

Appendix A:
COMMUNITY PROFILES

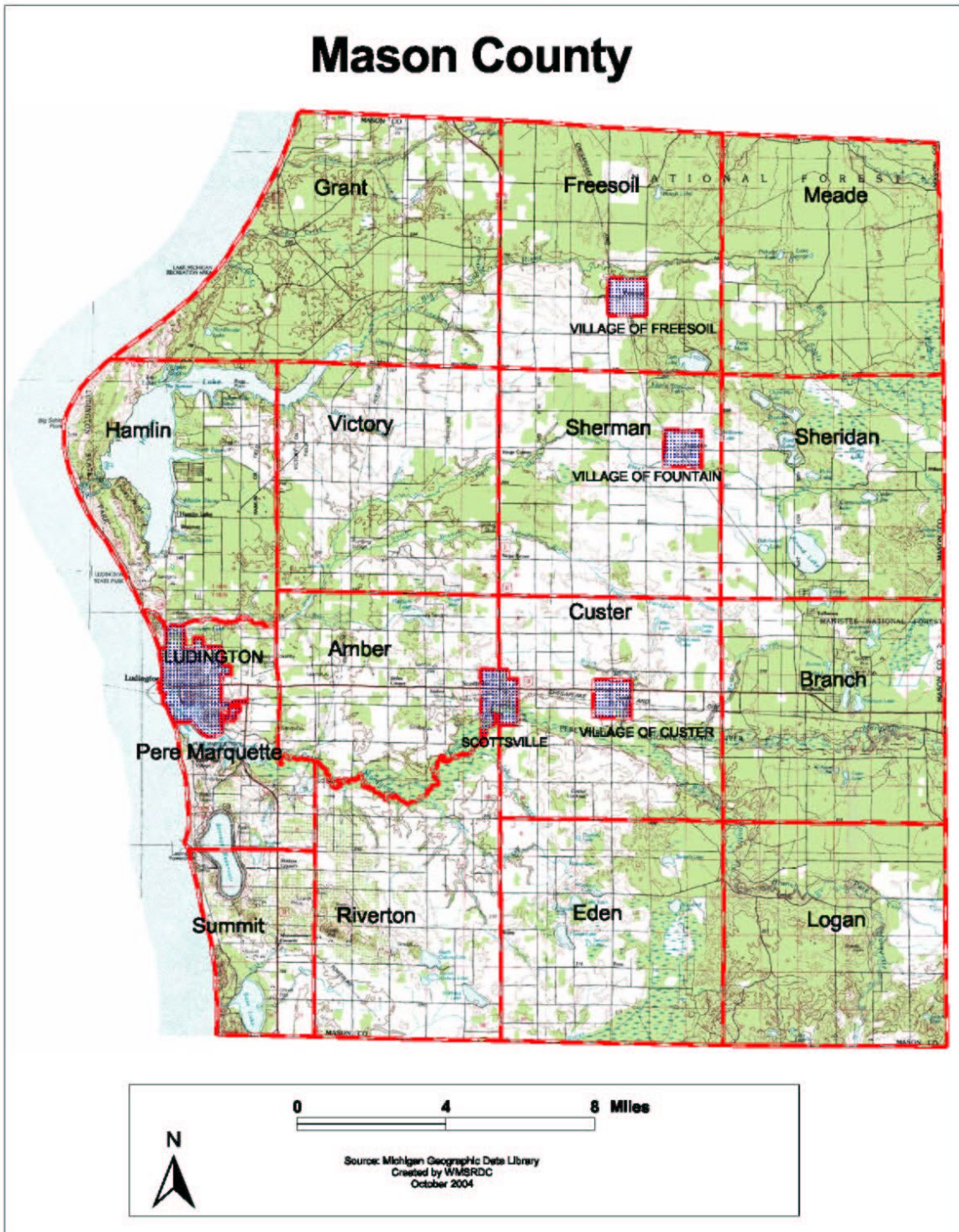
MASON COUNTY Community Profile			
1. Physical Features			
Lakes (acres)	Bass (492), Hamlin (4,666), Pere Marquette (590), Round (541)		
Rivers	Big Sable, Lincoln, Pere Marquette		
Cities	Ludington, Scottville		
Villages	Custer, Fountain, Free Soil		
Large public land areas	Ludington State Park; Huron Manistee National Forest; Nordhouse Dunes Wilderness Area; Mason County Campground; Mason County Picnic Area; Mason County Fairgrounds		
Other features	Lake Michigan shoreline ~26 mi.; Coastal dune environment; Freshwater estuary & drowned river mouth (Pere Marquette River)		
2. Land Cover: 2019 National Land Cover Dataset		Source: Multi Resolution Land Characteristics Consortium	
% Developed	3.31 %	% Forests	16.49 %
% Agriculture	9.73 %	% Wetland	7.25 %
3. Land Value: 2022 Real and Personal Equalized Valuations		Source: Mason County Equalization Report 2022	
Agricultural	\$108,391,475	Industrial	\$476,449,900
Commercial	\$161,839,900	Residential	\$1,596,823,104
Total personal	\$289,357,100		
4. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	29,103	% with disability	16.5 %
% change 2010 to 2020*	+ 1.19 %	% in poverty	14.8 %
Median age	46.3	ALICE households, 2021**	29 %
% under 18 years old	20.2 %	Avg. daily commute	18.5 minutes
% over 65 years old	24.0 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
5. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	750	Vacant housing units**	5,252
Campground & RV sites*	1,997	Peak seasonal population	70,293
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
6. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	17,387	Single units	13,520
Occupied housing units	12,135	Multi-units in structure	2,001
Vacant housing units	5,252	Mobile homes or other	1,865
7. Public Services			
Fire	- Branch Township Fire Department, 6697 E. US-10, Fountain, MI - Carr Community Fire Department, 4930 S. Masten Rd., Branch, MI - Custer Fire Department, 2549 E. US 10, Custer, MI - Fountain Area Fire Department, 4106 E. Main St., Fountain, MI - Free Soil/Meade Township Fire Department, 2613 E. Michigan St., Free Soil, MI - Grant Township Fire & Rescue, 835 W. Hoague Rd., Free Soil, MI - Hamlin Township Fire Dept, 3775 N. Jebavy Dr., Ludington, MI - Ludington Fire Department, 918 Tinkham Ave., Ludington, MI - Pere Marquette Township Fire Department, 1040 S. Pere Marquette Hwy, Ludington, MI - Riverton Township Fire Department, 2104 W Hawley St., Ludington, MI - Scottville Fire Department, 110 E Broadway St., Scottville, MI		
Police	- City of Ludington Police Department, 408 S. Harrison St., Ludington, MI - Mason County Sheriff Department, 302 N. Delia St., Ludington, MI		

	- Scottville Police, 105 N. Main St., Scottville, MI
Wastewater	- City of Ludington - City of Scottville - Village of Custer
Community Water Systems	- City of Ludington - City of Scottville - Pere Marquette Township - wells - Holiday Village Mobile Home Park (Amber Township) - Manistee Pines Estates (Grant Township) - Tall Oaks Condominiums (Hamlin Township) - Tamarac Village (Hamlin Township) - Heritage Hills Mobile Home Village (Summit Township)
Public transportation	Ludington Mass Transportation Authority, 5545 Carr Street
Other	- United States Coast Guard Station, 101 S. Lakeshore Dr. (Ludington) - Mason County Jail, 302 N. Delia St. (Ludington) - FiveCAP Inc., 302 N Main St (Scottville)
8. Critical Infrastructure	
Major roads	- US-31, US-10 - SR 116 - Pere Marquette Highway
Railroads	Marquette Rail
Bridges	- Marquette Railroad over Lincoln River, Fountain Village - US-31 over Pere Marquette River, Big Sable River, Lincoln River South Branch, Lincoln River North Branch - US-10 over Weldon Creek - Lakeshore Dr. (SR-116) over Lincoln Lake - Pere Marquette Highway over Pere Marquette River South Branch, Pere Marquette River North Branch - Jebavy over Lincoln River - Fisher Rd. over Lincoln River
Airports	Mason County Airport, 5300 W. US-10, Pere Marquette Twp
Shelters	<i>Shelters surveyed by Red Cross:</i> - Calvary Baptist Church, 220 N Jebavy Dr., Ludington, MI - Community Church, 109 N Harrison, Ludington, MI - Emanuel Lutheran, 501 E Danaher St, Ludington, MI - Lakeshore Resource Network, 920 E. Tinkham Ave, Ludington, MI - Ruby Creek Conservation & Recreation Club, 8152 E Washington Rd, Branch, MI - United Methodist Church of Ludington, 5810 Bryant Rd, Ludington, MI <i>Shelters that need to be surveyed by Red Cross:</i> - Bethany Lutheran Church (Salvation Army), 1101 S Madison St., Ludington, MI - Grace Episcopal Church, 301 N James St, Ludington, MI - COVE 906 E Ludington Ave., Ludington, MI - Mason County Eastern Middle/High School, 18 S Main St. Custer, MI - Mason County Eastern Elementary, 18 S Main St, Custer, MI - Mason County Central High School, 300 W Broadway, Scottville, MI - Mason County Central Middle School, 310 Beryl St, Scottville, MI - Mason County Reformed Church, 45 S Amber Rd, Scottville, MI - Scottville United Methodist Church, 114 US 10, Scottville, MI - Scottville Optimist Hall, 105 W State St, Scottville, MI - St Mary's Church and School, 85 Madison, Custer, MI - Trinity Evangelical Free Church, 1212 Monona Dr, Ludington, MI - West Shore Educational Service District, 2130 W US 10, Ludington, MI
Schools	- Covenant Christian School, 2980 W US 10, Ludington, MI - Gateway to Success Academy, 526 N Scottville Rd, Scottville, MI - Ludington Area Catholic School, 700 E Bryant Rd , Ludington, MI

