potential derailment at the overpass and the potential of a truck crashing into an abutment of the underpass where M-53 drops from 5 lanes to 2 lanes. Mitigation would include CN railways, MDOT, and the Imlay City. Proposed timeframe for implementation: 1 - 5 years. Budget: Unknown. Update: None, this is a newly submitted project.

Previously Included Mitigation Projects
None

#8 - Extreme Temperatures



Extreme Temperatures

Extreme temperatures are prolonged periods of very high or very low temperatures, often accompanied by other extreme meteorological conditions.

Hazard Description

Extreme temperatures are ranked as the number eight hazard for Lapeer County. Prolonged periods of extreme temperatures, whether extreme summer heat or extreme winter cold, can pose severe and often life-threatening problems for Michigan's citizens. Although they are radically different in terms of initiating conditions, the two hazards share a commonality in that they both primarily affect the most vulnerable segments of the population-the elderly, children, impoverished individuals, and people in poor health. Due to their unique characteristics, extreme summer heat and extreme winter cold hazards will be discussed individually.

Extreme Summer Heat

Extreme summer weather is characterized by a combination of very high temperatures and exceptionally humid conditions. When persisting over a long period of time, this phenomenon is commonly called a heat wave. The major threats of extreme summer heat are heatstroke (a major medical emergency), and heat exhaustion. Heatstroke often results in high body temperatures, and the victim may be delirious, stuporous, or comatose. Rapid cooling is essential to preventing permanent neurological damage or death. Heat exhaustion is a less severe condition than heatstroke, although it can still cause severe problems such as dizziness, weakness, and fatigue. Heat exhaustion is often the result of fluid imbalance due to increased perspiration in response to the intense heat. Treatment generally consists of restoring fluids and staying indoors in a cooler environment until the body returns to normal. Other, less serious risks associated with extreme summer heat are often exercise-related and include heat syncope (a loss of consciousness by persons not acclimated to hot weather), and heat cramps (an imbalance of fluids that occurs when people unaccustomed to heat exercise outdoors). Because the combined effects of high temperatures and high humidity are more intense in urban centers, heatstroke and heat exhaustion are a greater problem in cities than in suburban or rural areas. According to the CDC, approximately 702 deaths a year are directly attributable to extreme heat nationwide. Extreme summer heat is also hazardous to livestock and agricultural crops, and it can cause water shortages, exacerbate fire hazards, and prompt excessive demands for energy. Roads, bridges, railroad tracks and other infrastructure are susceptible to damage from extreme heat. Air conditioning is probably the most effective measure for mitigating the effects of extreme summer heat on people. Unfortunately, many of those most vulnerable to this hazard do not live or work in air-conditioned environments, especially in major urban centers where the vulnerability is highest. The use of fans to move air may help some, but recent research indicates that increased air movement may exacerbate heat stress in many individuals.

Extreme Winter Cold

Like heat waves, periods of prolonged, unusually cold weather can result in a significant number of temperature-related deaths. Each year in the United States, over 500 people die because of severe cold temperature-related causes according to the EPA. It should be noted that a significant number of cold-related deaths are not the direct result of "freezing" conditions. Rather, many deaths are the result of illnesses and diseases that are negatively impacted by severe cold weather, such as stroke, heart disease and pneumonia. It could convincingly be argued that were it not for the extreme cold temperatures, death in many cases would not have occurred at the time it did from the illness or disease alone. Hypothermia (the unintentional lowering of core body temperature), and frostbite (damage from tissue being frozen) are probably the two conditions most closely

associated with cold temperature-related injury and death. Hypothermia is usually the result of over-exposure to the cold and is generally thought to be clinically significant when core body temperature reaches 95 degrees or less. As body temperature drops, the victim may slip in and out of consciousness, and appear confused or disoriented. Treatment normally involves re-warming the victim, although there is some controversy in the medical community as to exactly how that should be done. Frostbite rarely results in death, but in extreme cases it can result in amputation of the affected body tissue. Hypothermia usually occurs in one of two sets of circumstances. One situation involves hypothermia associated with prolonged exposure to cold while participating in outdoor sports such as skiing, hiking, or camping. Most victims of this form of hypothermia tend to be young, generally healthy individuals who may lack experience in dealing with extreme cold temperatures. The second situation involves a particularly vulnerable person who is subjected to only a moderate, indoor cold stress. A common example would be that of an elderly person living in an inadequately heated home. In such circumstances, hypothermia may not occur until days or perhaps weeks after the cold stress begins. The special vulnerability of elderly persons to hypothermia has become readily apparent. Over half of the approximately 500 persons who die each year due to cold exposure are 60 years of age or older, even though this age group only represents about 23% of the country's population. This remarkable statistic may be due, in part, to the fact that elderly persons appear to perceive cold less well than younger persons and may voluntarily set thermostats to relatively low temperatures. In addition, high-energy costs and the relative poverty among some elderly people may discourage their setting thermostats high enough to maintain adequate warmth. Because many elderly people live alone and do not have regular visitors, the cold conditions may persist for several days or weeks, thus allowing hypothermia to set in. Babies and very young children are also very vulnerable to hypothermia. In addition, statistics indicate that death due to cold is more frequent among males than females in virtually all age groups. Part of that may be explained by differences in risk factors, and part may be due to different rates of cold exposure between the sexes.

Lapeer County Perspective and Vulnerability

Below is a list of significant extreme temperature events that have occurred in Lapeer County over the past 20 years.

February 23, 2015

Low temperatures bottoming out between 10 to 20 below zero, coupled with west to northwest winds less than 10 mph produced wind chills of 20 to 25 below zero, along and north of the I-69 corridor. The official low at Flint was -17 degrees, while Saginaw checked in at -14 degrees. (Excerpts from NOAA storm summary)

February 19, 2015

Artic airmass ushered in by northwest winds produced wind chills around 25 below zero along and north of M-59 corridor. Temperatures of zero to 5 below zero toward midnight on February 18th, coupled with northwest winds of 10 mph or less produced wind chills between 20 to 25 below zero. Although winds remained under 10 mph during the early morning hours of February 19th, temperatures bottomed out between 5 to 10 below zero. The official low at Flint was -10 degrees. (Excerpts from NOAA storm summary)

February 14 – February 15, 2015

Artic airmass ushered in by northwest winds produced wind chills around 30 below zero across most of southeastern Michigan the early morning of February 15th. Temperatures of -5 to 5 above zero in the evening hours of February 14th coupled with northwest winds of 15 to 20 mph produced wind chills around 25 below zero. Although winds diminished to around 10 mph during the early morning hours of February 15th, temperatures bottomed between 5 to 15 below zero. The official lows at the climate sites were as follows: Detroit -8 degrees, Flint -11 degrees. And Saginaw -12 degrees. (Excerpts from NOAA storm summary)

July 17 – July 22, 2011:

A mid-July heat wave helped cap off the warmest month on record at Detroit. Three direct deaths were reported due to the heat wave, as heat indices were above 100 degrees. Here are the highest tem-

peratures recorded for Detroit and Flint during the period: Flint, 95, 94, 94, 95, 99, and 84. (Excerpts from NOAA storm summary)

January 14 – January 18, 2009:

An arctic air mass became firmly established over the Great Lakes region on January 14th and persisted through the 18th. Temperatures fell below zero all four days, with wind chill values in the 5 to 30 below range during the majority of the time. Low temperatures for January 14-18th were as follows: -3, -3, -15, and -11. (Excerpts from NOAA storm summary)

July 17-July 22, 2011:

A mid-July heat wave helped cap off the warmest month on record in mid-Michigan. Three direct deaths were reported in Michigan due to the heat wave, as heat indices were above 100 degrees. The high temperatures recorded for mid-Michigan during the period of July 17th-22nd ranged between 84 and 99 degrees. (Excerpts from NOAA storm summary)

February 3 – February 6, 2007:

A bitter cold air mass blasted into the region on Saturday, February the 3rd and persisted through Tuesday, February the 6th. Temperatures through this period were 20 to 25 degrees below normal. Daytime temps struggled to reach 10 degrees while subzero temperatures occurred all 3 nights. Flint set 2 temperature records and was held to a daytime temperature less than 5 degrees for the first time in over 10 years. Winds of 15 to 25 M.P.H. gusted as high as 35 M.P.H. at times. After factoring in the winds, apparent temperatures ranged from 15 below to 25 below through nearly the entire event. Almost every school district in southeast Michigan canceled school on Monday and most did the same on Tuesday, citing conditions too dangerous for the kids either walking to school or waiting outside for the bus. Area hospitals reported numerous cases of patients suffering from cold related illnesses. Most of the cases involved frostbite. At least one fatality was blamed on the cold weather. Frozen pipes and water main breaks occurred throughout all of southeast Michigan, leaving many residents and business owners out in the cold. Area homeless shelters were filled to capacity. There were also many cases of fire sprinkler lines freezing and breaking, leading to flooding. AAA Michigan reported over 20,000 vehicle service calls due to the cold air, the most in nearly 10 years. Total damages were roughly estimated at $425,000, including electrical and mechanical damages to vehicles and property damages caused by flooding. Here are the official maximum and minimum temperatures observed at Detroit, Flint, and Saginaw, from the 4th through the 6th: Detroit: 8/-2 on the 4th, 12/-4 on the 5th, 12/-3 on the 6th; Flint: 4/-5 on the 4th, 9/-7 on the 5th, 11/-5 on the 6th; Saginaw: 5/-7 on the 4th, 10/-7 on the 5th, 10/-6 on the 6th. (Excerpts from NOAA storm summary)

January 10 – January 30, 2003:

Temperatures averaged well below normal across the Great Lakes region for much of January. In fact, for a three-week period, the temperature never rose above freezing. Temperatures fell below zero for several nights during this period. Frozen pipes and water main breaks occurred in many areas of Detroit and its suburbs. The cities of Flint and Saginaw also had several reports of water main breaks. Several area schools had to cancel classes due to frozen pipes. Many area homeless shelters were filled to capacity and area hospitals reported dozens of cases of frostbite. Three deaths were also attributed to this cold spell. Lapeer County was one of the communities affected by this event. (Excerpts from NOAA storm summary)

August 6 – August 9, 2001 (200 injuries and 1 fatality in the affected area):

A large high-pressure ridge settled across the Great Lakes region during the first week of August. With this ridge in place, high temperatures soared well into the 90s across southeast Michigan. During this period, Flint broke 3 record highs, including a high of 98 on the 8th. Detroit also broke a record on the 8th when a high of 99 degrees was reached. In addition to the heat, humidity levels rose significantly during the time period. The high heat and humidity allowed daytime heat indices to exceed 100 degrees four days in a row. In fact, heat advisories were in effect for all of southeast Michigan for the afternoons and evenings of the 7th, 8th, and 9th. During this time period, heat indices ranged from 105 to 110 degrees. The heat caused several people to seek emergency care for heat stroke and heat exhaustion. One

fatality also occurred due to the heat when an Oak Park man was found suffering from severe heat exhaustion while locked in his car. Several hours later, he was pronounced dead at an area hospital. The hot weather only aggravated the dry conditions already in place across southeast Lower Michigan. This led to tremendous worries among area farmers that they may lose entire crops. Thousands of power outages also occurred throughout the region as demand surpassed supply. Several factory workers across the area were sent home from work to escape the extreme heat. Many of those who were not, however, threatened to walk off the job as a result of not having air conditioning in their factories. Lapeer County was one of the communities affected by this event. (Excerpts from NOAA storm summary)

December 21 – December 29, 2000 (estimated damage of $475,000 in affected areas):

Though the worst of the snow was over, the worst of the cold was just beginning. Temperatures never got out of single digits on the 22nd, with Detroit seeing a high of only 4 degrees, after a morning low of 3 below zero. Flint wasn't much better, recovering from a low of -5 to reach 8 degrees in the afternoon. That would prove to be the coldest daytime temperatures of the month - but some colder nights were still in store, especially for Flint. Christmas morning dawned clear and frigid, with a morning low of 13 degrees below zero at Flint, setting an all-time mark for the month of December (the old record was - 12 on Dec 23, 1989). Three nights later, Flint would give the new record a run for its money, coming up just short with a low of -11 on the 28th (this was still a new record for the day). The arctic weather would take a toll on pipes. Both Ypsilanti High School and Chelsea High School had pipes burst over Christmas weekend, damaging classrooms. Several buildings on the University of Michigan campus in Ann Arbor had similar ruptures, including the School of Dentistry and Wolverine Tower. The cold also hampered shipping interests. Ice formation was extremely rapid on the Great Lakes and the connecting waterways. Several freighters got stuck in ice on both the Detroit River and Lake St. Clair, blocking the shipping channel and bringing dozens of ships to a halt. Icebreaker assistance was needed to free the freighters. Ferry service on the St. Clair River between Michigan and Canada was also interrupted due to ice jams. Average temperatures for the month were 19.3 degrees in Detroit, 16.6 at Flint, and 17.2 in Saginaw. End result: the 4th coldest December of all time in Detroit, and the 2nd coldest at both Flint and Saginaw. Combined with the high snowfall totals and it's safe to say: if you don't like cold and snow, then December of 2000 was the most miserable December in southeast Michigan history. No other December on record comes close to its combination of heavy snow and brutal cold. Lapeer County was one of the communities affected by this event. (Excerpts from NOAA storm summary)

Vulnerability

The record low for Lapeer County is -26ºF (January of 1984) and the record high is 100ºF (June and July of 1988). Between 1995 and 2020, there were fourteen extreme temperature events in the Lapeer region. Nine were extreme cold events and five were excessive heat events. According to the National Centers for Environmental Information, 7 deaths and 252 injuries were caused by the events and $475,000 or an average of $33,928.57 in property damage was reported. Based on historic data, Lapeer County averages less than one extreme temperature event a year. See **Table 2-12** for a detailed list of extreme temperature events in Lapeer County.

Mitigation Strategies for Extreme Temperatures

The following strategies are suggested to minimize the effects of Lapeer County's number eight hazard, extreme temperatures:

- Emergency Generators
- Community Shelters/Potable Water
- Public Education for Disaster Preparedness
- Utilize wireless emergency alerts
- County Hazard Mitigation Project Manager
- Elderly Assistance Programs

New Mitigation Projects

None

Previously Included Mitigation Projects

Attica Township

Project: Backup generator. Project description: Pur-

Table 2-12 Lapeer County Extreme Temperature Events				
Date	Type	Deaths	Injuries	Property Damage
12/9/1995	Cold Wave	3	0	$0
2/1/1996	Extreme Cold	1	0	$0
1/17/1997	Extreme Cold	2	0	$0
2/11/1999	Record Warmth	0	0	$0
7/4/1999	Excessive Heat	0	52	$0
3/8/2000	Record Warmth	0	0	$0
12/21/2000	Extreme Cold	0	0	$475,000
8/6/2001	Excessive Heat	1	200	$0
1/10/2003	Extreme Cold/Wind Chill	0	0	$0
1/14/2009	Extreme Cold/Wind Chill	0	0	$0
7/17/2011	Excessive Heat	0	0	$0
2/14/2015	Extreme Cold/Wind Chill	0	0	$0
2/19/2015	Extreme Cold/Wind Chill	0	0	$0
2/23/2015	Extreme Cold/Wind Chill	0	0	$0
			Total	$475,000
			Average Cost/ Event	$33,928.57

Source: National Oceanic and Atmospheric Administration

chase of a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $45,000. Update: Not provided.

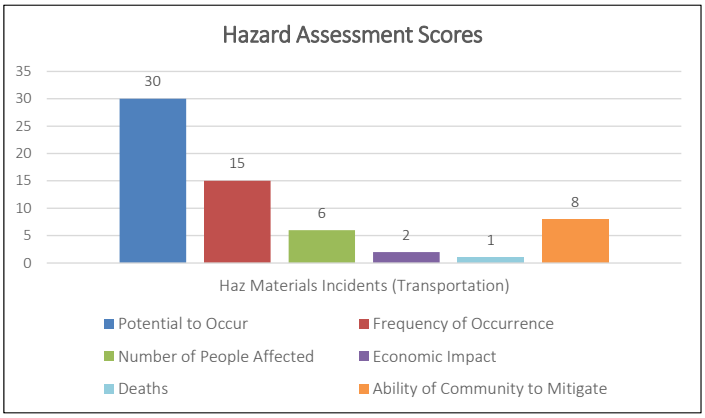
City of Lapeer

Project: Backup generator. Project description: Purchase of 1 large and 2 small (portable) backup generators to maintain sewage lift stations and traffic signals. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: This project is still ongoing.

Village of Otter Lake

Project: Backup generator. Project description: Purchase a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $25,000 . Update: Not provided.

#9 - Hazardous Materials Incidents (Transportation)



Hazardous Materials Incidents (Transportation)

Hazardous materials incidents during transportation is an uncontrolled release of hazardous materials during transport capable of posing a risk to life, health, safety, property or the environment.

Hazard Description

Hazardous materials incidents during transportation are ranked as the number nine hazard in Lapeer County. As a result of the extensive use of chemicals in our society, all modes of transportation – highway, rail, air, marine, and pipeline – are carrying thousands of hazardous materials shipments daily through local communities. A transportation accident involving any one of those hazardous material shipments could cause a local emergency affecting many people. Pipeline transportation accident issues are addressed in the "Oil or Natural Gas Well/ Pipeline Accidents" section of this document. Refer to that section for information on those hazards.