	<ul style="list-style-type: none"> - Ludington Area School District Ludington High School, 508 N Washington Ave, Ludington, MI OJ DeJong Middle School, 706 E Tinkham Ave, Ludington, MI Ludington Elementary School, 5771 W. Bryant Rd, Ludington, MI Ludington Early Childhood Center, 5771 W. Bryant Rd, Ludington, MI - Mason County Central Schools High School, 300 Broadway Ave, Scottville, MI Middle School 310 W Beryl St, Scottville, MI Upper Elementary, 505 W Maple Ave, Scottville, MI Scottville Elementary School, 201 W Maple Ave, Scottville, MI - Mason County Eastern Schools Elementary School, 18 S Main St, Custer, MI Junior High/ High School, 18 S Main St, Custer, MI - West Shore ESD, 2130 US-10, Ludington, MI - Victory Early Childhood Center, 4171 N Stiles Rd, Scottville, MI
Community medical facilities, Hospitals	<ul style="list-style-type: none"> - District 10 Mason County Health Department, 916 Diana St, Ludington, MI - Spectrum Health Ludington Hospital, 1 Atkinson Dr, Ludington, MI - Oakview Medical Care Facility, 1001 Diana St, Ludington, MI - Medilodge of Ludington, 1000 E. Tinkham, Ludington, MI - West Michigan Community Mental Health System, 920 Diana St, Ludington, MI
Ambulance service	<ul style="list-style-type: none"> - Life EMS of Mason County, 4910 W 1st St, Pere Marquette Twp, Ludington, MI - Life EMS Ambulance- Mason Scottville Base, 665 N. Main St, Amber Twp
Dams	<ul style="list-style-type: none"> - Brookside Cemetery Dam, Whiskey Creek Dam No. 2, Hamlin Lake Dam, West Shore Community College Dam, Bass Lake Dam, Gun Lake Dam, Ludington Pumped Storage Plant and Dam, Hall Dam, West Riverton Cemetery Dam, Nickelson Pond Dam, Weinert Dam #1, Romeo and Juliet Lakes, Gallie Dam, Evens Dam
9. Economic Assets	
Major employers	<ul style="list-style-type: none"> - Corewell Health Ludington Hospital, 1 Atkinson Dr, Ludington - UACJ Automotive/Whitehall Industries, 5175 W 6th St, Pere Marquette Twp - Indian Summer Co-op, 3958 W Chauvez Rd, Riverton Twp - FloraCraft, 1 Longfellow Place, Ludington - House of Flavors Manufacturing, 110 N William St, Ludington - Ludington Area Schools, 809 E Tinkham Ave, Ludington - Great Lakes Castings, 800 N Washington Ave, Ludington - West Shore Educational Service District, 2130 W U.S. 10, Ludington - West MI Community Mental Health, 920 Diana St, Ludington - Mason Co. Central School District, 300 W Broadway, Scottville
Power generation	<ul style="list-style-type: none"> - Ludington Pumped Storage Plant and Dam, 3525 S. Lakeshore Dr. - Michigan Power, L.P. (natural gas cogeneration facility), 5795 W. 6th St. - Lake Winds Energy Park, 56 wind turbines (Riverton and Summit townships)
Electric transmission	<ul style="list-style-type: none"> - Consumers Energy Power Line (Amber Township, Eden Township, Grant Township, Pere Marquette Township, Riverton Township, Summit Township, Victory Township)
Pipelines	<ul style="list-style-type: none"> - Natural Gas Pipeline (Amber Township, Branch Township, Custer Township, Grant Township, Pere Marquette Township, Riverton Township, Victory Township) - H2S Gas Pipeline (Amber Township, Grant Township, Pere Marquette Township, Riverton Township, Victory Township) - Brine Pipeline (Amber Township, Grant Township, Pere Marquette Township, Victory Township)
Commercial transportation	<ul style="list-style-type: none"> - S.S. Badger Carferry, 701 Maritime Dr., Ludington, MI
10. Other Assets, Infrastructure, etc.	
Community facilities	<i>Refer to individual community profiles</i>
Festivals	<i>Refer to individual community profiles</i>
Historic Sites	<ul style="list-style-type: none"> - Armistice Day Storm Informational Designation, Stearns Park, Ludington, MI - Swedish Lutheran Church, 501 Danaher St, Ludington, MI - First Mason County Courthouse, 1687 S Lakeshore Dr, Ludington, MI

	<ul style="list-style-type: none"> - Fish House (demolished), 407 W Filer, Ludington, MI - Daniel W. Goodenough, House, 706 E Ludington Ave, Ludington, MI - Frank N. Latimer and Fanny Allen, House, 701 Ludington Ave, Ludington, MI - Ray Lessard House, 110 N Lavinia St, Ludington, MI - Mason County Courthouse, 300 E Ludington Ave, Ludington, MI - S.S. Badger, 700 William St, Ludington, MI - S.S. Pere Marquette 18 Informational Site, Stearns Park, Ludington, MI - William A. Cartier House 409 E. Ludington Ave, Ludington, MI - East Ludington Avenue Historic District, Ludington, MI - Haskell Manufacturing Company Building (now Lofts on Rowe), 801 N. Rowe, Ludington, MI - Ludington North Breakwall Light, Ludington, MI - Ludington US Coast Guard Station, 101 S Lakeshore Dr, Ludington, MI - Scottville Informational Designation, Downtown Pedestrian Mall, Scottville, MI - Scottville School, 209 N. Main, Scottville, MI - Reorganized Church of Jesus Christ of Latter-Day Saints, Free Soil, MI - Notipekagon Commemorative Designation, S. Custer Rd, Custer, MI - Marquette's Death Informational Site, Pere Marquette Twp, Ludington, MI - Ghost Town of Hamlin Informational Site, Ludington St. Park, Ludington, MI - Big Sable Point Light Station, Ludington State Park, Ludington, MI - Lake Michigan Beach House, Ludington State Park, Ludington, MI
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Mason County



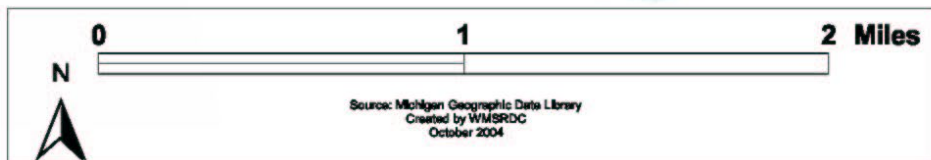
CITY OF LUDINGTON Community Profile			
1. Physical Features			
Lakes	Pere Marquette, Lincoln		
Rivers	None identified		
Notable features	<ul style="list-style-type: none">- Historic downtown and homes- Waterfront community- Commercial and recreational Lake Michigan harbor- County seat- Regional commerce and services- History of industry & manufacturing		
Land description	<ul style="list-style-type: none">- Lake Michigan shoreline; Coastal dune environment; Freshwater estuary & drowned river mouth (Pere Marquette River)- Urbanized with manufacturing, commerce, and residential development		
2. Land Value: 2022 Real and Personal Equalized Valuations			
		Source: Mason County Equalization Report 2022	
Agricultural	\$0	Industrial	\$13,554,600
Commercial	\$53,844,400	Residential	\$284,839,300
Total personal	\$13,229,900		
3. Population Characteristics			
		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	7,728	% with disability	17.4 %
% change 2010 to 2020*	-5.2 %	% in poverty	19.4 %
Median age	43.6	ALICE households, 2021**	29 %
% under 18 years old	22.9 %	Avg. daily commute	19.4 minutes
% over 65 years old	28.0 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population			
		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	364	Vacant housing units**	976
Campground & RV sites*	205	Peak seasonal population	15,132
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing			
		Source: 2021 American Community Survey 5-year Estimates	
Housing units	4,357	Single units	2,814
Occupied housing units	3,381	Multi-units in structure	1,430
Vacant housing units	976	Mobile homes or other	113
6. Public Services			
Fire	Ludington Fire Department, 918 E. Tinkham Ave.		
Police	<ul style="list-style-type: none">- City of Ludington Police Department, 408 S. Harrison St.- Mason County Sheriff Department, 302 N. Delia St.		
Wastewater	City of Ludington		
Community Water System	City of Ludington		
Public transportation	Ludington Mass Transportation Authority, 5545 Carr Street (Pere Marquette Twp)		
Other	<ul style="list-style-type: none">- United States Coast Guard Station, 101 S. Lakeshore Dr.- Mason County Jail, 302 N. Delia St.		
7. Critical Infrastructure			
Major roads	<ul style="list-style-type: none">- US-10- Lakeshore Dr. (SR 116)		
Railroads	Marquette Rail		
Bridges	<ul style="list-style-type: none">- Lakeshore Dr. (SR-116) over Lincoln Lake- Washington St over Pere Marquette Lake		

Airports	- <i>None identified</i>
Shelters	<i>Shelters surveyed by Red Cross:</i> - Community Church, 109 N Harrison - Emanuel Lutheran, 501 E Danaher St - Lakeshore Resource Network, 920 E. Tinkham Ave - United Methodist Church of Ludington, 107 S Harrison St <i>Shelters that need to be surveyed by Red Cross:</i> - Bethany Lutheran Church (Salvation Army), 1110 S Madison St - Grace Episcopal Church, 301 N James St - Trinity Evangelical Free Church, 1212 Monona Dr
Schools	- Ludington Area Catholic School, 700 E Bryant Rd - Ludington Area School District Ludington High School, 508 N Washington Ave OJ DeJong Middle School, 706 E Tinkham Ave Ludington Elementary School, 5771 W. Bryant Rd Ludington Early Childhood Center, 5771 W. Bryant Rd
Community medical facilities, Hospitals	- District 10 Mason County Health Department, 916 Diana St, Ludington - Corewell Health Ludington Hospital, 1 Atkinson Dr, Ludington - Oakview Medical Care Facility, 1001 Diana St, Ludington - Medilodge of Ludington, 1000 E. Tinkham, Ludington - West Michigan Community Mental Health System, 920 Diana St, Ludington
Ambulance service	- <i>None identified</i>
Dams	- <i>None identified</i>
8. Economic Assets	
Major employers	- Corewell Health Ludington Hospital, 1 Atkinson Dr - FloraCraft, 1 Longfellow Place - House of Flavors Manufacturing, 110 N William St - Ludington Area Schools, 809 E Tinkham Ave - Great Lakes Castings, 800 N Washington Ave - West MI Community Mental Health, 920 Diana St
Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- <i>None identified</i>
Commercial transportation	S.S. Badger Carferry, 701 Maritime Dr.
9. Other Assets, Infrastructure, etc.	
Community facilities	- City of Ludington, 400 S. Harrison St. - Ludington Library, 217 E. Ludington Ave. - Mason County Department of Human Services, 915 Diana St. - Mason County Courthouse, 304 E Ludington Ave
Festivals	- Freedom Festival (Fourth of July at downtown) - Rhythm & dunes (summer concerts at Waterfront park) - Suds on the shore (August at Rotary Park) - Ludington Lakestride (June) - Love Ludington Weekend (June)
Historic Sites	- Armistice Day Storm Informational Designation, Stearns Park (Ludington) - Swedish Lutheran Church, 501 Danaher St (Ludington) - First Mason County Courthouse, 1687 S Lakeshore Dr (Ludington) - Fish House (demolished), 407 W Filer (Ludington) - Daniel W. Goodenough, House, 706 E Ludington Ave (Ludington) - Frank N. Latimer and Fanny Allen, House, 701 Ludington Ave (Ludington) - Ray Lessard House, 110 N Lavinia St (Ludington) - Mason County Courthouse, 300 E Ludington Ave (Ludington) - S.S. Badger, 700 William St (Ludington) - S.S. Pere Marquette 18 Informational Site, Stearns Park (Ludington)

	<ul style="list-style-type: none"> - William A. Cartier House 409 E. Ludington Ave (Ludington) - East Ludington Avenue Historic District (Ludington) - Haskell Manufacturing Company Building, 801 N. Rowe (Ludington) - Ludington North Breakwall Light (Ludington) - Ludington US Coast Guard Station, 101 S Lakeshore Dr (Ludington)
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Land Use and Natural Features Map (USGS Quad.)

City of Ludington

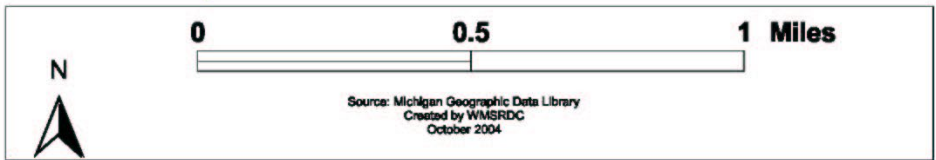
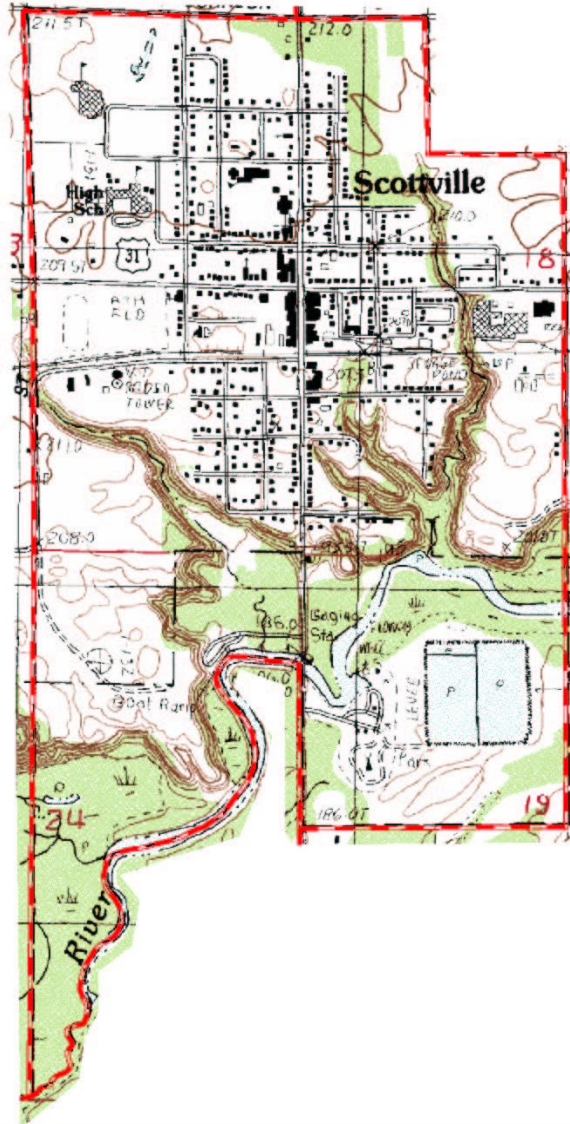


CITY OF SCOTTVILLE Community Profile			
1. Physical Features			
Lakes	- None identified		
Rivers	Pere Marquette River		
Notable features	Historic downtown		
Land description	Schools, residential density, local retail		
2. Land Value: 2022 Real and Personal Equalized Valuations		Source: Mason County Equalization Report 2022	
Agricultural	\$0	Industrial	\$2,718,00
Commercial	\$3,373,600	Residential	\$21,281,300
Total personal	\$1,002,700		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	1,343	% with disability	17.2 %
% change 2010 to 2020*	+ 3.5 %	% in poverty	27.7 %
Median age	34.5	ALICE households, 2021**	29 %
% under 18 years old	21.9 %	Avg. daily commute	18.6 minutes
% over 65 years old	13.3 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	45
Campground & RV sites*	55	Peak seasonal population	1,833
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	568	Single units	367
Occupied housing units	523	Multi-units in structure	194
Vacant housing units	45	Mobile homes or other	7
6. Public Services			
Fire	Scottville Fire Department, 110 E Broadway St.		
Police	Scottville Police, 105 N. Main St.		
Wastewater	City of Scottville		
Community Water System	City of Scottville		
Public transportation	- None identified		
Other	FiveCAP Inc., 302 N Main St		
7. Critical Infrastructure			
Major roads	US-10		
Railroads	Marquette Rail		
Bridges	Scottville Rd over Pere Marquette River		
Airports	- None identified		
Shelters	Shelters that need to be surveyed by Red Cross: - Mason County Central High School, 300 W Broadway - Mason County Central Middle School, 310 Beryl St - Scottville United Methodist Church, 114 US 10 - Scottville Optimist Hall, 105 W State St		
Schools	- Gateway to Success Academy, 526 N Scottville Rd - Mason County Central Schools High School, 300 Broadway Ave		

	Middle School 310 W Beryl St Upper Elementary, 505 W Maple Ave Scottville Elementary School, 201 W Maple Ave
Community medical facilities, Hospitals	- <i>None identified</i>
Ambulance service	- <i>None identified</i>
Dams	- <i>None identified</i>
8. Economic Assets	
Major employers	Mason Co. Central School District, 300 W Broadway, Scottville Gourmet Mushroom, Inc. 506 E State St., Scottville
Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- <i>None identified</i>
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities	- City of Scottville, 105 N. Main St. - Scottville Library, 204 E. State St. - Mason County Road Commission, 510 E. State St.
Festivals	Scottville 10 + 31 Celebration (August)
Historic Sites	- Scottville Informational Designation, Downtown Pedestrian Mall (Scottville) - Scottville School, 209 N. Main (Scottville) - Old Engine Club, Scottville River Park (Scottville)

Land Use and Natural Features Map (USGS Quad.)