Michigan has had numerous hazardous material transportation incidents that affected the immediate vicinity of an accident site or a small portion of the surrounding community. Those types of incidents, while problematic for the affected community, are commonplace. They are effectively dealt with by local and state emergency responders and hazardous material response teams. Larger incidents, however, pose a whole new set of problems and concerns for the affected community. Large-scale or serious hazardous material transportation incidents that involve a widespread release of harmful material (or have the potential for such a release) can adversely impact the life, safety and/or health and well-being of those in the immediate vicinity of the accident site, as well as those who meet the spill or airborne plume. In addition, damage to property and the environment can be severe as well. Statistics show almost all hazardous material transportation incidents are the result of an accident or other human error. Rarely are they caused simply by mechanical failure of the carrying vessel.

Being surrounded by the Great Lakes, one of the most dangerous hazardous material transportation accident scenarios that could occur in Michigan would be a spill or release of oil, petroleum or other harmful materials into one of the lakes from a marine cargo vessel. Such an incident, if it involved a large quantity of material, could cause environmental contamination of unprecedented proportions. Fortunately, the Great Lakes states, working in partnership with oil and petroleum companies and other private industries, have taken significant steps to ensure that a spill of significant magnitude is not likely to occur on the Great Lakes.

Heating fuel and motor fuel account for approximately 98% of all the hazardous materials that are being transported on today's roadways. The remaining 2% includes all other hazardous materials. Available estimates from the Michigan State Police indicate that about 100 loads of propane go over I-69 daily during the winter season. In the warmer months, this amount declines. However, large quantities of anhydrous ammonia are transported during the warmer months. Anhydrous ammonia is sprayed on farm fields and is also used for air conditioning and refrigeration purposes. This would also be an extremely dangerous hazardous material if a release occurred during transportation.

Lapeer County Perspective and Vulnerability

Lapeer County has had numerous small-scale hazardous material transportation incidents that required a response by local fire departments and hazardous material teams, and many required the implementation of evacuation and other protective actions. As a manufacturer, user and transporter of hazardous materials, Lapeer County remains vulnerable to the threat of a serious hazardous material transportation incident at any point in time. Also, Lapeer County is crisscrossed by major interstate routes and state

trunk line roads, all of which are used by commercial traffic that may be transporting hazardous materials.

To get an estimate of how many trucks may be carrying hazardous materials on these roads, MDOT's 2019 commercial traffic counts were used as a baseline. These counts are Average Daily Traffic (ADT) counts for major routes. Using these numbers and estimating that 10% of all truck traffic in the county is carrying hazardous materials, **Table 2-13** was developed. Using the same 10% methodology, staff can estimate the number of trains transporting hazardous materials through Lapeer County as well using daily train volumes from the Federal Railroad Administration database as shown in **Table 2-14**. This data is also shown below.

Table 2-13 Commercial ADTs and Estimated Trucks Carrying Hazardous Materials

Major Route in Lapeer County	MDOT Commercial ADT	Estimated Trucks Carrying Hazardous Materials
I-69	5,527	553
M-53	1,210	121
M-90	116	12
M-24	1,007	101
Totals	7,860	787

Source: Michigan Department of Transportation

Table 2-14 Federal Railroad Administration ADTs and Estimated Trains Carrying Hazardous Materials

Major Route in Lapeer, MI	FRA ADT	Estimated Trains Carrying Hazardous Materials
CN (Lapeer)	20	2
HESR (Clifford)	Less than 1	Less than 1
Totals	20	2

Source: Federal Railroad Administration

Approximately 787 trucks and about 2 trains are transportation hazardous materials daily through the County. Also see **Figure 2-10**. This map includes a buffer zone of one mile where major transportation routes including railroads carry hazardous materials. These buffer zones include about 32,060 people living within the county. All hazardous material transportation incidents listed below were obtained from the U.S. Department of Transportation, Pipeline and Hazardous Material Safety Administration. According to this database, there have been no recorded events in the last 10 years.

August 3, 2006
A driver had been traveling through a heavy rainstorm. Gas was venting on his argon trailer. The safety valve was working as it was designed. When the safety valve could not maintain pressure under 38 PSIG, a bursting disk blew and the pressure in the trailer was released. An air liquid service tech traveled to the site and replaced the blown disk.

July 27, 1988:
A tanker breaks loose from a semi and rolls over on M-53. Phosphoric acid leaked from the tanker causing traffic to be detoured for approximately 6 hours.

March 4, 1981
50 cars of a 85 car train derailed near the Tuscola/ Lapeer County line. One train car that was carrying hydrochloric acid had ruptured. 200 residents near the accident were evacuated.

October 20, 1976
Two train butadiene tankers derailed and exploded. 2,000 residents of Clifford and North Branch were evacuated. The tankers burned for more than 48 hours. 1 deputy was injured.

September 5, 1976
A railroad tanker leaked Nitric Acid. 300 residents near the leak were evacuated. 3 firemen were injured.

April 2, 1975 (The damage was estimated to be $250,000)
25 Grand Trunk Railroad freight cars derailed. 2 cars contained sodium nitrate. Another nitrate car was buried beneath other rail cars. M-24 was closed for a day.

Costs associated with hazardous materials incidents during transportation include deaths, injuries, loss of infrastructure, damage to property, and use of emergency personnel. The U.S. Department of Transportation recorded 106 hazardous materials incidents in Michigan for 2019 for a cost of $433,612. During a

Figure 2-10

Source: Genesee County GIS

catastrophic event, costs could easily climb into the millions. Since 1975 there have been at least 5 significant transportation incidents involving hazardous material in Lapeer County. These events have resulted in the evacuation of 200 to 2,000 people per incident. A 1975 incident caused an estimated $250,000 in damage. As the number of trucks transporting hazardous waste increases, the probability of accidents involving the transport of hazardous materials will also increase.

Mitigation Strategies for Hazardous Materials Incidents (Transportation)

The following strategies are suggested to minimize the effects of Lapeer County's number nine hazard, hazardous materials incidents during transportation:

- Updated Disaster Response Plan
- Safety Training For Transport Operators
- Training For Responders
- Repair of Critical Infrastructure
- Public Education
- Update Response Equipment
- County Hazard Mitigation Project Manager

New Mitigation Projects

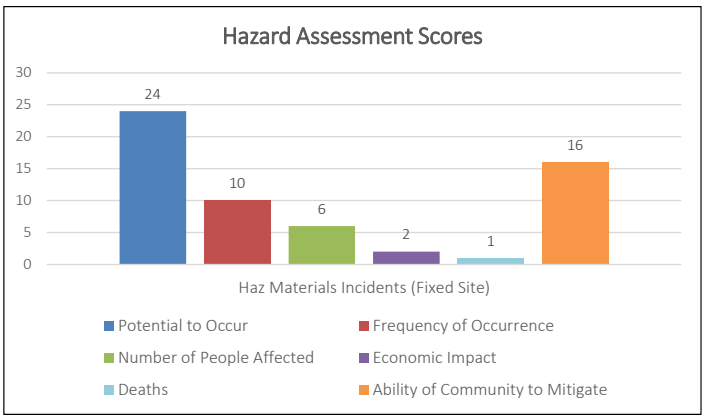
City of Imlay City

Project: Infrastructure Improvements. Project description: Two of the City's largest potential hazards are trains hauling unknown hazardous materials through downtown Imlay City and trucks hauling unknown hazardous material down I-69 and along M-53. Both of these concerns come to a junction at the railroad overpass on M-53. The City has the concern of a potential derailment at the overpass and the potential of a truck crashing into an abutment of the underpass where M-53 drops from 5 lanes to 2 lanes. Mitigation would include CN railways, MDOT, and the Imlay City. Proposed timeframe for implementation: 1 - 5 years. Budget: Unknown. Update: None, this is a newly submitted project.

Previously Included Mitigation Projects

None

#10 - Hazardous Materials Incidents (Fixed Sites)



Hazardous Materials Incidents (Fixed Sites)

Hazardous materials incidents at a fixed site are an uncontrolled release of hazardous materials from a fixed site capable of posing risk to life, health, safety, property, or the environment.

Hazard Description

Hazardous materials incidents at fixed sites are ranked as the number ten hazard in Lapeer County. Over the past few decades, new technologies have developed at a stunning pace. As a result, hazardous materials are present in quantities of concern in business and industry, agriculture, universities, hospitals, utilities, and other facilities in our communities. Hazardous materials are materials or substances which, because of their chemical, physical, or biological nature, pose a potential risk to life, health, property, or the environment if they are released.

Examples of hazardous materials include corrosives, explosives, flammable materials, radioactive materials, poisons, oxidizers, and dangerous gasses. Hazardous materials are highly regulated by federal and state agencies to reduce risk to the general public and the environment. Despite precautions taken to ensure careful handling during the manufacture, transport, storage, use, and disposal of these materials, accidental releases do occur. Often, these releases can cause severe harm to people or the environment if proper mitigative action is not immediately taken. Most releases are the result of human error. Occasionally, releases can be attributed to natural causes, such as a flood that washes away barrels of chemicals stored at a site. However, those situations are the exception rather than the rule.

In 1986, the President signed into law the Superfund Amendments and Reauthorization Act (SARA). Included under Title III of SARA was the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), commonly known as SARA Title III. SARA Title III is meant to encourage and support emergency planning efforts at the State and local levels and to provide the public and local units of government with information concerning potential chemical hazards present in their communities.

Determining if a facility is subject to emergency planning requirements is straightforward. The Environmental Protection Agency (EPA) publishes a list of Extremely Hazardous Substances (EHS). For each EHS, the list identifies and describes the chemical, and includes a number called a Threshold Planning Quantity (TPQ). The TPQ, expressed in pounds, is the key number. If a facility has within its boundaries an amount of an EHS equal to or in excess of its TPQ, then Section 302 of SARA Title III requires that the facility is subject to emergency planning requirements and must notify both the State Emergency Response Commission (SERC) and the Local Emergency Management Office of this fact. The facility must also identify an emergency response coordinator who works with the Local Emergency Management Office on developing and implementing the local emergency plan at the facility. This regulation applies even if the chemical is on site for only a day. There are no exemptions for emergency planning notification.

Lapeer County Perspective and Vulnerability

According to the Michigan Department of Environment, Great Lakes, and Energy, there are currently 18 sites in Lapeer County designated as SARA Title III, Section “302 Sites”. These sites are required to have an emergency plan on file with the Local Emergency Planning Commission, Fire Department, and their facility. Although the 302 Sites vary in material type and toxicity, for the purpose of this plan, staff has assumed that any release would affect (exposure may cause injuries or death and/or the area may be evacuated) the population within a 1-mile radius of the site. Staff estimates that there are approximately 18,092 people within a 1-mile radius of these sites. See **Figure 2-11** for the locations of

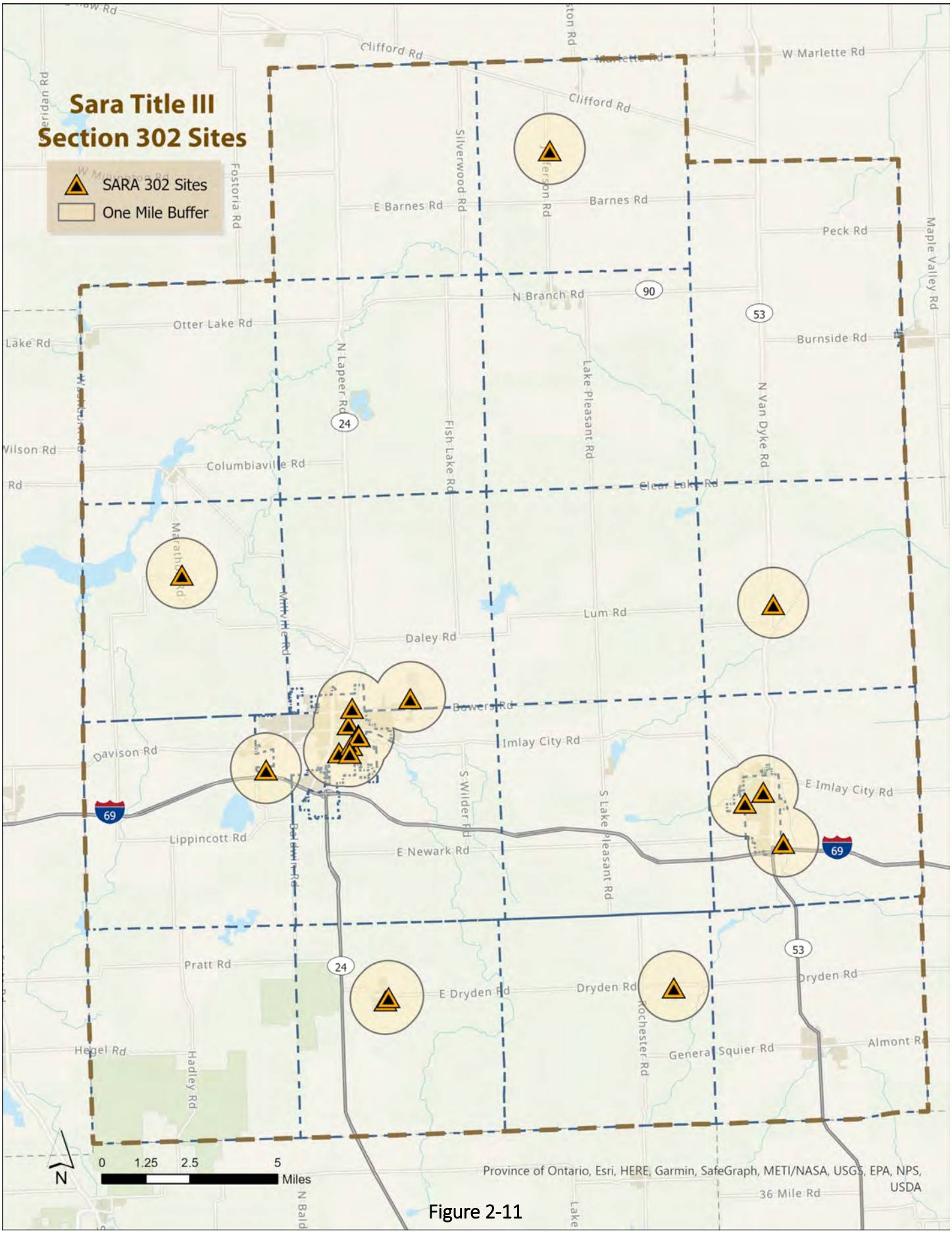


Figure 2-11

Source: Michigan Department of Environment, Great Lakes, and Energy and Genesee County GIS

SARA Title III, Section 302 Sites.

In the last ten years, there have been three significant hazardous materials incidents at fixed sites according to the Lapeer County EMAC. In May 2019, there was an explosion near a Sunoco gas station in downtown Lapeer. A gas leak caused the explosion, however it did not cause significant damage other than destroying some manhole covers. The area was evacuated and assessed by the local fire department and Consumers Energy. It was later determined that gas leaked into nearby sewer lines which resulted in a lengthy cleanup process involving the Michigan Department of Environment, Great Lakes, and Energy (EGLE). It took about three months to clean up the gas leak and replace sewer lines before the area was completely opened up. Two other events that occurred in 2010 involved a smaller scale gas leak at a different gas station and a 500 gallon gas spill from a ruptured supply line. Both incidents involved proper cleanup in coordination with Michigan EGLE.

Since monetary damages were not available for the events mentioned above, staff used transportation related hazardous material releases as they have a similar effect on the surrounding community, to assess the potential impact from a fixed site release. Historic transportation related hazardous material releases in Lapeer County, as recorded by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, have the potential to cause the evacuation of 200 to 2,000 people. One of the listed incidents was estimated to cause $450,000 in damages. Similar damages can be assumed for fixed site incidents.

Mitigation Strategies for Hazardous Materials Incidents (Fixed Sites)

The following strategies are suggested to minimize the effects of Lapeer County's number ten hazard, hazardous materials incidents at fixed sites:

- Public Education
- Training for Responders
- Update Hazardous Material Inventory
- Update Disaster Response Plan
- County Hazard Mitigation Project Manager

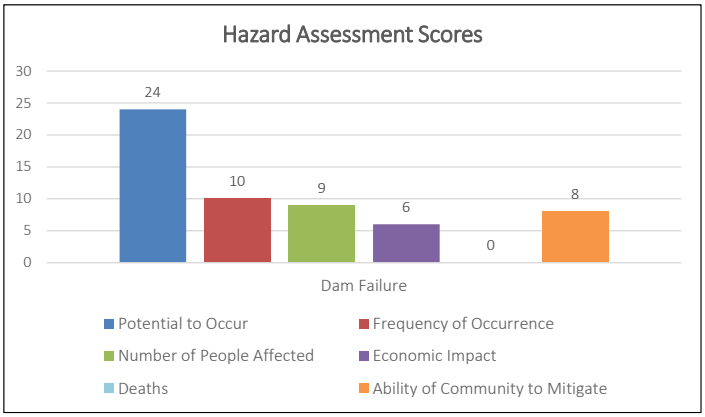
New Mitigation Projects

None

Previously Included Mitigation Projects

None

#11 - Dam Failure



Dam Failure

Dam failure is the collapse or failure of an impoundment resulting in downstream flooding.

Hazard Description

Dam failure is ranked as the number 11 hazard in Lapeer County. A dam failure can result in loss of life and extensive property or natural resource damage for miles downstream from the dam. Dam failures occur not only during overtopping of a dam, but also due to poor operation, lack of maintenance and repair, and vandalism. Such failures can be catastrophic because they occur unexpectedly, with no time for evacuation. The Michigan Department of Environmental, Great Lakes, and Energy (EGLE) has documented approximately 263 dam failures in Michigan. There are over 2,523 dams in the state of Michigan and about 1,061 of them are regulated by Part 315 of the Dam Safety Program. Dams are regulated when they are over 5 feet in height, and when over 5 acres are impounded during the design flood (a flood that does not exceed the magnitude of the discharge for the design frequency).

Permits are required for construction and repair of regulated dams. Inspection reports are also required every three to five years based on the dam's hazard potential rating. The hazard potential rating is determined by the Dam Safety Program, and is based on an assessment of the potential for loss of life, property damage, and environmental damage in the area downstream of a dam in the event of dam failure or failure of appurtenant works. Hazard potential rating is not based upon the structural or hydraulic condition of the dam. The definitions for the hazard classification as specified in the state's Dam Safety Statute, Part 315, Dam Safety, of Act 451, P.A. 1994 are as follows:

"Low hazard potential dam" means a dam located in an area where failure may cause damage limited to agriculture, uninhabited buildings, structures, or township or county roads, where environmental degradation would be minimal, and where danger to individuals is slight or nonexistent.

"Significant hazard potential dam" means a dam located in an area where its failure may cause damage limited to isolated inhabited homes, agricultural buildings, structures, secondary highways, short line railroads, or public utilities, where environmental degradation may be significant, or where danger to individuals exists.

"High hazard potential dam" means a dam located in an area where a failure may cause serious damage to inhabited homes, agricultural buildings, campgrounds, recreational facilities, industrial or commercial buildings, public utilities, main highways, Class I carrier railroads, or where environmental degradation would be significant, or where danger to individuals exists with the potential for loss of life.

Part 315 of the Dam Safety Program also requires that dam owners prepare and keep current, Emergency Action Plans (EAP) for all high hazard and significant hazard potential dams. An EAP is a plan developed by the owner that establishes notification procedures for its departments, public off-site authorities, and other agencies of the emergency actions to be taken before and following an impending or actual dam failure.

Lapeer County Perspective and Vulnerability

Lapeer County has a total of 35 dams. 28 dams are rated as a Low Hazard, 6 dams are rated as a Significant Hazard and 1 dam is rated as a High Hazard. The hazard classifications assess potential damage if the dam were to fail, rather than assessing the structural condition of the dam. With 7 dams classified as having significant or high hazard potential, and the reality of an aging infrastructure, dam failure is a significant hazard in Lapeer County. See **Figure 2-12** for a

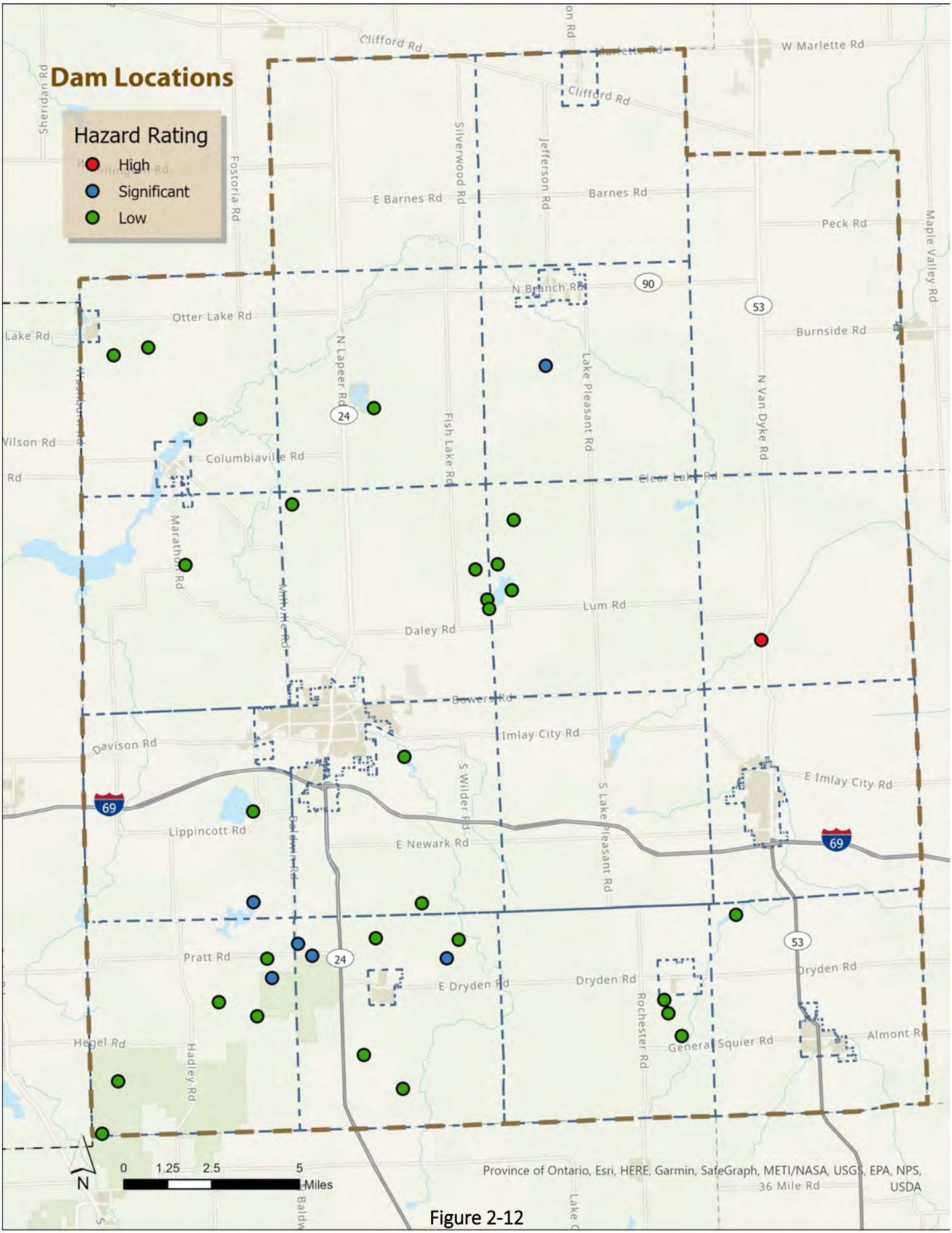


Figure 2-12

Source: Genesee County GIS

map of Lapeer County dams.

Costs associated with dam failures include deaths, injuries, loss of infrastructure, damage to property, temporary housing, use of emergency personnel and clean-up afterwards. Lapeer County has no prior history of dam failure, so potential costs are taken from other communities' experiences. In May of 2003, Silver Lake Dam in the city of Marquette, Michigan failed. More than 1,800 people were evacuated from the city, and the total damages were estimated at more than $100,000,000. That figure includes $10,000,000 in utility facility damages, $4,000,000 in environmental damages, and $3,000,000 in road and bridge damages. On May 19, 2020, the Edenville Dam in Midland County failed resulting in about $200 million in damages to more than 2,500 buildings. Some 10,000 people were forced to evacuate their homes in Midland, Gladwin, and Saginaw Counties due to the failure. Based on the information provided above, if a dam failure were to occur in Lapeer County, it could potentially cost millions.

Mitigation Strategies for Dam Failure

The following strategies are suggested to minimize the effects of Lapeer County's number 11 hazard, dam failure:

- Assess Dam Integrity
- Repair of Critical Dams
- Identify Area Potentially Affected by Hazard
- Public Education
- County Hazard Mitigation Project Manager

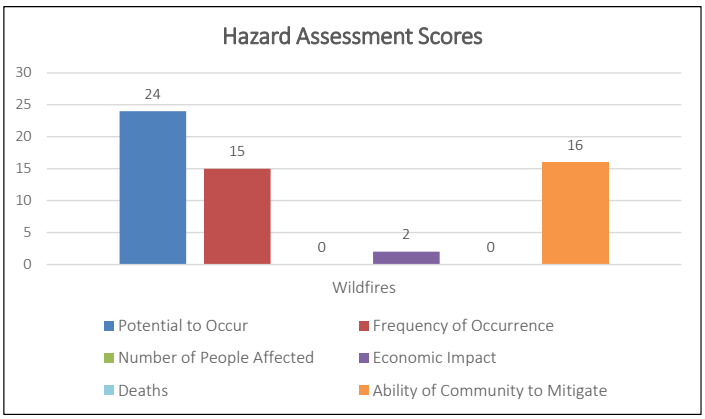
New Mitigation Projects

None

Previously Included Mitigation Projects

None

#11 - Wildfires



Wildfires

A wildfire is an uncontrolled fire in grasslands, brush lands or forested areas.

Hazard Description

Wildfires are ranked as the number 11 hazard in Lapeer County. Forests cover approximately 49 percent (18.2 million acres) of Michigan's total land base. These vast forests provide Michigan with the largest state-owned forest system in the United States. In addition, Michigan has the fifth largest timberland acreage, with 4.2 million acres of softwoods and 13.1 million acres of hardwoods. That vast forest cover is an asset for both industry and recreation. However, it also makes many areas of Michigan highly vulnerable to wildfires. Although Michigan's landscape has been shaped by wildfire, the nature and scope of the wildfire threat has changed. Since Michigan's landscape has changed substantially over the last several decades due to wild land development, the potential danger from wildfires has become more severe.

Increased development in and around rural forested areas (a 63 percent increase in the number of rural homes during the 1980s) has increased the potential for loss of life and property from wildfires. There are simply not enough fire suppression forces available in rural areas to protect every structure from wildfire. Contrary to popular belief, lightning strikes are not the primary cause of wildfires in Michigan. Today, only about 2% of all wildfires in Michigan are caused by lightning strikes; the rest are caused by human activity. Outdoor burning is the leading cause of wildfires in Michigan. Most Michigan wildfires occur close to where people live and recreate, which puts both people and property at risk. The immediate danger from wildfires is the destruction of timber, property, wildlife, and injury or loss of life to persons who live in the affected area or who are using recreational facilities in the area.

Lapeer County Perspective and Vulnerability

According to Michigan Department of Natural Resources - Forest Management Division records, there were 44 wildfires between 1981-1998, and 416.2 acres burned in Lapeer County. According to the City of Lapeer Fire Department, in the past 10 years, there were 11 wildfires/grassfires that were 5 acres or larger in Lapeer County. Even though these numbers are low in comparison to wildfires in northern Michigan, the probability of a wildfire in Lapeer County is still high. Statewide, there is an expected loss of $1.1 million to wildfires annually (Michigan Hazard Mitigation Plan).

Mitigation Strategies for Wildfires

The following strategies are suggested to minimize the effects of Lapeer County's number 11 hazard, wildfires:

- Public Education
- Update Disaster Response Plan
- Training for Responders
- Update Fire Fighting Equipment
- Ban Open Burning
- County Hazard Mitigation Project Manager

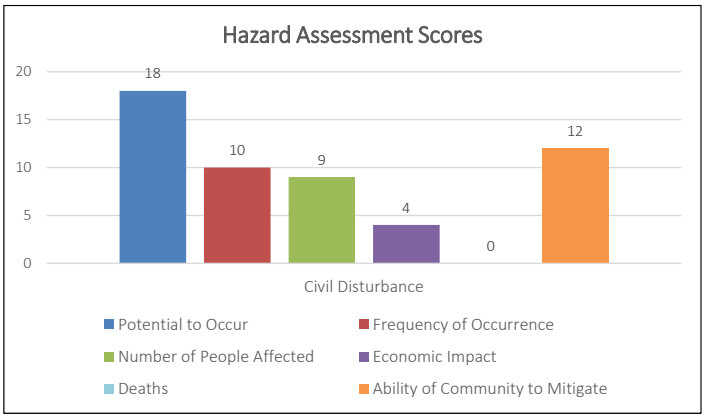
New Mitigation Projects

None

Previously Included Mitigation Projects

None

#12 - Civil Disturbance



Civil Disturbance

Civil disturbance is a public demonstration or gathering, or a prison uprising, that results in a disruption of essential functions, rioting, looting, arson or other unlawful behavior.

Hazard Description

Civil disturbance is ranked as the number 12 hazard in Lapeer County. Large-scale civil disturbances rarely occur, but when they do they are usually an offshoot or result of one or more of the following events: 1) labor disputes where there is a high degree of animosity between the participating parties; 2) high profile/controversial judicial proceedings; 3) the implementation of controversial laws or other governmental actions; 4) resource shortages caused by a catastrophic event; 5) disagreements between special interest groups over a particular issue or cause; or 6) a perceived unjust death or injury to a person held in high esteem or regard by a particular segment of society. An example of a civil disturbance includes prison uprisings. Prison uprisings are normally the result of perceived injustice by inmates regarding facility rules, operating policies and/or living conditions, or insurrections started by rival groups or gangs within the facility.

Lapeer County Perspective and Vulnerability

In recent years, there have been many protests across the country that have escalated to rioting, looting, and other acts of violence. These riots are the result of civil unrest related to racial inequalities as well as political ideologies. However, in June 2020 a large-scale peaceful assembly was held in Lapeer to acknowledge the Black Lives Matter movement. Although this assembly did not escalate to violence and was entirely peaceful, it is important for local officials to be prepared for these situations that could potentially become threatening.

On May 4, 2004, members of the United Food and Commercial Workers Local 87 were locked out of their jobs at Vlasic Foods Inc. for 40 days during labor negotiations. Union members picketed the plant for the duration of the lockout.

Historically, there have only been minor civil disturbances in Lapeer County. The Vlasic strike in 2004 was one of the County's larger disturbances, as Vlasic is one of the top employers in the County with 300 employees. Additionally, the county's level 2 security prison provides great potential for a major civil disturbance. While Lapeer County has been fortunate to date, a major civil disturbance cannot be discounted.

Mitigation Strategies for Civil Disturbance

The following strategies are suggested to minimize the effects of Lapeer County's number 12 hazard, civil disturbance:

- Training for Responders
- Update Response Equipment
- Utilize Wireless Emergency Alerts
- Public Education
- County Hazard Mitigation Project Manager

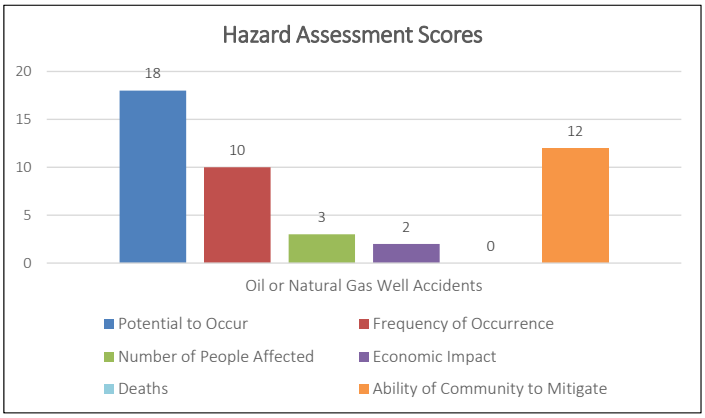
New Mitigation Projects

None

Previously Included Mitigation Projects

None

#13 - Oil and Natural Gas Well/Pipeline Accidents



Oil and Natural Gas Well/Pipeline Accidents

Oil and natural gas well/pipeline accidents are an uncontrolled release of oil or natural gas, or the poisonous by-product hydrogen sulfide, form production wells or pipelines.

Hazard Description

Oil and natural gas well/pipeline accidents are ranked as the number 13 hazard for Lapeer County. Accidents from oil and natural gas wells and pipelines are ranked as the number thirteen hazard in Lapeer County. Oil and natural gas are produced from fields scattered across 61 counties in the Lower Peninsula. Since 1925, over 41,000 oil and natural gas wells have been drilled in Michigan, of which roughly half have produced oil and gas. To date, Michigan wells have produced approximately 1.2 billion barrels of crude oil and 3.6 trillion cubic feet of gas. The petroleum and natural gas industry is highly regulated and has a fine safety record, but the threat of accidental releases, fires and explosions still exists.

Michigan is both a major consumer and producer of natural gas and petroleum products. According to the Michigan Public Service Commission (MPSC), approximately 25% of the natural gas consumed in Michigan is produced within the state. The remaining 75% is imported by five interstate pipeline companies that have access to the major natural gas producing regions in North America. Michigan cycles more natural gas through its storage system than any other state. Michigan ranks 11th in the nation in production of natural gas and ranks 6th in consumption at 937.2 billion cubic feet. Michigan's petroleum product consumption in 1997 was 189 million barrels, ranking it 10th nationally.

These figures underscore the fact that vast quantities of petroleum and natural gas are extracted from, transported through, and stored in the state, making many areas vulnerable to petroleum and natural gas emergencies. Michigan's gas and petroleum networks are highly developed and extensive, representing every sector of the two industries – from wells and production facilities, to cross-country transmission pipelines that bring the products to market, to storage facilities, and finally to local distribution systems. Even though pipelines are by far the safest form of transportation for these products, the threat of fires, explosions, ruptures, and spills nevertheless exists.

Petroleum and natural gas pipelines can leak or erupt and cause property damage, environmental contamination, injuries, and even loss of life. Many pipeline accidents that occur in Michigan are caused by third party damage to the pipeline, often due to construction or some other activity that involves trenching or digging operations.