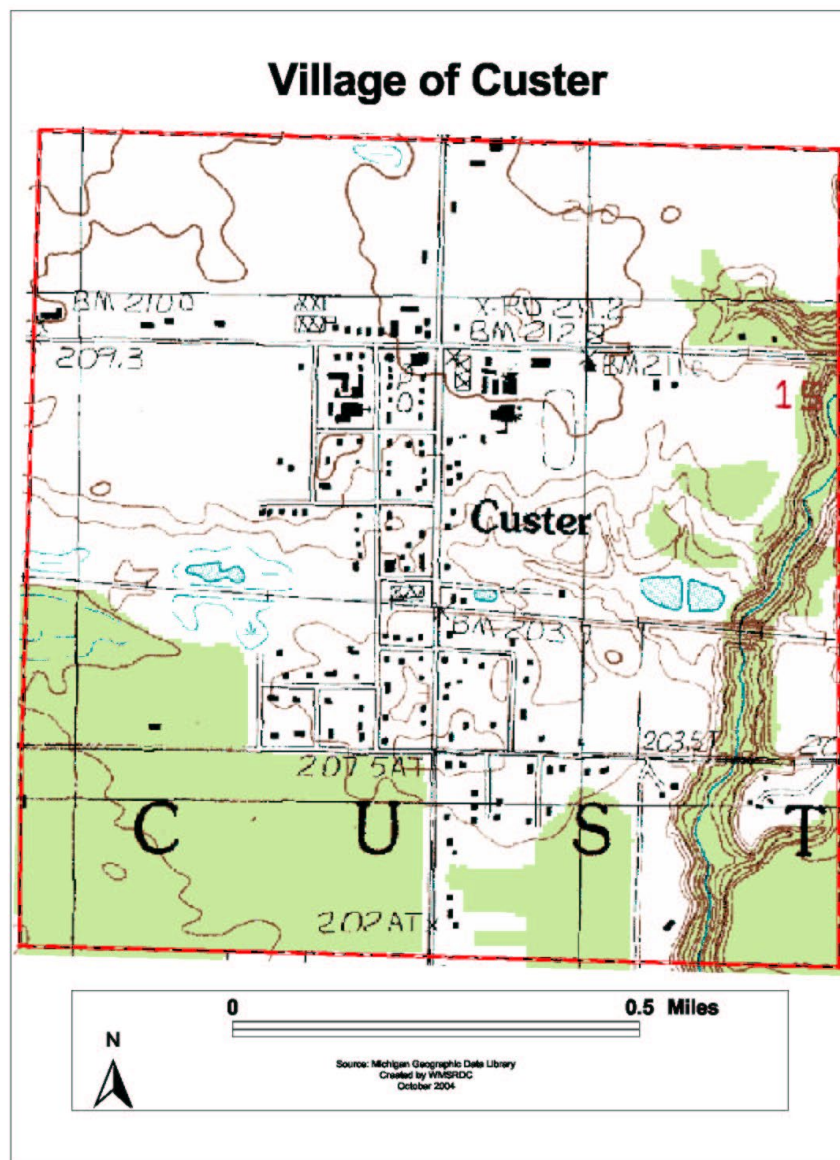
City of Scottville



CUSTER VILLAGE Community Profile			
1. Physical Features			
Lakes	- None identified		
Rivers	Black Creek		
Notable features	- None identified		
Land description	Schools, residential density, local retail		
2. Land Value: 2022 Real and Personal Equalized Valuations		*Not available for village	
Agricultural	*	Agricultural	*
Commercial	*	Commercial	*
Total personal	*		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	288	% with disability	12.7 %
% change 2010 to 2020*	- 4.2 %	% in poverty	9.2 %
Median age	35.2	ALICE households, 2021**	29 %
% under 18 years old	26.7 %	Avg. daily commute	20.0 minutes
% over 65 years old	12.5 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	5
Campground & RV sites*	0	Peak seasonal population	318
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	118	Single units	102
Occupied housing units	113	Multi-units in structure	13
Vacant housing units	5	Mobile homes or other	3
6. Public Services			
Fire	Custer Fire Department, 2549 E. US 10		
Police	- None identified		
Wastewater	Village of Custer		
Community Water System	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	US-10, US-31		
Railroads	Marquette Rail		
Bridges	- First Street Bridge - Black Creek Bridge on US 10		
Airports	- None identified		
Shelters	Shelters that need to be surveyed by Red Cross: - Mason County Eastern Middle/High School, 18 S Main St - Mason County Eastern Elementary, 18 S Main St - St Mary’s Church and School, 85 Madison		
Schools	- Mason County Eastern Schools Elementary School, 18 S Main St Junior High/ High School, 18 S Main St		

Community medical facilities, Hospitals	- <i>None identified</i>
Ambulance service	- <i>None identified</i>
Dams	- <i>None identified</i>
8. Economic Assets	
Major employers	- <i>None identified</i>
Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- <i>None identified</i>
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Village of Custer, 2249 E. U.S. 10
Festivals:	- <i>None identified</i>
Historic Sites:	- Site of Indian Battle, Pere Marquette River

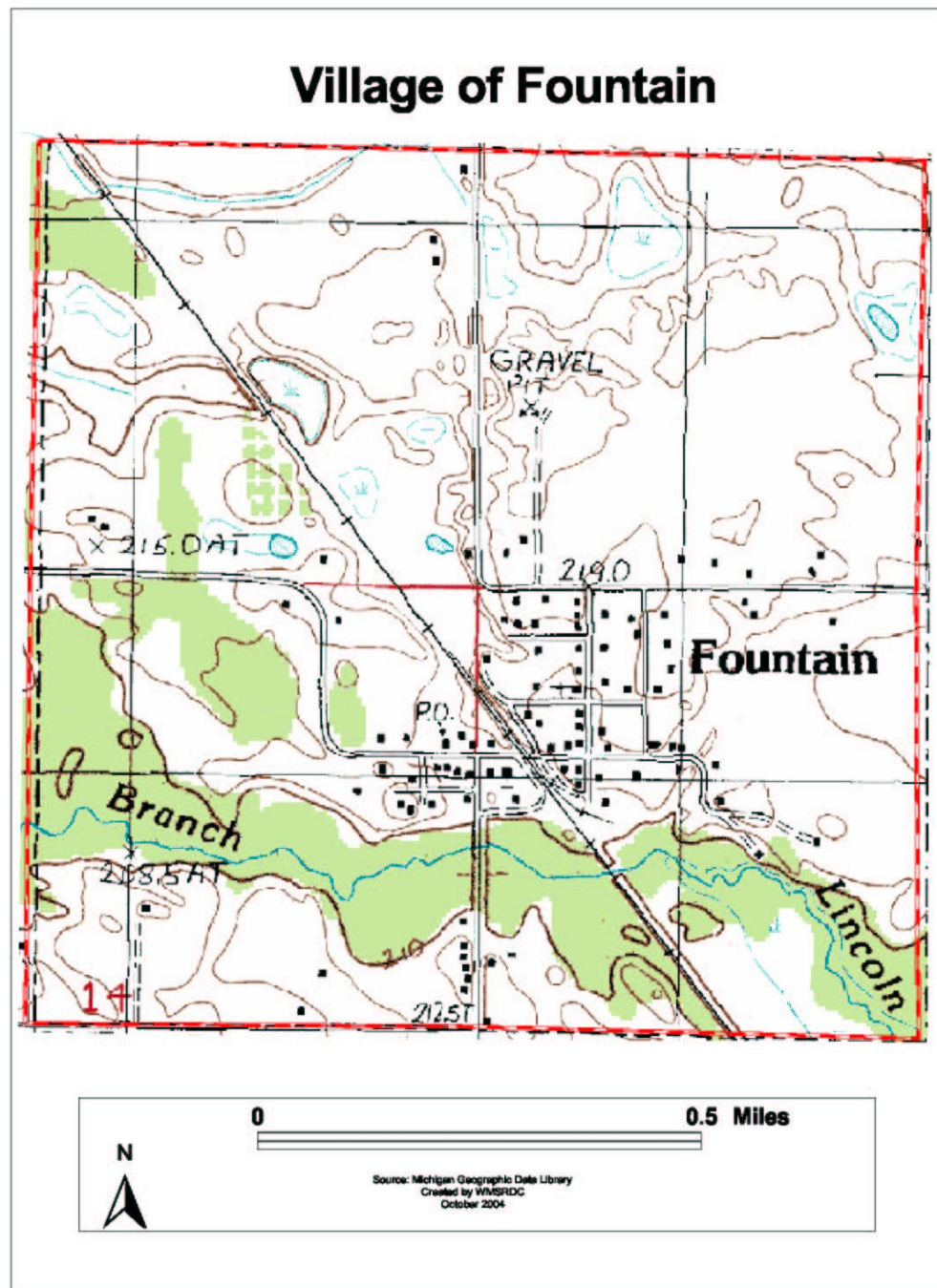
Land Use and Natural Features Map (USGS Quad.)



FOUNTAIN VILLAGE Community Profile			
1. Physical Features			
Lakes	- None identified		
Rivers	Lincoln River		
Notable features	- None identified		
Land description	Residential density, local retail		
2. Land Value: 2022 Real and Personal Equalized Valuations		*Not available for village	
Agricultural	*	Agricultural	*
Commercial	*	Commercial	*
Total personal	*		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	196	% with disability	9.7 %
% change 2010 to 2020*	- 11.9 %	% in poverty	30.6 %
Median age	32.8	ALICE households, 2021**	29 %
% under 18 years old	35.7 %	Avg. daily commute	26.2 minutes
% over 65 years old	7.7 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	29
Campground & RV sites*	0	Peak seasonal population	370
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	96	Single units	79
Occupied housing units	67	Multi-units in structure	0
Vacant housing units	29	Mobile homes or other	17
6. Public Services			
Fire	Fountain Area Fire Department, 4106 E. Main St.		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	- None identified		
Railroads	Marquette Rail		
Bridges	Marquette Railroad over Lincoln River		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	- None identified		
8. Economic Assets			
Major employers	- None identified		

Power generation	- None identified
Electric transmission	- None identified
Pipelines	- None identified
Commercial transportation	- None identified
9. Other Assets, Infrastructure, etc.	
Community facilities:	Sherman Township Hall, 3854 Main St.
Festivals:	- None identified
Historic Sites:	- None identified