In addition to these hazards, many of Michigan's oil and gas wells contain extremely poisonous hydrogen sulfide (H2S) gas. Hydrogen sulfide is a naturally occurring gas mixed with natural gas or dissolved in the oil or brine and released upon exposure to atmospheric conditions. Over 1,300 wells in Michigan have been identified as having H2S levels exceeding 300 parts per million (ppm).

At concentrations of 700 ppm, as little as one breath of hydrogen sulfide can be deadly as seen in **Table 2-15**. Although hydrogen sulfide can be detected by a "rotten egg" odor in concentrations from .03 ppm to 150 ppm, larger concentrations paralyze a person's olfactory nerves so that odor is no longer an indicator of the hazard. Within humans, small concentrations can cause coughing, nausea, severe headaches, irritation of mucous membranes, vertigo, and loss of consciousness.

Hydrogen sulfide forms explosive mixtures with air at temperatures of 500 degrees Fahrenheit or above and is dangerously reactive with powerful oxidizing

Table 2-15 Physiological Responses to Hydrogen Sulfide (H2S)	
10 ppm	Beginning eye irritation
50-100 ppm	Slight conjunctivitis and respiratory tract irritation after 1 hour of exposure
100 ppm	Coughing, eye irritation, loss of sense of smell after 2-15 minutes. Altered respiration, pain in the eyes and drowsiness after 15-30 minutes followed by throat irritation after 1 hour. Several hours of exposure results in gradual increase in severity of these symptoms and death may occur within the next 48 hours.
200-300 ppm	Marked conjunctivitis and respiratory tract irritation after 1 hour of exposure.
500-700 ppm	Loss of consciousness and possibly death in 30 minutes to 1 hour
700-1000 ppm	Rapid unconsciousness, cessation of respiration and death.
1000-2000 ppm	Unconsciousness at once, with early cessation of respiration and death in a few minutes. Death may occur even if the individual is removed to fresh air at once.

Source: American National Standards Institute, Standard: 237.2-1972

materials. Hydrogen sulfide can also cause the failure of high-strength steels and other metals.
This requires that all company and government responders be familiar not only with emergency procedures for the well site, but also with the kinds of materials that are safe for use in sour gas well response.

Lapeer County Perspective and Vulnerability

In Lapeer County, there are 12 gas wells, of which only one is currently producing. There are also 83 oil wells with only 15 currently producing (United States Geological Survey GIS Data); see **Figure 2-13** for a map of oil and gas wells in Lapeer County. This is a relatively small quantity when compared to the State leader, Otsego County, with over 6,200 drilled wells of which 1,900 are active (Shale XP Online Oil and Gas Research and Visualization Tool). When drilling for gas or oil in certain geologic formations, a saltwater solution becomes mixed with the gas or oil. This saltwater, or brine, must be separated out from the gas or oil. After the brine is pumped out from the gas or oil, it can be used for dust control on dirt roads if it meets a certain chemical composition. Otherwise, the brine is disposed of by injecting it into a non-productive well. This well is then referred to as a brine disposal well. According to the US Department of Transportation Pipeline and Hazardous Materials Safety Administration, there has been one oil and natural gas well/pipeline incidents in the past 10 years. During this event, there were no deaths, no injuries, and $9,811 in damages. This assumes that roughly $981 in damages may occur on an annual basis due to oil and gas well/pipeline incidents. The incidents listed below are included from the previous plan update. The Lapeer County EMAC could not recall any other events that have occurred in the past 10 years.

- On August 26, 1991, 1,000 gallons of oil spilled from an inactive oil field in Marathon Township.

Mitigation Strategies for Oil and Natural Gas Well/ Pipeline Accidents

The following strategies are suggested to minimize the effects of Lapeer County's number 13 hazard, oil and natural gas well/pipeline accidents:

- Training for Responders
- Update Response Equipment
- Update Inventory of Oil and Natural Gas Wells
- County Hazard Mitigation Project Manager

New Mitigation Projects

None

Previously Included Mitigation Projects

None

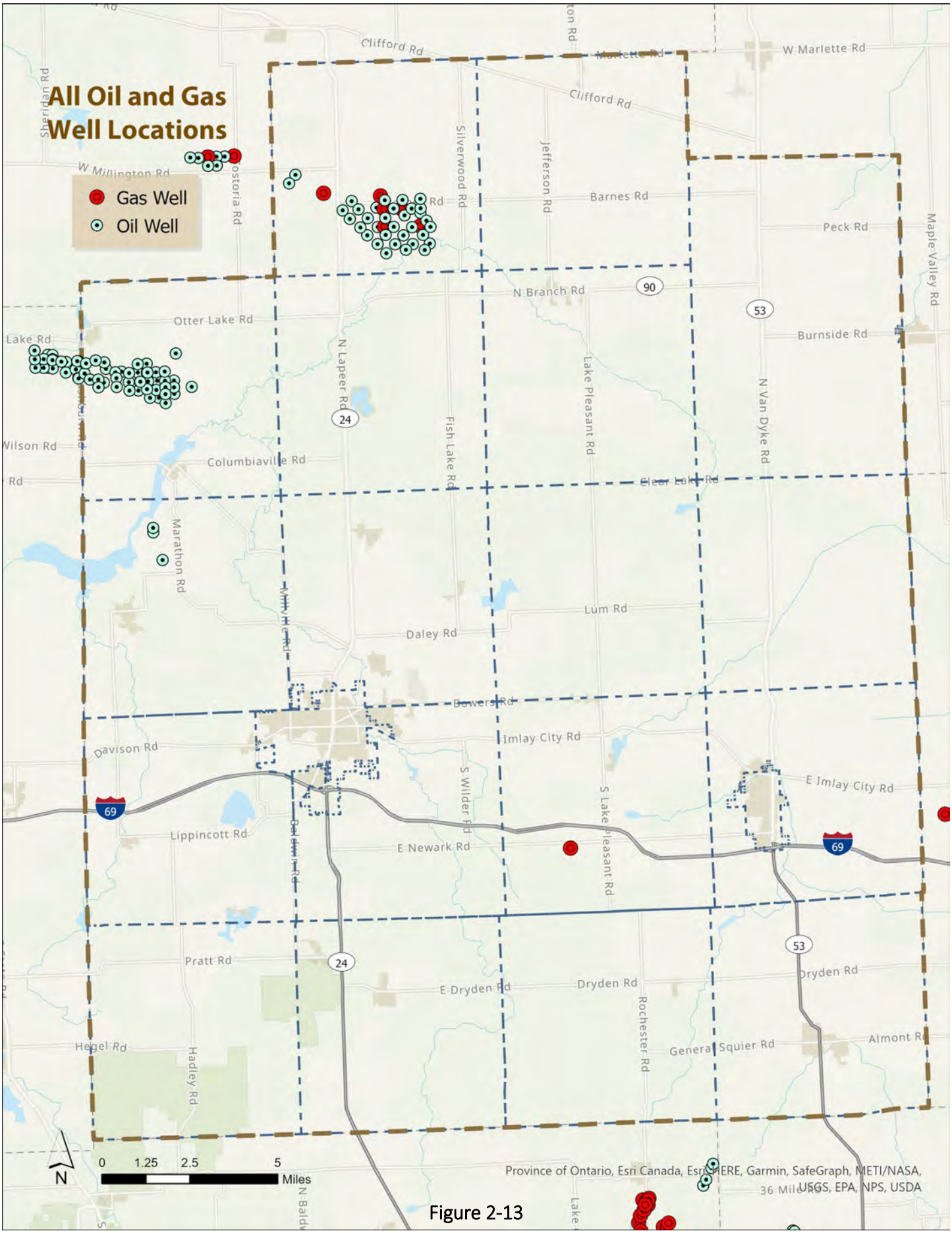
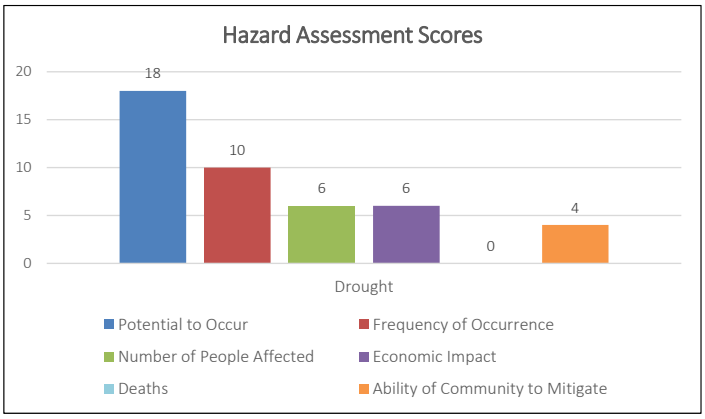


Figure 2-13

Source: US Geological Survey Data

#14 - Drought



Drought

Drought is a water shortage caused by a deficiency of rainfall, generally lasting for an extended period of time.

Hazard Description

Drought is ranked as the number 14 hazard in Lapeer County. Drought is a normal part of the climate of Michigan and of virtually all other climates around the world – including areas with high and low average rainfall. Drought differs from normal arid conditions found in low rainfall areas in that aridity is a permanent characteristic of that type of climate.

Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. The severity of a drought depends not only on its location, duration, and geographical extent, but also on the water supply demands made by human activities and vegetation. This multi-faceted nature of the hazard makes it difficult to define a drought and assess when and where one is likely to occur.

Drought differs from other natural hazards in several ways. First, it is difficult to determine the exact beginning and end of a drought, since its effects may accumulate slowly and linger even after the event is generally thought of as being over. Second, the lack of a clear-cut definition of drought often makes it difficult to determine whether one actually exists, and if it does, its degree of severity. Third, drought impacts are often less obvious than other natural hazards, and they are typically spread over a much larger geographic area. Fourth, due primarily to the aforementioned reasons, most communities do not have in place any contingency plans for addressing drought. This lack of pre-planning can greatly hinder a community's response capability when a drought does occur.

Droughts can cause many severe impacts on communities and regions, including: 1) water shortages for human consumption, industrial, business and agricultural uses, power generation, recreation and navigation; 2) a drop in the quantity and quality of agricultural crops; 3) decline of water quality in lakes, streams and other natural bodies of water; 4) malnourishment of wildlife and livestock; 5) increase in wildfires and wildfire-related losses to timber, homes and other property; 6) declines in tourism in areas dependent on water-related activities; 7) declines in land values due to physical damage from the drought conditions and/or decreased economic or functional use of the property; 8) reduced tax revenue due to income losses in agriculture, retail, tourism and other economic sectors; 9) increases in insect infestations, plant disease, and wind erosion; and 10) possible loss of human life due to food shortages, extreme heat, fire, and other health-related problems such as diminished sewage flows and increased pollutant concentrations in surface water.

Lapeer County Perspective and Vulnerability

According to the National Centers for Environmental Information, there have been two drought events in Lapeer County in the past 20 years. Those two events are explained below. See **Table 2-16** for a list of recent droughts in Lapeer County.

Table 2-16 Lapeer County Droughts

Date	Crop Damage
7/1/2001	$150,000,000
9/1/2002	$0

Source: National Oceanic and Atmospheric Administration

September 1 – September 30, 2002:

The month of September turned out to be like much of the summer of 2002 was, hot and dry. The dry weather was especially severe from the northern

suburbs of Detroit to the Tri Cities and thumb. The monthly rainfall total of 0.29 inches recorded at Flint Bishop Airport was the lowest ever recorded for September, making the month the driest September on record for the city of Flint. The 0.39 inches recorded in Saginaw made it the second driest September on record. Flint, Saginaw, and Detroit metro airport received less than .05 inches of precipitation during the first half of the month. The dryness was only worsened by the heat. Several record highs were set throughout eastern Michigan during the month of September. After an extremely hot and dry July and August, the weather of September 2002 only exasperated drought conditions. During the first half of the month, hundreds of communities across the area were under water restrictions. Hardest hit from the drought was the agricultural industry. September yields across most of the area were estimated to be fewer than 50 percent, and many counties across eastern Michigan were declared agricultural disaster areas. At the time of this publication, an estimate of monetary damages due to crop loss was not available. Lapeer County was one of the communities affected by this event. (Excerpts from NOAA storm summary)

July 1 – July 31, 2001 (The damage was estimated to be $150 Million in affected areas):

An upper level high-pressure ridge dominated the weather pattern across southeast Michigan beginning late June and continuing through the month of July. This ridge prevented the development of widespread thunderstorms and prevented rainfall from moving into the region from the west. While there were occasional isolated thunderstorms, much of the region suffered a pronounced dry spell. The lack of rainfall put a hardship on the area's water supply and measures were taken to curb usage. This included prohibiting outdoor watering in many communities in Macomb, Washtenaw, Genesee, Oakland, and Wayne counties. During the five-week period ending July 28th, Detroit Metro Airport officially reported only 0.32 inches of rainfall. This became Detroit's 11th driest month on record. With 1.59 inches, this was Flint's 10th driest month on record. In contrast to July, April through early June saw slightly above normal precipitation. This wet spring delayed planting of crops and resulted in shallower than normal rooting systems for crops already established. By mid-summer, however, the upper air pattern changed, and rainfall waned. In terms of timing, the drought impacted many summer crops during moisture-sensitive growth stages of greatest water need, leading to moisture stress that peaked by mid-August. It was estimated that yields of corn, dry beans and soybeans were 1/3 from normal. Rains returned to the region in mid and late August. Too late, however, to reverse the negative effects from mid-summer. At the date of this publishing, an estimate dollar amount of damage to area crops is unknown. Lapeer County was one of the communities affected by this event. (Excerpts from NOAA storm summary)

Lapeer County faced severe drought conditions in 2001 and 2002. Farmers reported crop yields that were 30 to 50 percent below average. As of the 2017 Agricultural Census, there were 1,013 farms located throughout Lapeer, with a total acreage of 165,464 and an average farm size of 163 acres. The 2017 Agricultural Census shows market value of agricultural products in Lapeer County to be $69 million. A 30 to 50 percent crop loss would equate to an annual market value loss of $20.7 million to $34.5 million. This is a significant hazard for Lapeer County.

Mitigation Strategies for Drought

The following strategies are suggested to minimize the effects of Lapeer County's number 14 hazard, drought:

- Water Ration Program for Drought Conditions
- Water Conservation Program
- Public Education
- County Hazard Mitigation Project Manager

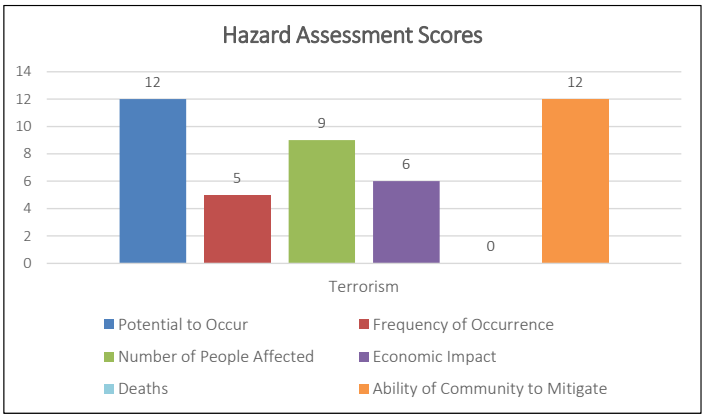
New Mitigation Projects

None

Previously Included Mitigation Projects

None

#14 - Terrorism



Terrorism

Terrorism is an intentional unlawful use of force, violence or subversion against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political, social, or religious objectives.

Hazard Description

Terrorism is ranked as the number 14 hazard in Lapeer County. In today's world, terrorism can take on many forms, although civilian bombings, assassination and extortion are probably the methods with which we are most familiar. Internationally, such acts have, unfortunately, become quite commonplace, as various religious, ethnic, and nationalistic groups have attempted to alter and dictate political agendas, seek revenge for perceived past wrongdoing, or intentionally disrupt the political, social and economic infrastructure of individual businesses, units of government, or nations.

The Middle East and parts of Europe have been hard hit by acts of terrorism over the past several decades. Parts of Asia and South America have also experienced a high level of activity. Tragically, with the events of September 11, 2001, terrorism has now occurred on our own soil. Equally alarming is the rapid increase in the scope and magnitude of terrorism methods and threats, which now include: 1) nuclear, chemical, and biological weapons; 2) information warfare such as cyberattacks; 3) ethnic/religious/gender intimidation (hate crimes); 4) state and local militia groups that advocate the overthrow of our government; 5) eco-extremism, designed to destroy or disrupt specific research or resource-related activities; and 6) widespread and organized narcotics (and other contraband) smuggling and distribution organizations.

Just as the methods and potential investigations have increased, so too have the potential targets of terrorism. As recent events across the country have shown, virtually any public facility or infrastructure, or place of public assembly can be considered a target of terrorism. In addition, certain types of businesses engaged in controversial activities are also potential targets. With the advent of the information age and growth in the number of computer "hackers", computer systems are potential targets as well (especially those of government agencies, large businesses, financial institutions, health care facilities, and colleges/universities).

One of the primary common denominators of most terrorists is their general desire for organizational recognition, but not necessarily individual recognition. They often seek publicity for their "cause" or specific agenda, but they go to great lengths to avoid individual detection by law enforcement agencies.

The exception to this might be individuals and organizations involved in narcotics or other contraband smuggling and distribution, who seek to keep their clandestine operations out of public and law enforcement scrutiny. Another commonality is that innocent people are always the ones that suffer the most in these senseless and cowardly criminal acts.

Lapeer County Perspective and Vulnerability

Lapeer County has several government buildings, churches, stadiums, recreation facilities, and many other large facilities that accommodate many people. Any government building or individual can become a target of domestic terrorism. Although in recent years no violent acts of domestic terrorism have taken place in Lapeer County, other examples of terrorism across the country can be used since there is always potential for these events to occur in this community. On April 15, 2013, the Boston Marathon was the target of a bombing. Lapeer County and downtown Lapeer in particular, hold many large-scale public events and officials should be aware of a possible threat. The horrific events of September 11, 2001 have shown that anyone, anywhere, at any point in time, can be a target of terrorism. All citizens now have a responsibility to be aware of any situation that may indicate this type of threat, and to inform law enforcement of what may be occurring.

Although at first it might appear Lapeer County is an unlikely target for terrorism, it cannot be totally discounted. Potential targets include: major natural gas lines running north/south that serves the metropolitan southeast Michigan areas; a water line that travels east/west serving Lapeer and continues into Genesee County; major transportation routes; and all industrial sites in the area. Furthermore, any government building or individual can become a target of domestic terrorism.

Mitigation Strategies for Terrorism

The following strategies are suggested to minimize the effects of Lapeer County's number 14 hazard, terrorism:

- Prepare Vulnerability Studies for Critical Infrastructure
- Training for Responders
- Enforce Homeland Security Directives
- Updated Disaster Response Plan
- Training for Critical Infrastructure Employees
- County Hazard Mitigation Project Manager

New Mitigation Projects

None

Previously Included Mitigation Projects

Attica Township

Project: Backup generator. Project description: Purchase of a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $45,000. Update: Not provided.

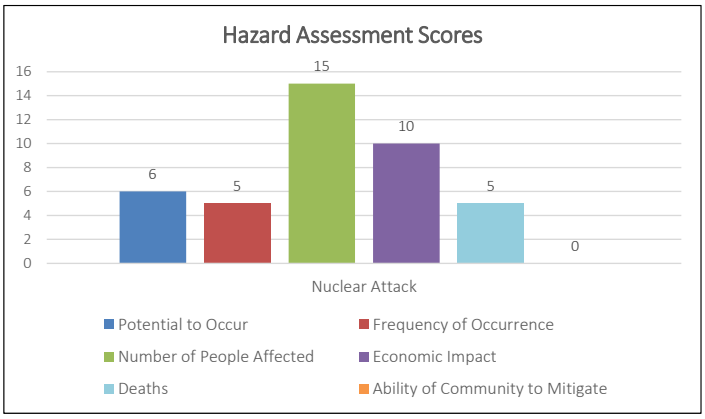
City of Lapeer

Project: Backup generator. Project description: Purchase of 1 large and 2 small (portable) backup generators to maintain sewage lift stations and traffic signals. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: This project is still ongoing.

Village of Otter Lake

Project: Backup generator. Project description: Purchase a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $25,000 . Update: Not provided.

#15 - Nuclear Attack



Nuclear Attack

Nuclear attacks are any large-scale hostile action taken against the United States which involves nuclear weapons and results in destruction of military and/or civilian targets.

Hazard Description

Nuclear attack is ranked the number 15 hazard in Lapeer County. The United States is vulnerable to several national security threats from external, hostile forces. National security threats include nuclear attack, chemical and biological warfare, and terrorism. The potential for damage resulting from a national security emergency ranges from the relatively localized damage caused by a terrorist attack using weapons of mass destruction, to the catastrophic devastation that could be expected following a full-scale nuclear attack. This section focuses on the nuclear attack threat. Information on terrorism and other hostile acts of destruction are addressed in this document under the hazard "Terrorism".

World events in recent years have greatly changed the nature of the nuclear attack threat against the United States. The breakup of and establishment of democratic forms of government in the former Soviet Union and other Soviet-Bloc nations in Eastern Europe has essentially ended the "Cold War" that shaped and influenced world politics since the late 1940s. That tremendous turn of events has, for all intents and purposes, reduced the need for the United States and former Soviet states to maintain huge stockpiles of nuclear weapons. The reduction in nuclear weapons stockpiles that has occurred over the past few years in both countries has diminished the threat of a full-scale, massive nuclear attack that would threaten the very existence of the world as we know it.

However, while the threat of attack has diminished, it is still a possibility due to the large number of nuclear weapons still in existence in present-day Russia and throughout the rest of the world. Even though an International Nuclear Non-Proliferation Treaty is in place, several countries are thought to be actively pursuing the development of nuclear weapons. In addition, internal instability and strife within Russia and some of its neighboring countries could cause the region to fall back under its previous form of government, which could potentially revive a larger-scale nuclear attack threat. Both Russia and U.S. nuclear weapons systems remain on high alert, which increases the risk of an accidental nuclear launch that could spawn a nuclear counterattack. Given the state of Russia's aging nuclear technical systems, that scenario is not out of the realm of possibility.

Although the nature and scope of an attack at this time would likely be reduced from previous possibilities, the potential impact on the country would still be devastating. Despite the fact that it is based on a fully-armed and functional Soviet Union as an adversary, the Federal Emergency Management Agency (FEMA) attack planning guidance provided in the document "Nuclear Attack Planning Base 1990" (NAPB-90) remains the basis for the population protection strategy adopted for Michigan.

This strategy is incorporated in the Michigan Emergency Management Plan (MEMP) and most local Emergency Operations Plans (EOP). The NAPB report identifies potential aiming points or target areas throughout the United States. These targets were categorized into seven classifications: 1) commercial power plants; 2) chemical facilities; 3) counterforce military installations; 4) other military bases; 5) military support industries; 6) refineries; and 7) political targets. The potential size, or yield, and the height of burst were postulated for each target. The State of Michigan has 25 target areas. In addition, four target areas near the Ohio and Indiana borders directly affect Michigan jurisdictions.

The NAPB report was an attempt by FEMA to devel-

op a risk assessment of a potential attack upon the United States.

Targets are identified using specific criteria, part of which involved the target's importance to counter-attack measures. For this reason, not all chemical facilities, for example, are included. Further, designation as a target area does not imply that all targets will be affected equally. The NAPB-90 planning base is, by design, a worse case nuclear scenario. Even though the situation in the former Soviet Union and its neighboring countries has changed dramatically, the NAPB report still contains some valid assumptions about a potential nuclear attack upon the United States.

Lapeer County Perspective and Vulnerability

Although an unlikely hazard to occur in Lapeer County, potential nuclear attacks cannot be overlooked. Russia still maintains a fully capable nuclear arsenal and many smaller nations are working towards a nuclear capability. A single weapon could cause death and destruction on a massive scale. Nuclear weapons inflict damage over a wide area and through a variety of effects. Thus, it makes sense to continue to prepare for a nuclear attack hazard as part of an overall emergency management strategy.

Mitigation Strategies for Nuclear Attack

The following strategies are suggested to minimize the effects of Lapeer County's number 15 hazard, nuclear attack:

- Updated Disaster Response Plan
- Enhance Warning System
- Training for Responders
- County Hazard Mitigation Project Manager

New Mitigation Projects

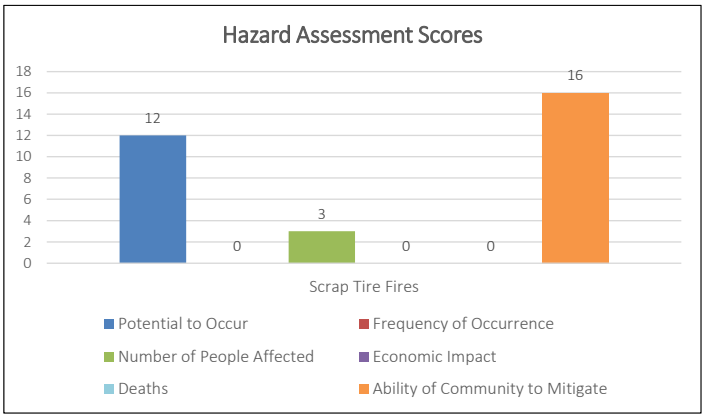
Almont Township

Project: Warning sirens. Project description: Install an early hazard warning system with 4 sirens at various locations in the Township not covered by a warning system. Proposed timeframe for implementation: 1 - 5 years. Budget: $110,000 - $120,000. Update: None, this is a newly submitted project.

Previously Included Mitigation Projects

None

#16 - Scrap Tire Fires



Scrap Tire Fires

A scrap tire fire is a large fire that burns scrap tires which are being stored for recycling or re-use.

Hazard Description

Scrap tire fires are ranked the number 16 hazard in Lapeer County. With the disposal of an estimated 290 million vehicle tires annually in the United States, management of scrap tires has become a major economic and environmental issue. Michigan generates ten million scrap tires each year. Although responsible means of disposal have become more common, tire dumps of the last forty years present environmental and safety hazards that will last into the foreseeable future. According to EGLE, as of August 2018, it is estimated there are 17,000 scrap tires around Lapeer County and over 1.2 million scrap tires in regulated/registered scrap tire collection sites across the state. Issues pertaining to the management of scrap tire disposal sites are difficult and diverse. Whole tires are difficult to landfill because they tend to float to the surface and are banned by many licensed landfills due to associated problems. In addition, scrap tires are breeding grounds for mosquitoes, which can reproduce at 4,000 times their natural rate in a scrap tire disposal site. From an emergency management perspective, the most serious problem that scrap tire disposal sites pose is that they can be a tremendous fire hazard if not properly designed and managed.

Lapeer County Perspective and Vulnerability

With hundreds of scrap tires reported in scrap tire collection sites in Lapeer County, a fire would be extremely dangerous and difficult to put out. Although there is potential for scrap tire fires in Lapeer County, there have been no reported significant scrap tire fires in the county over the past 10 years. See **Figure 2-14** below for a map of scrap tire inventory across the state of Michigan. See **Table 2-17** for a list of these sites.

Mitigation Strategies for Scrap Tire Fires

The following strategies are suggested to minimize the effects of Lapeer County's number 16 hazard, scrap tire fires:

- Inventory Scrap Tire Storage Facilities
- Training for Responders
- Storage and Disposal Education and Enforcement
- County Hazard Mitigation Project Manager

New Mitigation Projects

None

Previously Included Mitigation Projects

None

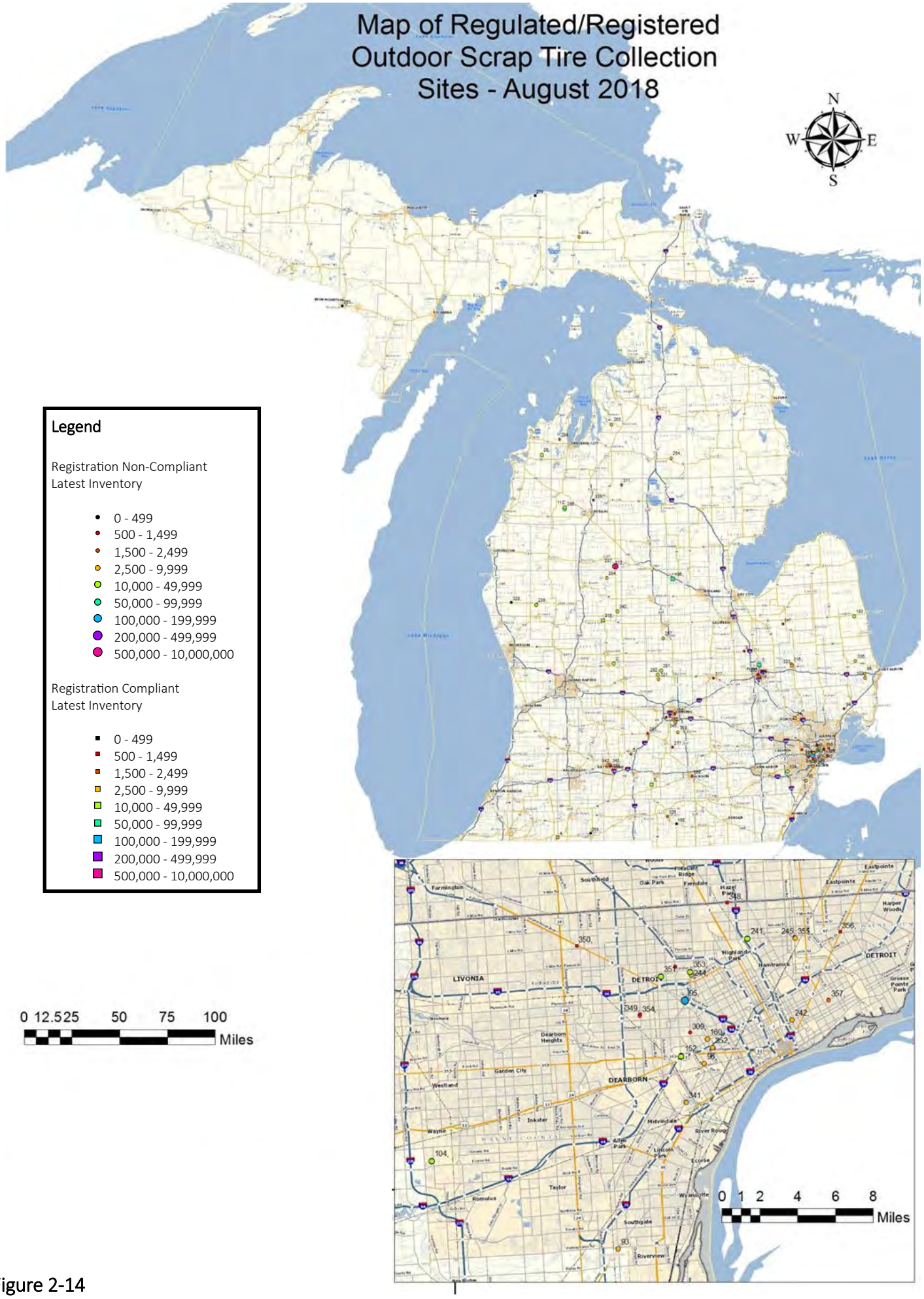


Figure 2-14

Source: Michigan Department of Environment, Great Lakes, and Energy

Table 2-17 Scrap Tire Collection/Processing Sites				
ID	Name	City	District	Inventory
4	Entech, Inc.	White Pigeon	Kalamazoo	3,000
5	Huffman Rubber	Homer	Kalamazoo	40,000
7	Environmental Rubber Recycling	Flint	Lansing	80,000
8	First Class Tire Shredders	Clio	Lansing	500
10	Wingfoot Commercial Tire Sys LLC	Lansing	Lansing	500
24	Warehouse Tire	Pontiac	SE MI	6,900
175	GM-Milford Proving Grounds	Milford	Lansing	1,000
176	Quality Dairy Company (Discount Tire Company)	Lansing	Lansing	500
186	CM Rubber Technologies	Coleman	Saginaw Bay	64,080
198	Jefferson Township Transfer Station	Osseo	Jackson	499
253	Great American Environmental Services	Kingsford	Marquette	317
269	Cobalt Holddings LLC	Sturgis	Kalamazoo	1
270	Monache Construction and Sanitation	Grand Marais	Marquette	450
315	Larry's Tire, Inc.	Lakeview	Grand Rapids	22,300
323	Lapeer County Road Commission	Lapeer	Lansing	200
328	Oceana County Transfer Station	Shelby	Grand Rapids	1
339	Saddler Road Property	Luther	Cadillac	600
345	KJB Ventures	Holt	Lansing	3,500
346	Mikhos Auto Sales	Lansing	Lansing	2,000
347	Tire Maxx	Livonia	SE MI	1,270
348	JR Auto Sales Inc DBA A1 Kelly Tire	Detroit	SE MI	1,194
349	Bills Tire & Rims Inc	Detroit	SE MI	704
350	National Tire Express, Inc.	Detroit	SE MI	931
356	Leevs A-1 Tires, Inc.	Detroit	SE MI	1,499