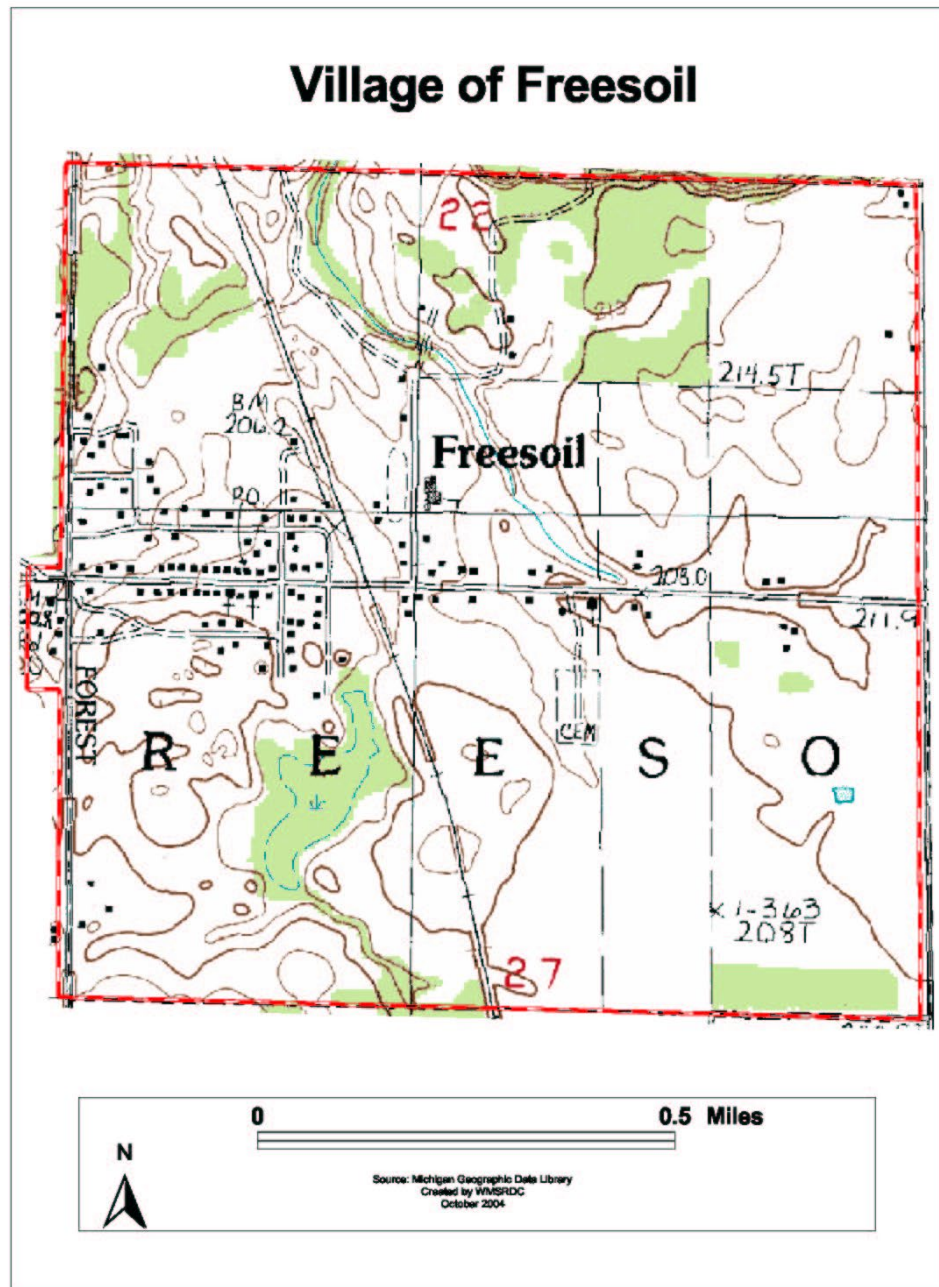
Land Use and Natural Features Map (USGS Quad.)



FREE SOIL VILLAGE Community Profile			
1. Physical Features			
Lakes	- None identified		
Rivers	- None identified		
Notable features	- None identified		
Land description	Residential density		
2. Land Value: 2022 Real and Personal Equalized Valuations		*Not available for village	
Agricultural	*	Agricultural	*
Commercial	*	Commercial	*
Total personal	*		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	96	% with disability	24.0 %
% change 2010 to 2020*	+ 9.7 %	% in poverty	13.8 %
Median age	54.7	ALICE households, 2021**	29 %
% under 18 years old	10.4 %	Avg. daily commute	32 minutes
% over 65 years old	35.4 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	19
Campground & RV sites*	0	Peak seasonal population	210
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	69	Single units	66
Occupied housing units	50	Multi-units in structure	0
Vacant housing units	19	Mobile homes or other	3
6. Public Services			
Fire	Free Soil/Meade Township Fire Department, 2613 E. Michigan St.		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	- None identified		
Railroads	Marquette Rail		
Bridges	- None identified		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	- None identified		
8. Economic Assets			
Major employers	- None identified		

Power generation	- None identified
Electric transmission	- None identified
Pipelines	- None identified
Commercial transportation	- None identified
9. Other Assets, Infrastructure, etc.	
Community facilities:	- Free Soil Village Office, 2520 E Michigan St - Free Soil Post Office, 2650 E Michigan St
Festivals:	- None identified
Historic Sites:	- Reorganized Church of Jesus Christ of Latter-Day Saints (Free Soil)

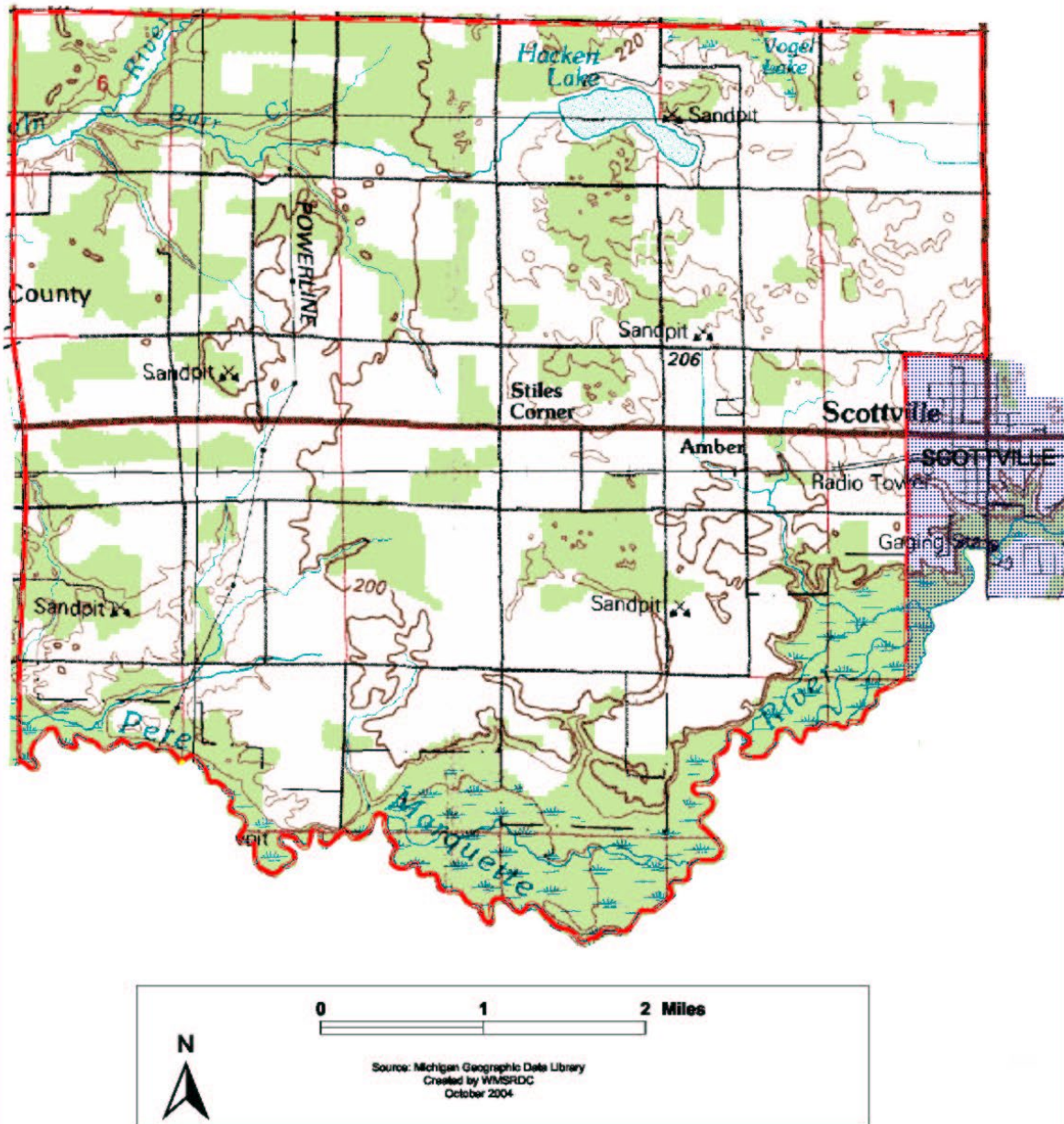
Land Use and Natural Features Map (USGS Quad.)



AMBER TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Hackert Lake		
Rivers	Pere Marquette River, Lincoln River		
Notable features	Situated between cities of Ludington and Scottville		
Land description	Regional retail along US 10 corridor surrounded by rural, residential, and agriculture areas		
2. Land Value: 2022 Real and Personal Equalized Valuations		Source: Mason County Equalization Report 2022	
Agricultural	\$4,873,000	Industrial	\$1,632,500
Commercial	\$37,952,800	Residential	\$80,428,500
Total personal	\$19,813,000		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	2,533	% with disability	13.3 %
% change 2010 to 2020*	- 0.2 %	% in poverty	13.4 %
Median age	41.7	ALICE households, 2021**	29 %
% under 18 years old	19.5 %	Avg. daily commute	17.4 minutes
% over 65 years old	17.5 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	138	Vacant housing units**	259
Campground & RV sites*	164	Peak seasonal population	5,019
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	1,255	Single units	812
Occupied housing units	996	Multi-units in structure	235
Vacant housing units	259	Mobile homes or other	208
6. Public Services			
Fire	- None identified		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	Holiday Village Mobile Home Park		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	US-31, US-10		
Railroads	Marquette Rail		
Bridges	US-31 over Pere Marquette River		
Airports	- None identified		
Shelters	Shelters that need to be surveyed by Red Cross: - Mason County Reformed Church, 45 S Amber Rd, Scottville, MI - West Shore Educational Service District, 2130 W US 10, Ludington, MI		
Schools	- Covenant Christian School, 2980 W US 10, Ludington, MI - West Shore ESD, 2130 US-10, Ludington, MI		
Community medical facilities, Hospitals	- None identified		

Ambulance service	Life EMS Ambulance- Mason Scottville Base, 665 N. Main (Amber Twp), Scottville, MI
Dams	Brookside Cemetery Dam, Nickelson Pond Dam
8. Economic Assets	
Major employers	West Shore ESD, 2130 US-10, Ludington, MI
Power generation	- <i>None identified</i>
Electric transmission	- Consumers Energy Power Line
Pipelines	- Natural Gas Pipeline - H2S Gas Pipeline - Brine Pipeline
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Amber Township Hall, 144 S. Amber Rd, Scottville, MI
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