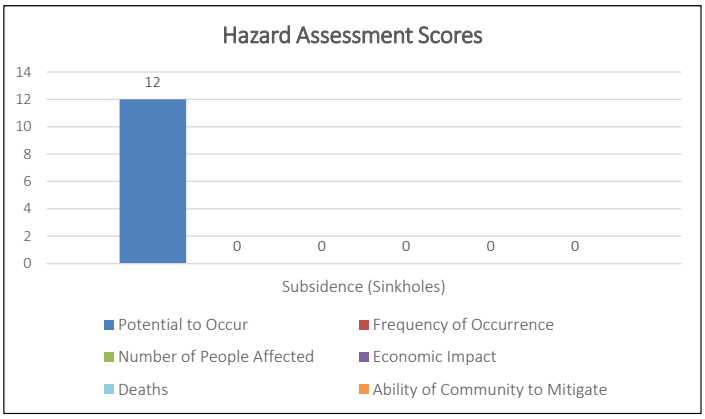
Scrap Tire Collection Sites				
ID	Name	City	District	Inventory
2	Pitsch Recycling & Disposal, Inc.	Belding	Grand Rapids	10,000
6	Trading Dutchman	Bellevue	Kalamazoo	2,400
25	669 Salvage	Interlochen	Cadillac	10,000
93	Big 4 Auto Parts	Riverview	SE MI	5,000
94	Boss Technologies	New Haven	SE MI	1,000
95	Techno Rubber	Detroit	SE MI	112,885
96	Heavy T's Auto	Detroit	SE MI	4,000
99	Lewis Family Tires	Goodells	SE MI	3,500
102	Norman Rusch	Smiths Creek	SE MI	4,000
104	William Connolly	Romulus	SE MI	10,500
112	William Loudin Property	Harrietta	Cadillac	10,000
152	Warholak Tire Service	Detroit	SE MI	11,660
160	Stramaglia World Trade Center	Detroit	SE MI	9,500
183	Carsonville Salvage	Carsonville	Sagianw Bay	15,000
199	Huco, Inc.	Jackson	Jackson	2,000
239	Lowell Webster	Fremont	Grand Rapids	20,798
241	McCormick Auto Parts	Detroit	SE MI	15,000
242	Long & Sons Auto Wrecking	Detroit	SE MI	5,200
244	Intervale Excavating & Demolition	Detroit	SE MI	3,000
245	McNichols Scrap Iron and Metal	Detroit	SE MI	500
257	Clifford Wetzel Property	Ithaca	Lansing	2,500
263	Swain's Junk Yard	Mancelona	Gaylord	3,500
264	William's Junk Yard	Grayling	Gaylord	3,000
277	Howard Hector	Eaton Rapids	Lansing	800
281	Rich Ro Farms (Colony)	Saint Johns	Lansing	30,000
282	Rich Ro Farms (Wacousta Rd.)	Saint Johns	Lansing	30,000
283	Charlotte Iron and Metal	Charlotte	Lansing	800
284	Karry Moline	Evart	Grand Rapids	5,000
287	Schumacher Salvage	Sears	Cadillac	500,000
289	Ultimate Tires & Auto Repair, Inc.	Detroit	SE MI	530
294	Michael Williams	Cedar	Cadillac	2,000

Source: Michigan Department of Environment, Great Lakes, and Energy

Scrap Tire Collection Sites (Continued)				
ID	Name	City	District	Inventory
296	John Tripp, Jr.	Harrietta	Cadillac	50,000
309	Omni Warehousing, LLC	Detroit	SE MI	1,000
311	VanBrooklin Auto Salvage	Lake City	Cadillac	2,000
312	Don Ruegsegger	Sears	Cadillac	1,500
313	Richard Brow & Sons Property	Newberry	Marquette	3,000
316	Lapeer County Road Commission	Lapeer	Lansing	200
317	Specialty Salvage	Owosso	Lansing	1,300
318	Juanita Hawkins	Mason	Lansing	8,000
319	Warehouse (Brandon Tire Site)	Flint	Lansing	2,000
320	Warehouse 2 (Brandon Tire Site)	Flint	Lansing	800
321	Berlyn Acres	Fowler	Lansing	8,000
326	A Used Tire Specialist	Hillsdale	Jackson	2,000
333	Brandon Tire (Sam's Scrap Tire)	Flint	Lansing	3,200
336	Renos	Flint	Lansing	8,000
338	Corey Bouyer	Battle Creek	Kalamazoo	1,300
340	F & R Tires LLC	Blanchard	Grand Rapids	20,000
341	Vulcan Masters	Detroit	Detroit	3,500
342	Terry Murhpy	Springfield	Kalamazoo	8,000
343	Springfield Tyre	Battle Creek	Kalamazoo	3,400
351	Intervale Real Estate, Inc.	Detroit	SE MI	32,000
352	Livernois New and Used Tire Services	Detroit	SE MI	4,141
353	Modern Soluttions LLC	Detroit	SE MI	15,853
354	Used Tire Warehouse Inc.	Detroit	SE MI	1,672
355	Selman Transportation, Inc.	Hamtramck	SE MI	4,500
357	F&S Tire Service	Detroit	SE MI	1,706

Source: Michigan Department of Environment, Great Lakes, and Energy

#17 - Subsidence (Sinkholes)



Subsidence (Sinkholes)

Subsidence is the lowering or collapse of the land surface caused by natural or human-induced activities that erode or remove subsurface support.

Hazard Description

Subsidence is ranked as the number 17 hazard in Lapeer County. Subsidence can be caused by a variety of natural or human-induced activities. Natural subsidence occurs when the ground collapses into underground cavities produced by the solution of limestone or other soluble materials by groundwater. Human-induced subsidence is caused principally by groundwater withdrawal, drainage of organic soils, and underground mining.

In the United States, these activities have caused more than 17,000 square miles of surface subsidence, with groundwater withdrawal (more than 80% of subsidence) being the primary culprit. In addition, approximately 18% of the Unites States land surface is underlain by cavernous limestone, gypsum, salt, or marble, making the surface of these areas susceptible to sinkholes. Generally, subsidence poses a greater risk to property than to life. FEMA (1997) conservatively estimated losses to all types of ground subsidence, including karst, to be at least $125 million per year in the U.S., a very low figure indeed according to USGS. Sparse and incomplete data show that the average cost of karst-related damages in the United States over the last 15 years is estimated to be at least $300,000,000 per year and the actual total is probably much higher. The National Research Council estimates of annual damage from various types of subsidence is outlined in **Table 2-18**.

Table 2-18 Land Subsidence: Estimated Annual National Damage

Type of Subsidence	Annual Damage
Drainage of organic soils	$40,000,000
Underground fluid withdrawal	$35,000,000
Underground mining	$30,000,000
Natural compaction	$10,000,000
Sinkholes	$10,000,000
Hydro compaction (collapsible soils)	N/A
Total:	$125,000,000

Source: National Research Council

In Michigan, the primary cause of subsidence is underground mining. Although mine subsidence is not as significant a hazard in Michigan as in other parts of the country, many areas in Michigan are potentially vulnerable to mine subsidence hazards. Mine subsidence is a geologic hazard that can strike with little or no warning and can result in very costly damage. Mine subsidence occurs when the ground surface collapses into underground mined areas. In addition, the collapse of improperly stabilized mine openings is also a form of subsidence. Mine subsidence generally affects very few people, unlike other natural hazards that may impact many people.

Mine subsidence can cause damage to buildings, disrupt underground utilities, and be a potential threat to human life. In extreme cases, mine subsidence can literally swallow whole buildings or sections of ground into sinkholes, endangering anyone that may be present at that site. Mine subsidence may take years to manifest. Examples of collapses occurring 100 years after mines were abandoned have been documented in several areas of the country.

Lapeer County Perspective and Vulnerability

Although subsidence cannot be entirely discounted, it is not considered a serious threat in Lapeer County due to our stable bedrock and distance from susceptible areas. While there are instances of subsidence in Michigan communities, staff has not been able to document an incident in Lapeer County.

Mitigation Strategies for Subsidence (Sinkholes)

The following strategies are suggested to minimize the effects of Lapeer County's number 17 hazard, subsidence:

- Identify Potential Subsidence Locations
- Restrict Development in Potential Subsidence Locations
- County Hazard Mitigation Project Manager

New Mitigation Projects

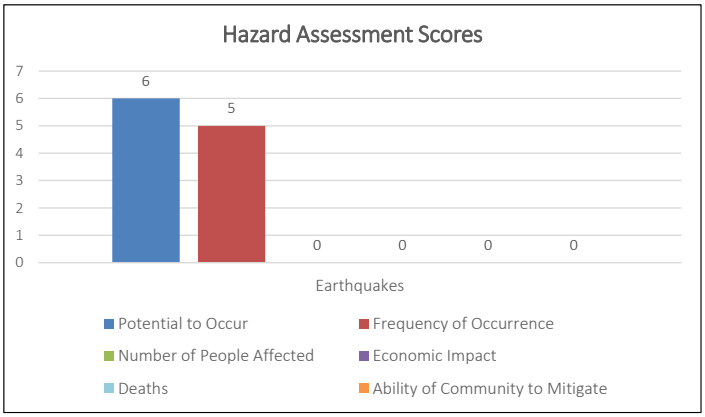
Village of North Branch

Project: Lining sewer main. Project description: Lining project of sewer main below M-90 from manhole 017 to manhole 121. Interior of main showing excess erosion and fractures. Failure of the main would cause sinkholes and require open excavation of our primary state highway. Proposed timeframe for implementation: 1 - 5 years. Budget: $910,000. Update: None, this is a newly submitted project.

Previously Included Mitigation Projects

None

#18 - Earthquakes



Earthquakes

An earthquake is a shaking or trembling of the crust of the earth caused by the breaking and shifting of rock beneath the surface.

Hazard Description

Earthquakes are ranked as the number 18 hazard in Lapeer County. Earthquakes range in intensity from slight tremors to great shocks. They may last a few seconds to several minutes or come as a series of tremors over a period of several days. The energy of an earthquake is released in seismic waves. Earthquakes usually occur without warning. In some instances, advance warnings of unusual geophysical events may be issued. However, scientists cannot yet predict exactly when or where an earthquake will occur. Earthquakes tend to strike repeatedly along fault lines, which are formed where large plates of the earth's crust below the surface constantly push and move against one another. Risk maps have been produced which show areas where an earthquake is more likely to occur. Earthquake monitoring is conducted by the United States Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), and universities throughout the country.

The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Most casualties result from falling objects and debris. Disruption of communication systems and damage to electric power lines, gas, sewer and water mains can be expected. Water supplies can become contaminated by seepage around water mains. Damage to roadways and other transportation systems may create food and other resource shortages if transportation is interrupted. In addition, earthquakes may trigger other emergency situations such as fires and hazardous material spills, thereby compounding the situation.

Lapeer County Perspective and Vulnerability

Earthquakes are not considered a threat because the nearest recorded fault line is no closer than the lower third of the state, and there is no record of an earthquake in Lapeer County. Also, Michigan has only experienced 6 earthquakes since 1947 with none of these occurring in or near Lapeer County according to the U.S. Geological Survey. However, it is worth mentioning that on August 9, 1947, an earthquake did hit a large area of south-central Michigan, affecting a total area of about 50,000 square miles, including points north to Muskegon and Saginaw. This is the closest recorded earthquake incident to Lapeer County. According to the U.S. Geological Survey - National Seismic Hazard Mapping Project map, **Figure 2-15**, illustrated below, there is a very low probability of a significant earthquake in Lapeer County. For this reason, earthquakes are not considered a serious hazard in Lapeer County.

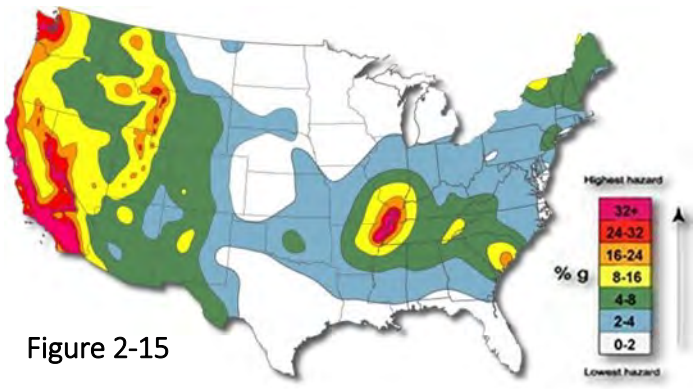


Figure 2-15

Source: US Geological Survey

Mitigation Strategies for Earthquakes

The following strategies are suggested to minimize the effects of Lapeer County's number 18 hazard, earthquakes:

- Emergency Generators
- Public Education
- Enforce Building Codes
- Update Disaster Response Plan
- County Hazard Mitigation Project Manager

New Mitigation Projects

None

Previously Included Mitigation Projects

Attica Township

Project: Backup generator. Project description: Purchase of a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $45,000. Update: Not provided.

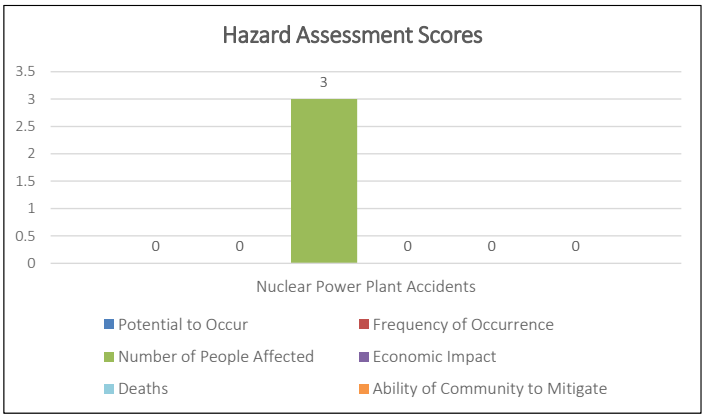
City of Lapeer

Project: Backup generator. Project description: Purchase of 1 large and 2 small (portable) backup generators to maintain sewage lift stations and traffic signals. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: This project is still ongoing.

Village of Otter Lake

Project: Backup generator. Project description: Purchase a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $25,000 . Update: Not provided.

#19 - Nuclear Power Plant Accidents



Nuclear Power Plant Accidents

A nuclear power plant accident is an actual or potential release of radioactive material at a commercial nuclear power plant or other nuclear facility, in sufficient quantity to constitute a threat to the health and safety of the off-site population.

Hazard Description

Nuclear power plant accidents are ranked as the number 19 hazard in Lapeer County. Though the construction and operation of nuclear power plants, these sites are closely monitored and regulated by the Nuclear Regulatory Commission (NRC). Accidents at these plants are considered a possibility and appropriate on-site and off-site emergency planning is conducted. An accident could result in the release of potentially dangerous levels of radioactive materials into the environment that could affect the health and safety of the public living near the nuclear power plant. A nuclear power plant accident might involve both a release of air borne radioactive materials and radioactive contaminate of the environment around the plant. The degree and area of environmental contamination could vary greatly depending on the type and amount of radioactivity and weather conditions. Response to a nuclear power plant accident requires specialized personnel who have been trained to handle radioactive materials safely, who have specialized equipment to detect and monitor radiation, and who are trained in personal radiation exposure control.

Lapeer County Perspective and Vulnerability

Nuclear power plant accidents are not considered a threat in Lapeer County since none exist in the County. The closest one is about 75 miles away from the City of Lapeer. It is the Fermi 2 Nuclear Power Station located in Newport, Michigan. There are also two other nuclear power plant facilities operating in Michigan. These are the Cook Nuclear Plant, which is located north of Bridgman along Lake Michigan, and the Palisades Nuclear Plant near South Haven. The Cook facility is about 180 miles from Lapeer, and the Palisades facility is about 160 miles from Lapeer. Michigan's fourth nuclear facility, Big Rock Point, was located near Charlevoix, but stopped generating electricity in 1997. The facility was scheduled to be turned into greenfield area in 2004.

Mitigation Strategies for Nuclear Power Plant Accidents

The following strategies are suggested to minimize the effects of Lapeer County's number 19 hazard, nuclear power plant accidents:

- Emergency Generators
- Update Disaster Response Plan
- Training for Responders
- County Hazard Mitigation Project Manager

New Mitigation Projects

None

Previously Included Mitigation Projects

Attica Township

Project: Backup generator. Project description: Purchase of a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $45,000. Update: Not provided.

City of Lapeer

Project: Backup generator. Project description: Purchase of 1 large and 2 small (portable) backup generators to maintain sewage lift stations and traffic signals. Proposed timeframe for implementation: Unknown. Budget: $25,000. Update: This project is still ongoing.

Village of Otter Lake

Project: Backup generator. Project description: Purchase a backup generator for the fire station. Proposed timeframe for implementation: Unknown. Budget: $25,000 . Update: Not provided.

Action Plan and Plan Maintenance

Action Plan

As part of the development of this plan, staff requested that local units of governments submit hazard mitigation projects for their municipality. Staff evaluated these projects and included them in the plan for hazards they will help mitigate along with projects listed in previous plan updates. Staff reached out to agencies who previously submitted hazard mitigation projects to request an update on past projects.

Staff also used project information to develop mitigation strategies (actions) that can be implemented to help mitigate hazards. The list of mitigation actions included in this section and projects was developed during previous Hazard Mitigation Plan updates and reviewed during this update process. The charts, which start on the 3rd page of this section, identify specific mitigation actions for each hazard, their implementing agency, a proposed timeline for implementation, and relative priority level. Included in the considerations were the cost of the projects compared with past events.

In addition to mitigation project types, an evaluation and summary of hazard-related actions that local communities have taken for improving the general well-being and future mitigation efforts were also completed.

Focus on the Expansion of Existing Authorities, Policies, Programs, and Resources

As part of the implementation and updating of the plan, during the five-year plan period, the Emergency Management Department will evaluate and hold discussions on current activities and projects being undertaken. An assessment regarding future projects needed in each community and county-wide will also be considered.

The goal of hazard mitigation is to reduce future impacts to property and residents, and lessen disruption to local services. Mitigation efforts should be ongoing in order to adapt to the needs of the communities and residents. In addition, efforts should include efficiencies in which residents can benefit during times of emergency. The majority of local units in Lapeer County feel that the best ways to expand existing authorities, policies, programs and resources are through coordination with other agencies and local units, along with educating the public. For information on existing authorities, policies, programs, and resources for individual communities, as well as how they can be expanded upon, please see the Community Profiles section of the plan.