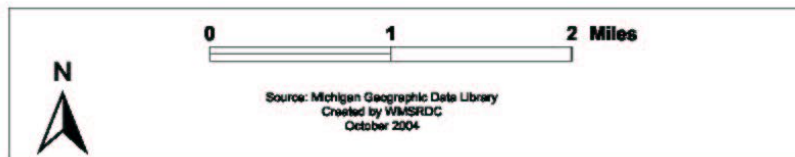
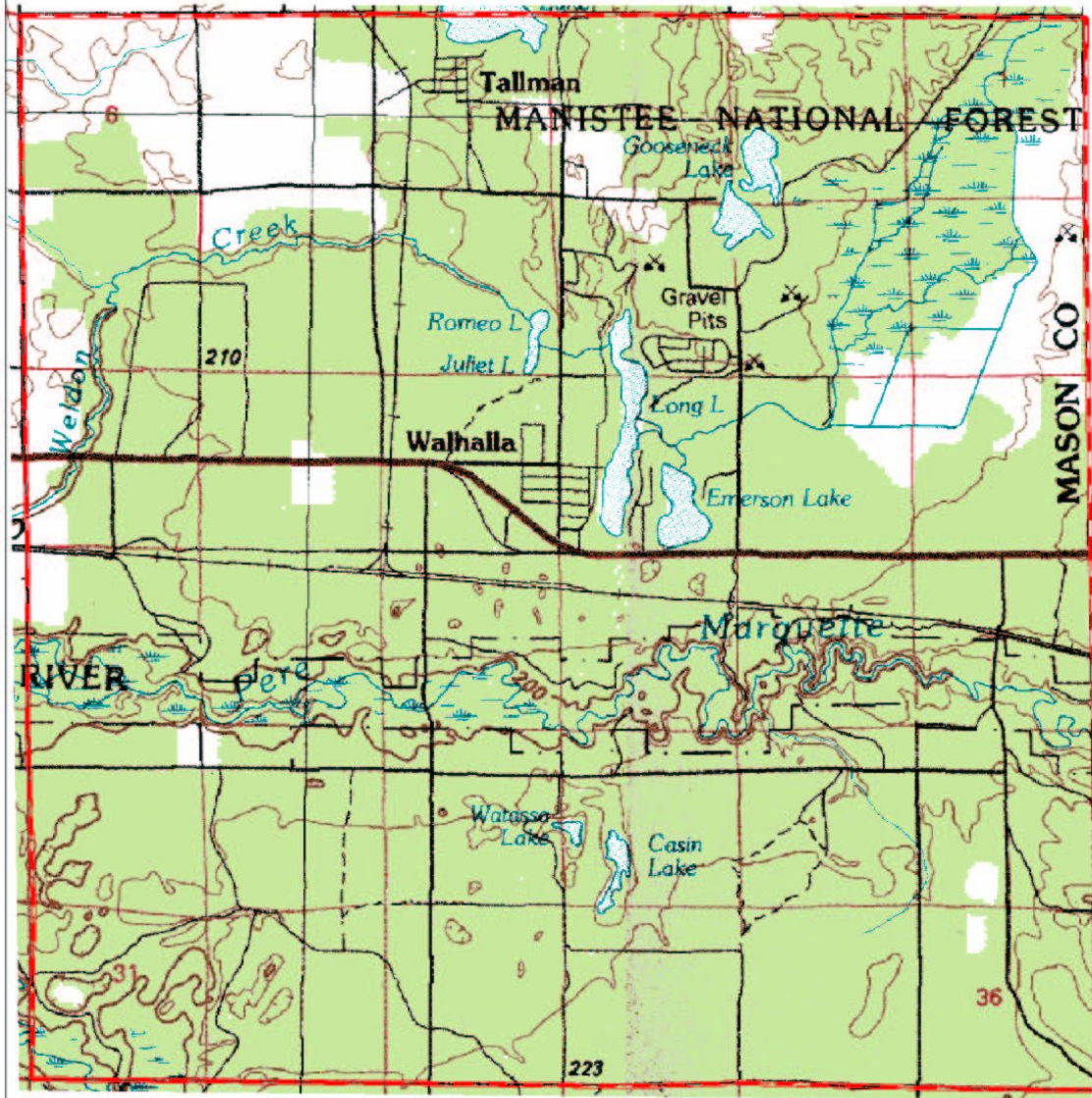
Amber Township



BRANCH TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Emerson Lake, Long Lake, Tallman Lake		
Rivers	Pere Marquette River		
Notable features	- Places include Walhalla and Tallman - Manistee National Forest		
Land description	Primarily wooded with residential concentrations, mainly near water features		
2. Land Value: 2022 Real and Personal Equalized Valuations			
		Source: Mason County Equalization Report 2022	
Agricultural	\$2,263,800	Industrial	\$0
Commercial	\$3,054,900	Residential	\$70,410,500
Total personal	\$4,785,500		
3. Population Characteristics			
		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	1,273	% with disability	18.1 %
% change 2010 to 2020*	+ 5.8 %	% in poverty	19.0 %
Median age	49.3	ALICE households, 2021**	29 %
% under 18 years old	23.6 %	Avg. daily commute	29.9 minutes
% over 65 years old	19.8 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population			
		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	16	Vacant housing units**	504
Campground & RV sites*	0	Peak seasonal population	4,329
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing			
		Source: 2021 American Community Survey 5-year Estimates	
Housing units	1,050	Single units	904
Occupied housing units	546	Multi-units in structure	10
Vacant housing units	504	Mobile homes or other	136
6. Public Services			
Fire	Branch Township Fire Department, 6697 E. US-10		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	US-10		
Railroads	Marquette Rail, Marquette Rail switch yard		
Bridges	- US-10 over Weldon Creek - Walhalla Rd over Pere Marquette River North Branch		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	Romeo and Juliet Dams, Hall Dam		

8. Economic Assets	
Major employers	- <i>None identified</i>
Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- Natural Gas Pipeline
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Branch Township Hall, 6688 1 st St., Walhalla, MI 49458
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

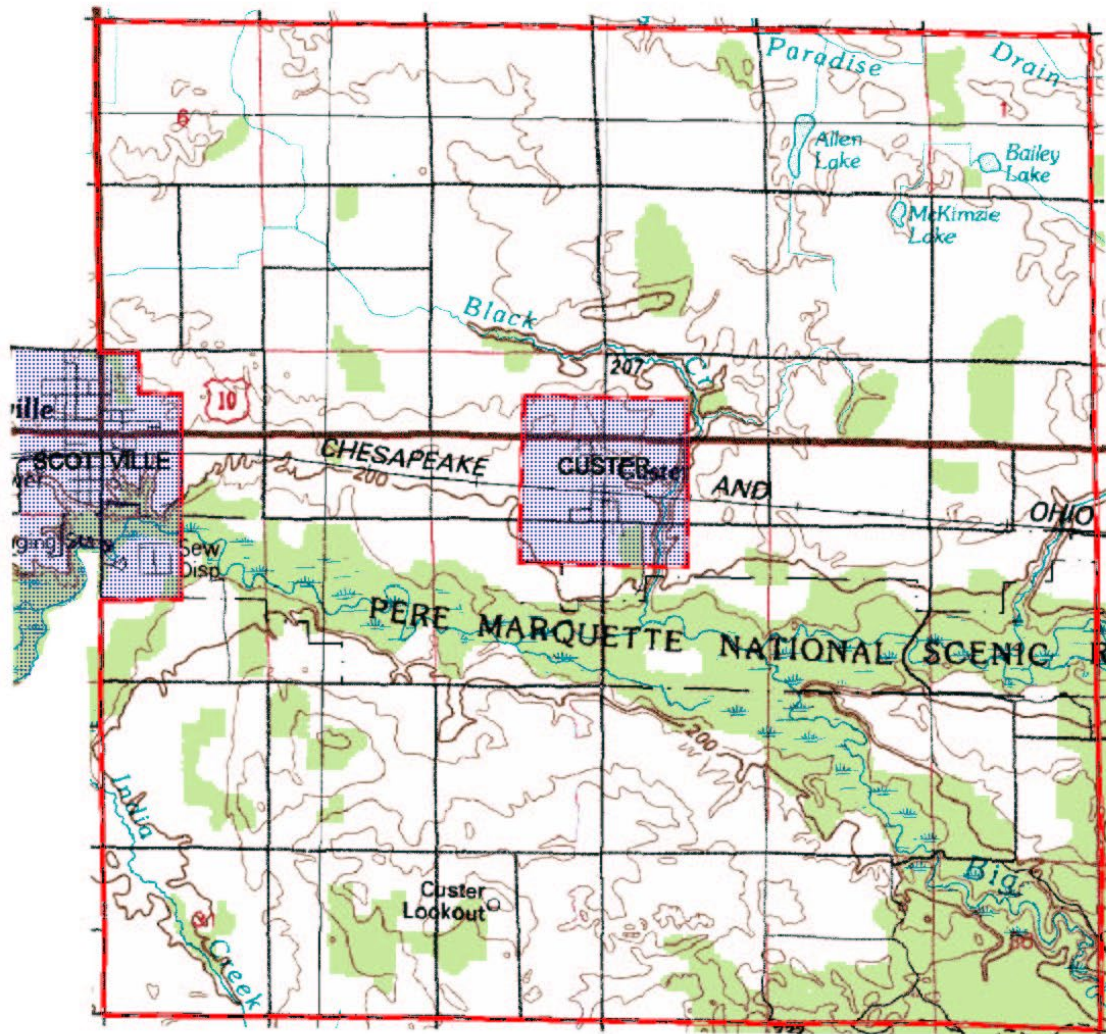
Branch Township



CUSTER TOWNSHIP Community Profile			
1. Physical Features			
Lakes	- No large lakes identified		
Rivers	Pere Marquette River		
Notable features	Custer Village lies in the middle and Scottville City borders to the west		
Land description	Mainly residential and agricultural, with forested/natural areas along the Pere Marquette River		
2. Land Value: 2022 Real and Personal Equalized Valuations		Source: Mason County Equalization Report 2022	
Agricultural	\$12,857,800	Industrial	\$0
Commercial	\$1,088,600	Residential	\$41,614,300
Total personal	\$4,017,100		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	1,357	% with disability	15.7 %
% change 2010 to 2020*	+ 5.3 %	% in poverty	6.5 %
Median age	39.2	ALICE households, 2021**	29 %
% under 18 years old	23.7 %	Avg. daily commute	21.3 minutes
% over 65 years old	17.4 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	75
Campground & RV sites*	0	Peak seasonal population***	1,807
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	***includes Village of Custer
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	576	Single units	523
Occupied housing units	501	Multi-units in structure	13
Vacant housing units	75	Mobile homes or other	49
6. Public Services			
Fire	- Custer Fire Station		
Police	- None identified		
Wastewater	- Village Wastewater Ponds		
Community Water Systems	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	US-10, US-31		
Railroads	Marquette Rail		
Bridges	- Marquette Railroad over Lincoln River (Fountain) - Custer Rd over Pere Marquette River - Indian Bridge (S Reek Rd) over Pere Marquette River		
Airports	- None identified		
Shelters	- None identified		
Schools	- Mason County Eastern, Custer, MI		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	- None identified		

8. Economic Assets	
Major employers	- <i>None identified</i>
Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- <i>None identified</i>
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Custer Township Hall, 1950 US-10
Festivals:	- <i>None identified</i>
Historic Sites:	Notipekagon Commemorative Designation, S. Custer Rd (Custer Township)

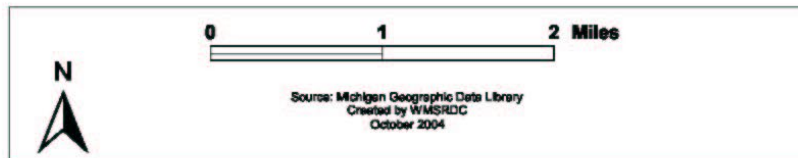
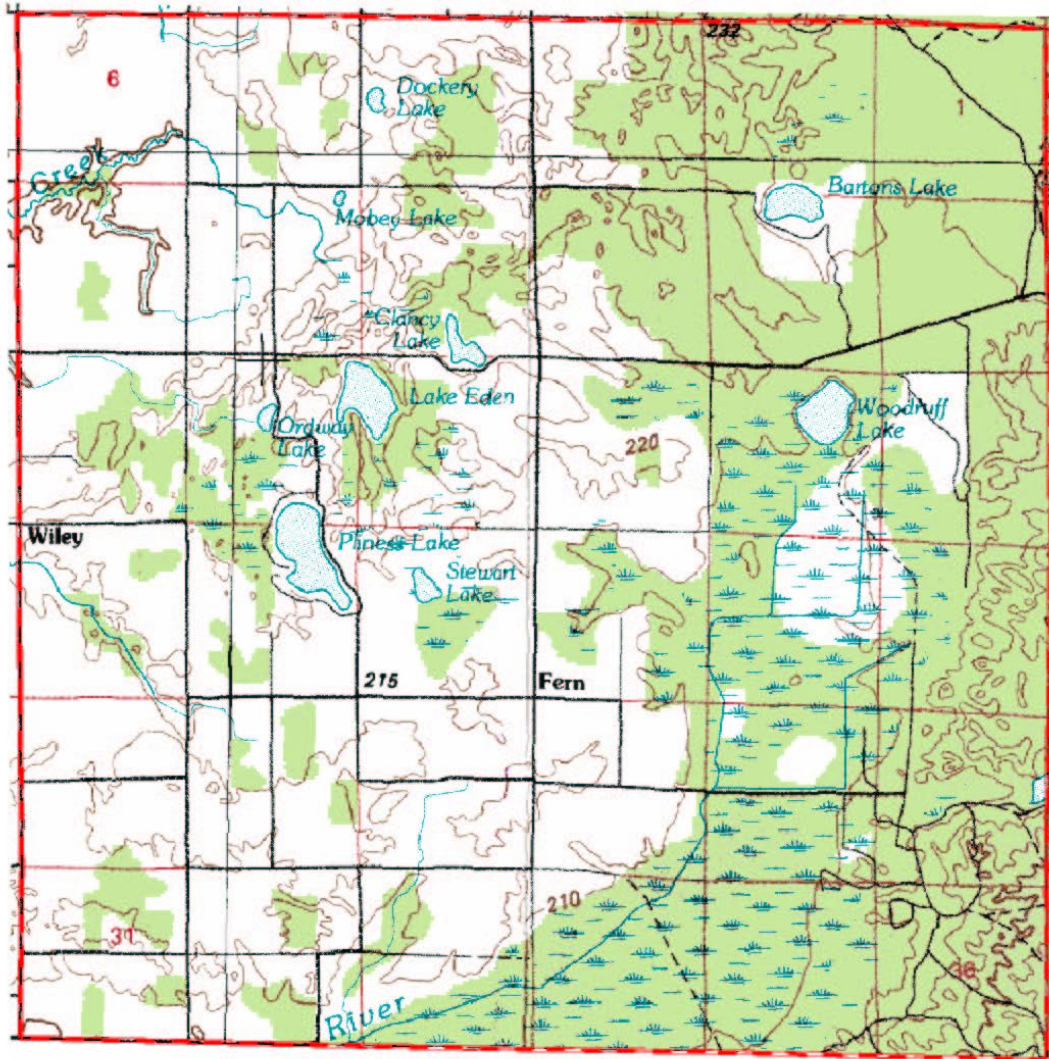
Custer Township



EDEN TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Lost Lake, Lake Eden, Woodruff Lake		
Rivers	Pentwater River North Branch		
Notable features	Manistee National Forest, Pentwater River North Branch headwaters		
Land description	Primarily forest, wetland, and agriculture. Residential density around Lost Lake		
2. Land Value: 2022 Real and Personal Equalized Valuations		Source: Mason County Equalization Report 2022	
Agricultural	\$12,116,600	Industrial	\$0
Commercial	\$0	Residential	\$35,143,200
Total personal	\$2,624,000		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	522	% with disability	8.6 %
% change 2010 to 2020*	- 0.3 %	% in poverty	19.7 %
Median age	42.4	ALICE households, 2021**	29 %
% under 18 years old	24.3 %	Avg. daily commute	29.6 minutes
% over 65 years old	16.7 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	208
Campground & RV sites*	0	Peak seasonal population	1,770
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	381	Single units	323
Occupied housing units	173	Multi-units in structure	0
Vacant housing units	208	Mobile homes or other	58
6. Public Services			
Fire	- None identified		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- None identified		
Public transportation	- None identified		
Warning System			
Other	- None identified		
7. Critical Infrastructure			
Major roads	- None identified		
Railroads	- None identified		
Bridges	Scottville Rd over Swan Creek		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	Whiskey Creek Dam No. 2		

8. Economic Assets	
Major employers	- <i>None identified</i>
Power generation	- <i>None identified</i>
Electric transmission	Consumers Energy Power Line
Pipelines	- <i>None identified</i>
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Eden Township Hall, 3369 Hawley Rd., Custer, MI 49405
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

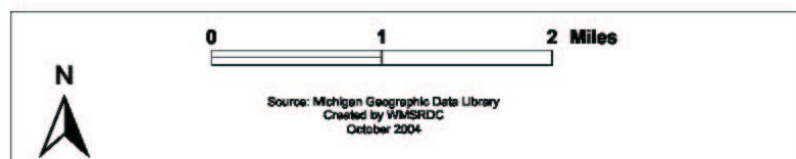
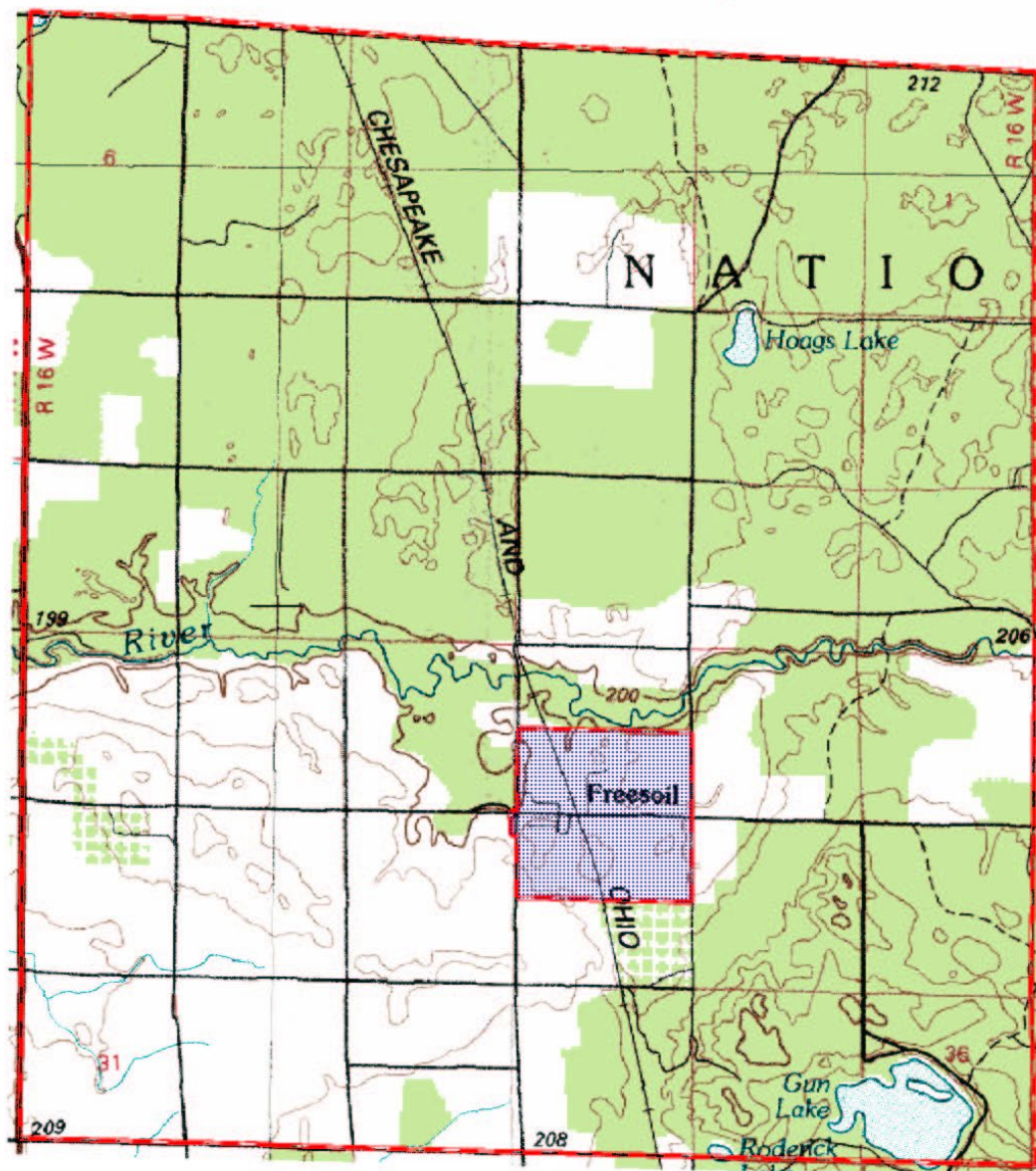
Eden Township