The local units placed a high importance on working with other local governments as well as the State in order to improve upon and expand the current policies, programs, activities, and resources. The State mirrors this sentiment in their Plan in section 4a "Mitigation Tools and Measures":

> "Successful implementation of a program to reduce vulnerability to hazards must, out of necessity, be a joint cooperative effort between the State and local governments. State government provides the means (i.e. enabling laws and local governing authority) for regulating land development, and local governments put that means to use and actually make land use development decisions."
>
> "For land use/development decision-making to be effective in limiting or eliminating hazard risk and vulnerability, local and state actions must be carefully coordinated. The State must ensure, through appropriate legislation and rules/regulations, that local governments have the necessary means to effectively guide and manage land use change and development."
>
> "Local governments, in turn, must make good land use decisions and exercise prudent stewardship of the land development process within their communities. Adequate guidance, oversight, and enforcement at the local level are critically important to successfully mitigating hazard risk and vulnerability" (Mitigation Tools and

Measures, Page 545 and 546).

Coordination between neighboring local governments and the State is perhaps the most effective way for communities to improve and expand each jurisdiction's existing authorities, policies, programs, and resources.

The State of Michigan's Plan also acknowledges some of the challenges in implementing effective hazard mitigation techniques:

> "Political, social and economic pressure at the local level often leads to approval of land uses and developments that may not be appropriate for a particular site or area. In some instances, code enforcement may be a problem. In others, adequate funding may not be available to support planning or regulatory activities, or there may be a lack of community support for such activities. The end result is that local communities may not be able to effectively utilize the measures they have at their disposal" (Mitigation Tools and Measures, Page 546).

The local jurisdictions in Lapeer County feel that their biggest set-back is the lack of available funding for large-scale hazard mitigation projects and for educating and training the public.

Relative Priority Levels

Each mitigation action has been assigned a priority level that indicates its importance relative to the hazard the action is mitigating. See below for an explanation of each priority level.

Top: Mitigation actions for hazards that pose the greatest threat and likelihood of affecting the community and which are eligible for federal FEMA Hazard Mitigation funding.

High: Mitigation actions for hazards that pose the greatest threat and likelihood of affecting the community.

Medium: Mitigation actions for hazards that pose a moderate threat and likelihood of affecting the community.

Low: Mitigation actions for hazards that pose the least threat and likelihood of affecting the community.

Implementing Agency Codes

The agency codes defined below are listed for each mitigation action, identifying the various agencies that should be involved with each action.

- Agencies in bold are the lead agencies
- *Indicates the agency has a project listed
- Local refers to the local unit of government
- Local ERA refers to local emergency response agencies such as police, fire, and medical
- County refers to county agencies such as the Road Commission, Office of Emergency Management, and Drain Commission
- State refers to various state agencies such as MDOT and the DNR
- Federal refers to federal agencies
- Utilities refers to private utilities such as power and phone companies
- Private refers to businesses and associations such as television and radio stations, scrap yards and trailer park associations
- Transport agency refers to transport truck shipping companies
- Transit agency refers to public and private agencies involved with mass transit including schools

Potential Funding Source

The funding sources listed below identify where implementing agencies could secure funding for each mitigation action.

- HMGP: Hazard Mitigation Grant Program
- FMAP: Flood Mitigation Assistance Program
- PDMP: Pre-Disaster Mitigation Program

Lapeer County Mitigation Projects

For detailed information about newly submitted Lapeer County Mitigation Projects and funding sources, see the project application forms in Appendix C.

Goals and Objectives

This section displays which goals and objectives are achieved by each mitigation action. For refence, the goals and objectives are provided in the Lapeer County Hazards Summary Section.

#1 - Snow and Ice Storms					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Enhance Storm Warning System	**Lapeer County Emergency Management** , Local*, Local ERA and Private	1 to 10 years, as needed	Top	HMGP	G - 1, 3, 6, 7 O - 2
Emergency Generators	**Lapeer County Emergency Management,** Local*, Local DPW and Local ERA	1 to 5 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Warming Stations	**Lapeer County Emergency Management** , Local ERA* , and Private	1 to 10 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Utilize Wireless Emergency Alerts	**Lapeer County Emergency Management** and Local	Ongoing	Top	HMGP	G - 1, 3, 4, 7 O - 2
Elderly Assistance Programs	**Lapeer County Emergency Management**, Local and State	Ongoing	High		G - 1, 6, 7 O - 3, 4
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	High		G - All O - All
Tree trimming Program	**Lapeer County Road Commission**, Local DPW, Utility*, and Private	Ongoing	High		G - 5, 7 O - 3
Public Education for Disaster Preparedness	**Lapeer County Emergency Management,** Local ERA, Local, Local DPW, and Utility	Ongoing	High		G - 1, 3, 6, 7 O - 4

#2 - Structure Fires					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Enhance Emergency Response System	**Lapeer County Emergency Management** , Local, and Local ERA	1 to 10 years, as needed	Top	HMGP	G - 1, 2, 7 O - 2
Update Fire Fighting Equipment	**Local** and Local ERA	1 to 5 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Public Education on Fire Safety	**Lapeer County Emergency Management** , Local, and Local ERA	Ongoing	High		G - 1, 6, 7 O - 4
Maintain Mutual Aid Agreements	**Lapeer County Emergency Management** , Local, and Local ERA	Ongoing	High		G - 1, 2, 5, 7 O - 3
Enforce Fire Code	**Lapeer County Emergency Management,** Local* and Local ERA	Ongoing	High		G - 1, 6, 7 O - 4
Arson Education	**Lapeer County Emergency Management** , Local, and Local ERA	Ongoing	High		G - 1, 6, 7 O - 4
Training For Responders	**Local ERA**	Ongoing	High		G - 1, 2, 5, 7 O - 3

#3 - Infrastructure Failure					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Emergency Generators	**Lapeer County Emergency Management**, Local *, Local DPW, and Local ERA	1 to 5 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Community Shelters	**Lapeer County Office of Emergency Management,** Local*, Local ERA, and Private	1 to 10 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Improve Critical Infrastructure	**Local***, Lapeer County Road Commission, Lapeer County Drain Commission, MDOT, Local DPW, and Utility	1 to 10 years, as needed	Top	HMGP, FMAP	G - 1, 5, 7 O - 3
Analysis of Infrastructure	**Local**, Lapeer County Road Commission, Lapeer County Drain Commission, MDOT, Local DPW, and Utility	Ongoing	High		G - 1, 5, 7 O - 3
Public Education for Disaster Preparedness	**Lapeer County Emergency Management**, Local, Local ERA, and Utility	Ongoing	High		G - 1, 3, 6, 7 O - 4
Infrastructure Maintenance Program	**Local**, Lapeer County Road Commission, Lapeer County Drain Commission, MDOT, Local DPW, and Utility	Ongoing	High		G - 1, 5, 7 O - 3
Tree Trimming Program	**Lapeer County Road Commission**, Local DPW*, Utility, and Private	Ongoing	High		G - 5, 7 O - 3
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	High		G - All O - All
Elderly Assistance Programs	**Lapeer County Emergency Management**, Local and State	Ongoing	High		G - 1, 6, 7 O - 3, 4

#3 - Riverine Flooding					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Join FEMA Flood Insurance Program – Map The Flood Plain	**Lapeer County Office of Emergency Management*** and Local*	1 to 5 years, as needed	Top	HMGP	G - 1, 2, 7 O - 1
Mitigation Assistance Program For Structures In The Flood Plain	**Lapeer County Emergency Management** and Local	1 to 10 years, as needed	Top	HMGP, FMAP, PDMP	G - 1, 2, 5, 7 O - 1
Identify Structures In The Flood Plain	**Local**	1 to 5 years, as needed	Top	HMGP	G - 1, 2, 7 O - 1
River Flood Control Measures	**Lapeer County Drain Commission,** Lapeer County Office of Emergency Management and Local*	1 to 10 years, as needed	Top	HMGP, FMAP	G - 1, 2, 7 O - 1
Emergency Generators	**Lapeer County Emergency Management**, Local *, Local DPW, and Local ERA	1 to 5 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Public Education for Disaster Preparedness	**Lapeer County Emergency Management**, Local, Local ERA, and Utility	Ongoing	High		G - 1, 3, 6, 7 O - 4
Enforce Zoning Regulations Regarding The Flood Plain	**Local**	Ongoing	High		G - 1, 2, 6, 7 O - 1, 4
Amend Zoning Regulations To Prohibit New Development In The Flood Plain	**Local**	1 to 5 years, as needed	High		G - 1, 2, 6, 7 O - 1, 4
Update Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	High		G - All O - All
Will Consider Hazard Mitigation in Future Master Plan Updates	**Local** (see Incorporating Recommendations into Community Plans section)	According to Master Plan update schedule	High		G - All O - All

#4 - Tornadoes					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Enhance Storm Warning System	**Lapeer County Emergency Management** , Local*, Local ERA and Private	1 to 10 years, as needed	Top	HMGP	G - 1, 3, 6, 7 O - 2
Emergency Generators	**Lapeer County Emergency Management**, Local*, Local DPW, and Local ERA	1 to 5 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Storm Shelters	**Lapeer County Office of Emergency Management**, Local*, Local ERA, and Private	1 to 10 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Utilize Wireless Emergency Alerts	**Lapeer County Emergency Management** and Local	Ongoing	Top	HMGP	G - 1, 3, 4, 7 O - 2
Enforce Building Codes	**Local** and Local ERA	Ongoing	High		G - 1, 6, 7 O - 4
Weather Spotter Training	**Lapeer County Emergency Management** and Local ERA	Ongoing	High		G - 1, 3, 4, 6 O - 2, 4
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	High		G - All O - All
Tree trimming Program	**Lapeer County Road Commission**, Local DPW, Utility*, and Private	Ongoing	High		G - 5, 7 O - 3
Public Education for Disaster Preparedness	**Lapeer County Emergency Management**, Local, Local ERA, and Utility	Ongoing	High		G - 1, 3, 6, 7 O - 4

#5 - Inclement Weather					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Enhance Storm Warning System	**Lapeer County Emergency Management** , Local*, Local ERA and Private	1 to 10 years, as needed	Top	HMGP	G - 1, 3, 6, 7 O - 2
Emergency Generators	**Lapeer County Emergency Management**, Local*, Local DPW, and Local ERA	1 to 5 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Storm Shelters	**Lapeer County Office of Emergency Management**, Local*, Local ERA, and Private	1 to 10 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Utilize Wireless Emergency Alerts	**Lapeer County Emergency Management** and Local	Ongoing	Top	HMGP	G - 1, 3, 4, 7 O - 2
Elderly Assistance Programs	**Lapeer County Emergency Management**, Local and State	Ongoing	High		G - 1, 6, 7 O - 3, 4
Weather Spotter Training	**Lapeer County Emergency Management** and Local ERA	Ongoing	High		G - 1, 3, 4, 6 O - 2, 4
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	High		G - All O - All
Tree trimming Program	**Lapeer County Road Commission**, Local DPW, Utility*, and Private	Ongoing	High		G - 5, 7 O - 3
Public Education for Disaster Preparedness	**Lapeer County Emergency Management**, Local, Local ERA, and Utility	Ongoing	High		G - 1, 3, 6, 7 O - 4

#6 - Public Health Emergencies					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Immunization Programs	**Lapeer County Health Department**, Lapeer County Office of Emergency Management, Local, Local ERA, State, and Federal	Ongoing	Top	HMGP	G - 1, 2, 5, 7 O - 3, 4
Training For Responders	**Lapeer County Health Department,** Lapeer County Office of Emergency Management, State, and Local	Ongoing	High		G - 1, 2, 5, 7 O - 3
Public Education for Disaster Preparedness	**Lapeer County Health Department,** Lapeer County Office of Emergency Management, State, Federal, Local ERA, and Local	Ongoing	High		G - 1, 3, 6, 7 O - 4

#7 - Transportation Accidents (Bus, Airplane, Train)					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Training For Responders	**Lapeer County Office of Emergency Management** and Local ERA	Ongoing	High		G - 1, 2, 5, 7 O - 3
Simulated Response Exercise	**Lapeer County Emergency Management** and Local ERA	Ongoing	High		G - 1, 2, 5, 7 O - 3
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	High		G - All O - All
Safety Training for Transit Operators	**Transit Agency**	Ongoing	High		G - 1, 2, 5, 7 O - 3
Public Education	**Lapeer County Emergency Management**, Local, Local ERA, and Transit	Ongoing	High		G - 1, 3, 6, 7 O - 4

#8 - Extreme Temperatures					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Emergency Generators	**Lapeer County Emergency Management**, Local *, Local DPW, and Local ERA	1 to 5 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Community Shelters	**Lapeer County Office of Emergency Management,** Local, Local ERA, and Private	1 to 10 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Utilize Wireless Emergency Alerts	**Lapeer County Emergency Management** and Local	Ongoing	Top	HMGP	G - 1, 3, 4, 7 O - 2
Public Education for Disaster Preparedness	**Lapeer County Emergency Management**, Local, Local ERA, and Utility	Ongoing	High		G - 1, 3, 6, 7 O - 4
Elderly Assistance Programs	**Lapeer County Emergency Management**, Local and State	Ongoing	High		G - 1, 6, 7 O - 3, 4

#9 - Hazardous Materials Incidents (Transportation)					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Repair of Critical Infrastructure	**Lapeer County Road Commission**, Lapeer County Drain Commission, MDOT, Local DPW*, and State	1 to 10 years, as needed	Top	HMGP, FMAP	G - 1, 5, 7 O - 3
Update Response Equipment	**Local ERA**	1 to 5 years, as needed	Top	HMGP	G - 1, 2, 5, 7 O - 3
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	High		G - All O - All
Safety Training For Transport Operators	**Transport Agency**	Ongoing	High		G - 1, 2, 5, 7 O - 3
Training For Responders	**Lapeer County Office of Emergency Management** and Local ERA	Ongoing	High		G - 1, 2, 5, 7 O - 3
Public Education	**Lapeer County Emergency Management**, Local, Local ERA, and Transit	Ongoing	High		G - 1, 3, 6, 7 O - 4

#10 - Hazardous Materials Incidents (Fixed Sites)					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Public Education for Disaster Preparedness	**Lapeer County Emergency Management**, Local ERA, Local, Local DPW, and Utility	Ongoing	High		G - 1, 3, 6, 7 O - 4
Update Hazardous Material Inventory	**Local**, Local ERA, State, and Private	Ongoing	High		G - 1, 2, 5, 7 O - 3
Training For Responders	**Lapeer County Office of Emergency Management** and Local ERA	Ongoing	High		G - 1, 2, 5, 7 O - 3
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	High		G - All O - All

#11 - Dam Failure					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Assess Dam Integrity	**Local,** Lapeer County Drain Commission, State, and Army Corps of Engineers	1 to 5 years, as needed	Top	HMGP	G - 1, 5, 7 O - 3
Repair of Critical Dams	**Local,** Lapeer County Drain Commission, State, and Army Corps of Engineers	1 to 10 years, as needed	Top	HMGP	G - 1, 5, 7 O - 3
Identify Area Potentially Affected By Hazard	**Local,** Lapeer County Drain Commission, State, and Army Corps of Engineers	1 to 5 years, as needed	Top	HMGP	G - 1, 5, 7 O - 1, 3
Public Education	**Lapeer County Emergency Management**, Local, Local ERA, and Transit	Ongoing	High		G - 1, 3, 6, 7 O - 4

#11 - Wildfires					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Update Fire Fighting Equipment	**Local** and Local ERA	1 to 5 years, as needed	Medium	HMGP	G - 1, 2, 5, 7 O - 3
Public Education for Disaster Preparedness	**Lapeer County Emergency Management,** Local ERA, Local, Local DPW, and Utility	Ongoing	Medium		G - 1, 3, 6, 7 O - 4
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	Medium		G - All O - All
Training For Responders	Lapeer County Office of Emergency Management and Local ERA	Ongoing	Medium		G - 1, 2, 5, 7 O - 3
Ban Open Burning	**Local**	1 to 5 years, as needed	Medium		G - 1, 7 O - 3

#12 - Civil Disturbance					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Update Response Equipment	**Local ERA**	1 to 5 years, as needed	Medium	HMGP	G - 1, 2, 5, 7 O - 3
Utilize Wireless Emergency Alerts	**Lapeer County Emergency Management** and Local	Ongoing	Medium	HMGP	G - 1, 3, 4, 7 O - 2
Public Education	**Lapeer County Emergency Management**, Local, Local ERA, and Transit	Ongoing	Medium		G - 1, 3, 6, 7 O - 4
Training For Responders	Lapeer County Office of Emergency Management and Local ERA	Ongoing	Medium		G - 1, 2, 5, 7 O - 3

#13 - Oil and Natural Gas Well/Pipeline Accidents					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Update Inventory Of Oil and Natural Gas Well	**Lapeer County Emergency Management**, State, and Local	1 to 5 years, as needed	Medium	HMGP	G - 1, 2, 5, 7 O - 3
Update Response Equipment	**Local ERA**	1 to 5 years, as needed	Medium	HMGP	G - 1, 2, 5, 7 O - 3
Training For Responders	Lapeer County Office of Emergency Management and Local ERA	Ongoing	Medium		G - 1, 2, 5, 7 O - 3

#14 - Drought					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Water Ration Program For Drought Conditions	**Local**	Ongoing	Medium		G - 1, 2, 6, 7 O - 3, 4
Water Conservation Program	**Local**	Ongoing	Medium		G - 1, 2, 6, 7 O - 3, 4
Public Education for Disaster Preparedness	**Lapeer County Emergency Management,** Local ERA, Local, Local DPW, and Utility	Ongoing	Medium		G - 1, 3, 6, 7 O - 4

#14 - Terrorism					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Emergency Generators	**Lapeer County Emergency Management,** Local *, Local DPW and Local ERA	1 to 5 years, as needed	Medium	HMGP	G - 1, 2, 5, 7 O - 3
Prepare Vulnerability Studies for Critical Infrastructure including cyber security	**Lapeer County Office of Emergency Management**, Local, Local DPW, State, and Utility	1 to 5 years, as needed	Medium		G - 1, 5, 7 O - 3
Training For Responders	**Lapeer County Office of Emergency Management** and Local ERA	Ongoing	Medium		G - 1, 2, 5, 7 O - 3
Enforce Homeland Security Directives	**Local**, Local ERA, Lapeer County Office of Emergency management, State, Federal, and Utility	Ongoing	Medium		G - 1, 2, 5, 7 O - 2
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	Medium		G - All O - All
Training For Critical Infrastructure Employees	**Lapeer County Office of Emergency management**, Local, Local ERA, Lapeer County Road Commission, Lapeer County Drain Commission, State, Federal, and Utility	Ongoing	Medium		G - 1, 2, 5, 7 O - 3

#15 - Nuclear Attack					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Enhance Warning System	**Lapeer County Emergency Management** , Local*, Local ERA and Private	1 to 10 years, as needed	Low	HMGP	G - 1, 3, 6, 7 O - 2
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	Low		G - All O - All
Training For Responders	**Lapeer County Office of Emergency Management** and Local ERA	Ongoing	Low		G - 1, 2, 5, 7 O - 3

#16 - Scrap Tire Fires					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Inventory Scrap Tire Storage Facilities	**Lapeer County Office of Emergency Management**, Local and State	1 to 5 years, as needed	Low		G - 1, 2, 5, 7 O - 3
Training For Responders	**Lapeer County Office of Emergency Management** and Local ERA	Ongoing	Low		G - 1, 2, 5, 7 O - 3
Proper Disposal Education and Enforcement	**Lapeer County Emergency Management,** Local, State, and Private	Ongoing	Low		G - 1, 3, 6, 7 O - 4

#17 - Subsidence (Sinkholes)					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Identify Potential Subsidence Locations	**Lapeer County Office of Emergency Management**, Local, and State	1 to 5 years, as needed	Low		G - 1, 2, 5, 7 O - 3
Restrict Development In Potential Subsidence Locations	**Local**	Ongoing	Low		G - 1, 2, 5, 7 O - 3

#18 - Earthquakes					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Emergency Generators	**Lapeer County Emergency Management,** Local *, Local DPW and Local ERA	1 to 5 years, as needed	Low	HMGP	G - 1, 2, 5, 7 O - 3
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	Low		G - All O - All
Enforce Building Codes	**Local**	Ongoing	Low		G - 1, 6, 7 O - 4
Public Education for Disaster Preparedness	**Lapeer County Emergency Management,** Local ERA, Local, Local DPW, and Utility	Ongoing	Low		G - 1, 3, 6, 7 O - 4

#19 - Nuclear Power Plant Accidents					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
Emergency Generators	**Lapeer County Emergency Management,** Local *, Local DPW and Local ERA	1 to 5 years, as needed	Low	HMGP	G - 1, 2, 5, 7 O - 3
Updated Disaster Response Plan	**Lapeer County Emergency Management** and Local ERA	1 to 5 years, as needed	Low		G - All O - All
Training For Responders	Lapeer County Office of Emergency Management and Local ERA	Ongoing	Low		G - 1, 2, 5, 7 O - 3

All Hazards					
Mitigating Action	Implementing Agency	Proposed Implementation Timeline	Relative Priority Level	Potential Funding Source	Goals & Objectives Achieved
County Hazard Mitigation Project Manager	**Lapeer County Office of Emergency Management**	1 to 5 years	Low		G - All O - All
Increase Morgue Capacity	**Lapeer County Health Department**	1 to 5 years	Low		G - 2, 7 O - 3

While this plan was developed as a multi-jurisdictional document, local units of government are individually responsible for submitting project applications to FEMA, providing the local match for projects, and implementing the Hazard Mitigation strategies and projects.

Table 3-1 General Hazard Mitigation Actions	Acquire and Update Equipment	Arson Education	Ban Open Burning	Community Shelters	Consider Hazard Mitigation in Future Plans	County Hazard Mitigation Project Manager	Elderly Assistance Programs	Emergency Generators	Enforce Fire/Zoning/Building Codes	Enforce Homeland Security Directives	Enhance Emergency Response System	Enhance Warning System	Further Study of Hazard	Immunization Programs	Increase Morgue Capacity	Maintain Mutual Aid Agreements	Maintenance and Repair Program	Mitigate Floodplain Structures	National Flood Insurance Program	Public Education Program	Repair of Critical Infrastructure/Dams	Restrict Development in Hazard Area	River Flood Control Measures	Safety Training Transit Operator	Simulated Hazard Response Exercises	Training Critical Infrastructure Employees	Training for Responders/Officials/Residents	Tree Trimming Program	Updated Disaster Response Plan	Utilize Wireless Emergency Alerts	Water Conservation Program	Water Ration Program in Droughts	Weather Spotter Training
1. Snow and Ice Storms				T		L	H	T				T			L					H									H	H	T			
2. Structure Fires	T	H				L			H		T				L	H				H								H					
3. Infrastructure Failure				T		L	H	T					H		L		H			H	T								H	H				
3. Riverine Flooding					H	L		T	H				T		L			T	T	H		H	T							H				
4. Tornadoes				T		L		T	H			T			L					H								H	H	T			H
5. Inclement Weather				T		L	H	T				T			L					H								H	H	T			H
6. Public Health Emergencies						L								T	L					H							H						
7. Transportation Accidents (Bus, Airplane, Train)						L									L					H				H	H		H		H				
8. Extreme Temperatures				T		L	H	T							L					H										T			
9. Hazardous Materials Incidents (Transportation)	T					L									L					H	T			H			H		H				
10. Hazardous Materials Incidents (Fixed Sites)						L							H		L					H							H		H				
11. Dam Failure						L							T		L					H	T												
11. Wildfires	M		M			L									L					M							M		M				
12. Civil Disturbance	M					L									L					M							M			M			
13. Oil and Natural Gas Well/Pipeline Accidents	M					L							M		L												M						
14. Drought						L									L					M											M	M	
14. Terrorism						L		M		M			M		L											M	M		M				
15. Nuclear Attack						L						L			L												L		L				
16. Scrap Tire Fires						L							L		L					L							L						
17. Subsidence (Sinkholes)						L							L		L							L											
18. Earthquakes						L		L	L						L					L									L				
19. Nuclear Power Plant Accidents						L		L							L												L		L				

Priority Level Top = T High = H Medium = M Low = L

Table 3-2 Specific Hazard Mitigation Projects (New Projects)	Almont Township - Warning Sirens	Imlay City - Infrastructure Improvements	City of Lapeer - Drain Repair and Expansion	Village of North Branch - Lining Sewer Main	Village of North Branc - Pump Station Upgrade
1. Snow and Ice Storms	T				
2. Structure Fires					
3. Infrastructure Failure		T	T	T	T
3. Riverine Flooding			T	T	T
4. Tornadoes	T				
5. Inclement Weather	T				
6. Public Health Emergencies					
7. Transportation Accidents (Bus, Airplane, Train)		H			
8. Extreme Temperatures					
9. Hazardous Materials Incidents (Transportation)		T			
10. Hazardous Materials Incidents (Fixed Sites)					
11. Dam Failure					
11. Wildfires					
12. Civil Disturbance					
13. Oil and Natural Gas Well/Pipeline Accidents					
14. Drought					
14. Terrorism					
15. Nuclear Attack	L				
16. Scrap Tire Fires					
17. Subsidence (Sinkholes)				L	
18. Earthquakes					
19. Nuclear Power Plant Accidents					

Priority Level

Top = T

High = H

Medium = M

Low = L

Table 3-3 Specific Hazard Mitigation Projects (From Previous Plan Update)	Village of Almont - Warning Sirens	Village of Almont - Infrastructure Improvements	Village of Almont - Soil Stabilization	Village of Almont - Culvert Improvements	Village of Almont - Shelter	Attica Township - Backup Generator	Attica Township - Warning Sirens	Elba Township - Shelter	Imlay City - Infrastructure Improvements	Imlay City - Bell River Restoration	Imlay City and Township - Warning Sirens	City of Lapeer - Backup Generator	City of Lapeer - Warning Sirens	~~City of Lapeer - Shelter (Removed)~~	~~City of Lapeer - Commercial/Industrial Inspections (Removed)~~	City of Lapeer - Floodplain Maps	Village of Otter Lake - Backup Generator	Village of Otter Lake - Warning Siren	~~Lapeer Conservation District - Tree Program (Removed)~~	Lapeer County - Floodplain Maps
1. Snow and Ice Storms						T						T					T		H	
2. Structure Fires															H					
3. Infrastructure Failure		T				T			T			T					T		H	
3. Riverine Flooding			T	T		T				T		T				T	T			T
4. Tornadoes	T				T	T	T	T			T	T	T	T			T	T	H	
5. Inclement Weather	T					T	T	T			T	T	T	T			T	T	H	
6. Public Health Emergencies																				
7. Transportation Accidents (Bus, Airplane, Train)																				
8. Extreme Temperatures						T						T					T			
9. Hazardous Materials Incidents (Transportation)																				
10. Hazardous Materials Incidents (Fixed Sites)																				
11. Dam Failure																				
11. Wildfires																				
12. Civil Disturbance																				
13. Oil and Natural Gas Well/Pipeline Accidents																				
14. Drought																				
14. Terrorism						M						M					M			
15. Nuclear Attack																				
16. Scrap Tire Fires																				
17. Subsidence (Sinkholes)																				
18. Earthquakes						L						L					L			
19. Nuclear Power Plant Accidents						L						L					L			

Priority Level Top = T High = H Medium = M Low = L

Plan Maintenance

This plan is a dynamic document that may need to be amended as needs arise (new funding becomes available or a change in hazard priority do to a hazard event). The Lapeer County Office of Emergency Management is the agency responsible for monitoring, evaluating, and updating the plan. An annual notice will be posted on the county's website and will also be sent to all local units of government requesting comment on plan contents and projects to be amended into the plan. Staff will conduct a review of the plan as needed. The review will be specific to the goals and objectives section, the hazard assessment and mitigation section, and any comments and projects that have been received. This review process will help staff determine if the plan needs to be amended. If necessary, staff will prepare amendments to the plan for review and approval at a meeting of the Lapeer County Emergency Management Advisory Council. The proposed amendments will be posted on the plan's website for public view and comment. The public will have an additional opportunity to comment on the plan and plan amendments at the committee meeting prior to approval.

Once every five years, staff must submit an updated plan to FEMA. In the fall of the fourth year of the plan, a notice will be posted on the plan's website and will be sent to all local units of government requesting comment on plan contents and projects to be amended into the plan. Staff will conduct a review of the plan. The review will be specific to the goals and objectives section, the hazard assessment and mitigation section, and any comments and projects that have been received. This review process will help staff determine if the plan needs to be amended or have a major update. If staff determines that the plan only needs to be amended, staff will prepare the amendments to the plan for review and approval at a meeting of the Lapeer County Emergency Management Advisory Council. The proposed amendments will be posted on the plan's website for public review and comment. The public will have an additional opportunity to comment on the plan and plan amendments at the committee meeting prior to approval. At this meeting, staff will involve the public and will ask for public input. A copy of the amended plan will be sent to FEMA for review and approval.

If the plan requires a major revision, staff will follow similar procedures as used in the development of this plan (Please see the "Plan Development Work Items and Meetings" section in the Introduction Chapter of this plan). This process will include the development of goals and objectives for the plan, hazard identification, hazard prioritization, vulnerability determination, identification of mitigating actions, and public involvement at key points of plan development. The updated plan will be reviewed and approved at a meeting of the Lapeer County Emergency Management Advisory Council. The public will have an additional opportunity to comment on the plan update at the committee meeting prior to approval. At this meeting, staff will involve the public and will ask for public input. A copy of the updated plan will be sent to FEMA for review and approval.

Incorporating Recommendations into Community Plans

The Lapeer County Hazard Mitigation Plan includes two cities, eighteen townships, and seven villages (see list in Introduction section). During the development of the hazard mitigation plan update, staff reached out to each local unit of government and asked if they would consider including recommendations from the Lapeer County Hazard Mitigation Plan into the next update of their master and zoning plans. Many of the local units of government in Lapeer County agreed to consider this request via a survey that was submitted to local officials; note that staff did not receive completed surveys from some LUGs. Table 3-4 lists these local units of government along with information on the updates of their master and zoning plans. See Appendix B for copies of the surveys that local officials completed. Also see Appendix C for a hazard mitigation project forms that were submitted by local units of government. An assessment of the implementation of the recommendations of the Hazard Mitigation Plan into their master plans and zoning plans was conducted by staff as part of the update. They are also required to notify

surrounding units of government and entities that have requested notification when they are beginning their master plan review process. The Lapeer County Office of Emergency Management will submit a request to each local unit covered by this plan to be notified when the local unit begins their review process. Staff will review the local units' master plans and recommend the incorporation of hazard mitigation plan recommendations.

Table 3-4 Lapeer County LUGs Master Plans and Zoning Ordinances

	Master Plan	Zoning Ordinance
Village of Almont	2018	2015 update; amended as needed
Almont Township	2018	2020 update; amended as needed
Arcadia Township	2019	2019 update; amended as needed
Attica Township	2016	2021 adopted; amended as needed
Burlington Township	2018	2018 update; amended as needed
Burnside Township	2007	2010 update; amended as needed
Village of Clifford	2007	2007 update; amended as needed
Village of Columbiaville	2006	2006 update; amended as needed
Deerfield Township	2013	2020 update; amended as needed
Village of Dryden	2020	2013 update; amended as needed
Dryden Township	2009	2008 adopted; amended as needed
Elba Township	2013	2015 update; amended as needed
Goodland Township	2012	2018 update; amended as needed
Hadley Township	2016	2014 update; amended as needed
City of Imlay City	2014	2019 update; amended as needed
Imlay Township	2014	2017 update; amended as needed
City of Lapeer	2021	2011 update; amended as needed
Lapeer Township	2018	2021 update; amended as needed
Marathon Township	2015	2019 update; amended as needed
Mayfield Township	2011	2011 update; amended as needed
Village of Metamora	2009	2019 update; amended as needed
Metamora Township	2011	2017 update; amended as needed
Village of North Branch	2018	2012 update; amended as needed
North Branch Township	2008	2019 update; amended as needed
Oregon Township	2020	2019 update; amended as needed
Village of Otter Lake	2009	2010 update; amended as needed
Rich Township	2010	2016 update; amended as needed

Table 3-5 Lapeer County Local Units of Government Projects (New Projects)	Almont Township - Warning Sirens	Imlay City - Infrastructure Improvements	City of Lapeer - Drain Repair and Expansion	Village of North Branch - Lining Sewer Main	Village of North Branc - Pump Station Upgrade
Village of Almont					
Almont Township	X				
Arcadia Township					
Attica Township					
Burlington Township					
Burnside Township					
Village of Clifford					
Village of Columbiaville					
Deerfield Township					
Village of Dryden					
Dryden Township					
Elba Township					
Goodland Township					
Hadley Township					
City of Imlay City		X			
Imlay Township					
City of Lapeer			X		
Lapeer Township					
Marathon Township					
Mayfield Township					
Village of Metamora					
Metamora Township					
Village of North Branch				X	X
North Branch Township					
Oregon Township					
Village of Otter Lake					
Rich Township					

Table 3-6 Lapeer County Local Units of Government Projects (From Previous Plan Update)	Village of Almont - Warning Sirens	Village of Almont - Infrastructure Improvements	Village of Almont - Soil Stabilization	Village of Almont - Culvert Improvements	Village of Almont - Shelter	Attica Township - Backup Generator	Attica Township - Warning Sirens	Elba Township - Shelter	Imlay City - Infrastructure Improvements	Imlay City - Bell River Restoration	Imlay City and Township - Warning Sirens	City of Lapeer - Backup Generator	City of Lapeer - Warning Sirens	~~City of Lapeer - Shelter (Removed)~~	~~City of Lapeer - Commercial/Industrial Inspections (Removed)~~	City of Lapeer - Floodplain Maps	Village of Otter Lake - Backup Generator	Village of Otter Lake - Warning Siren	~~Lapeer Conservation District - Tree Program (Removed)~~	Lapeer County - Floodplain Maps
Village of Almont	X	X	X	X	X															
Almont Township																				
Arcadia Township																				
Attica Township						X	X													
Burlington Township																				
Burnside Township																				
Village of Clifford																				
Village of Columbiaville																				
Deerfield Township																				
Village of Dryden																				
Dryden Township																				
Elba Township								X												
Goodland Township																				
Hadley Township																				
City of Imlay City									X	X	X									
Imlay Township											X									
City of Lapeer												X	X	X	X	X				
Lapeer Township																				
Marathon Township																				
Mayfield Township																				
Village of Metamora																				
Metamora Township																				
Village of North Branch																				
North Branch Township																				
Oregon Township																				
Village of Otter Lake																	X	X		
Rich Township																				

Appendix A

Meeting Information

Appendix B

Surveys

Appendix C

Project Applications