FREE SOIL TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Gun Lake, Hoags Lake		
Rivers	Big Sable River		
Notable features	Contains Village of Free Soil and areas of the Manistee National Forest		
Land description	Primarily forested while the southwest quarter is mainly agricultural		
2. Land Value: 2022 Real and Personal Equalized Valuations		Source: Mason County Equalization Report 2022	
Agricultural	\$6,483,900	Industrial	\$0
Commercial	\$458,200	Residential	\$47,223,200
Total personal	\$956,000		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	908	% with disability	18.6 %
% change 2010 to 2020*	+ 2.4 %	% in poverty	10.4 %
Median age	52.1	ALICE households, 2021**	29 %
% under 18 years old	15.3 %	Avg. daily commute	30.6 minutes
% over 65 years old	23.5 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	210
Campground & RV sites*	0	Peak seasonal population***	2,168
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates ***includes Village of Free Soil	
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	594	Single units	499
Occupied housing units	384	Multi-units in structure	0
Vacant housing units	210	Mobile homes or other	95
6. Public Services			
Fire	Free Soil/Meade Township Fire Department, 2613 E. Michigan St. (Free Soil Village)		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	US-31		
Railroads	Marquette Rail		
Bridges	US-31 over Big Sable River		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	Gun Lake Dam		
8. Economic Assets			
Major employers	- None identified		

Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- <i>None identified</i>
Commercial transportation	
9. Other Assets, Infrastructure, etc.	
Community facilities:	Free Soil Township Hall, 2691 E. Michigan St. (Free Soil Village)
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

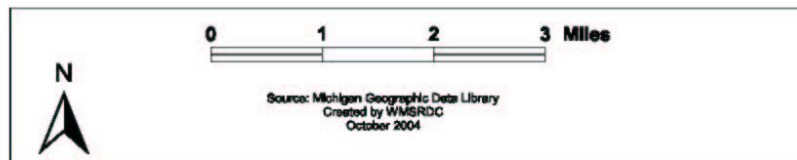
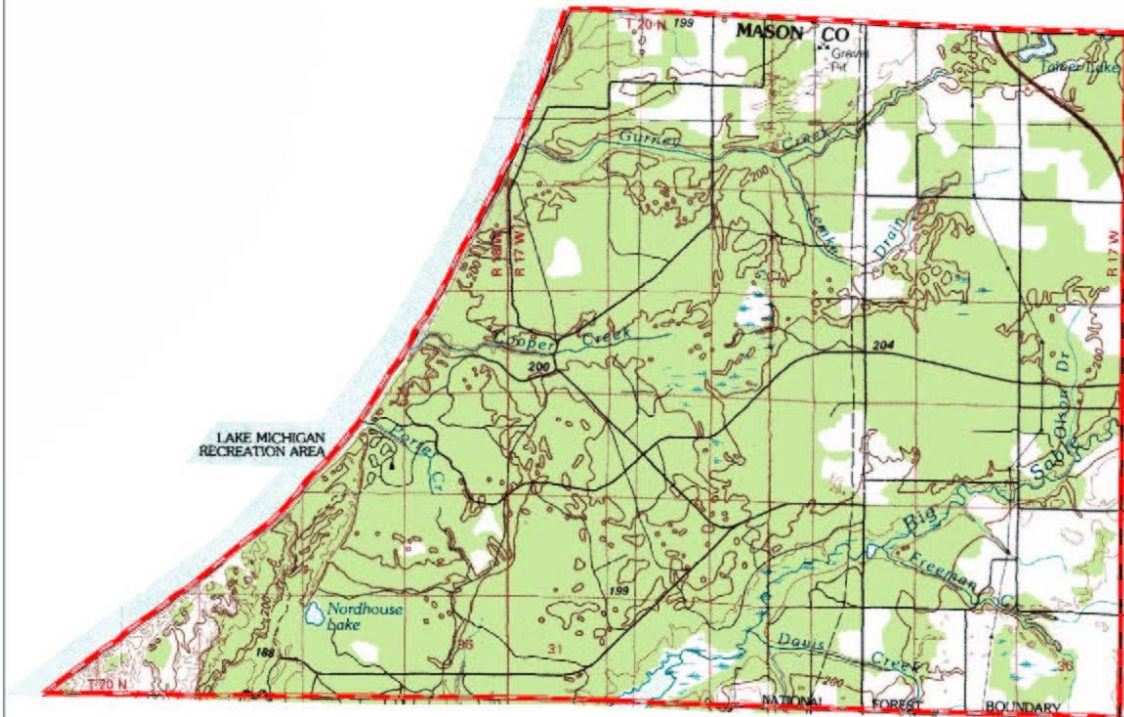
Freesoil Township



GRANT TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Hamlin Lake (part)		
Rivers	Big Sable River		
Notable features	Lake Michigan shoreline, Nordhouse Dunes Wilderness Area, Manistee National Forest		
Land description	Primarily forested with scattered residential and agricultural uses, and some retail along US-31		
2. Land Value: 2022 Real and Personal Equalized Valuations		Source: Mason County Equalization Report 2022	
Agricultural	\$3,578,100	Industrial	\$1,324,100
Commercial	\$1,389,400	Residential	\$72,378,700
Total personal	\$2,754,600		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	802	% with disability	15.2 %
% change 2010 to 2020*	+ 1.8 %	% in poverty	5.6 %
Median age	56.2	ALICE households, 2021**	29 %
% under 18 years old	17.8 %	Avg. daily commute	22.0 minutes
% over 65 years old	27.9 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	150
Campground & RV sites*	0	Peak seasonal population	1,702
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	500	Single units	448
Occupied housing units	350	Multi-units in structure	0
Vacant housing units	150	Mobile homes or other	52
6. Public Services			
Fire	Grant Township Fire & Rescue, 835 W. Hoague Rd.		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	Manistee Pines Estates		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	US-31		
Railroads	- None identified		
Bridges	- US-31 over Big Sable River - Quarterline Rd over Big Sable River		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	- None identified		

8. Economic Assets	
Major employers	- <i>None identified</i>
Power generation	- <i>None identified</i>
Electric transmission	Consumers Energy Power Line
Pipelines	- Natural Gas Pipeline - H2S Gas Pipeline - Brine Pipeline
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Grant Township Hall, 835 W. Hoague Rd
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

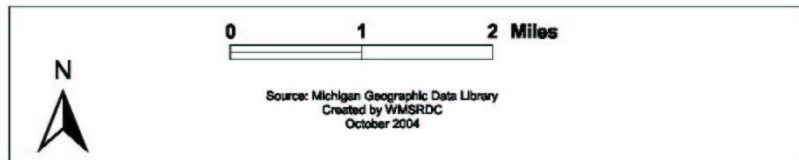
Grant Township



HAMLIN TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Hamlin Lake, Lincoln River		
Rivers	Lincoln River		
Notable features	Lake Michigan shoreline and dune environment, significant seasonal population increases likely		
Land description	Forested, residential and recreational. There are extensive urban-wildland interface due to the number of residential structures sprinkled throughout the primarily forested landscape.		
2. Land Value: 2022 Real and Personal Equalized Valuations		Source: Mason County Equalization Report 2022	
Agricultural	\$581,300	Industrial	\$1,045,300
Commercial	\$11,292,900	Residential	\$335,236,000
Total personal	\$9,577,200		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	3,682	% with disability	15.5 %
% change 2010 to 2020*	+ 8.9 %	% in poverty	13.0 %
Median age	57.5	ALICE households, 2021**	29 %
% under 18 years old	15.4 %	Avg. daily commute	17.0 minutes
% over 65 years old	32.9 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	854
Campground & RV sites*	195	Peak seasonal population	9,586
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	2,616	Single units	2,132
Occupied housing units	1,762	Multi-units in structure	53
Vacant housing units	854	Mobile homes or other	431
6. Public Services			
Fire	Hamlin Township Fire Dept, 3775 N. Jebavy Dr.		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- Tall Oaks Condominiums - Tamarac Village		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	SR 116		
Railroads	- None identified		
Bridges	- Lakeshore Dr. (SR-116) over Lincoln Lake - Jebavy over Lincoln River		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		

Ambulance service	- <i>None identified</i>
Dams	Hamlin Lake Dam
8. Economic Assets	
Major employers	- <i>None identified</i>
Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- <i>None identified</i>
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Hamlin Township Hall, 3775 N. Jebavy Dr., Ludington, MI
Festivals:	- <i>None identified</i>
Historic Sites:	<ul style="list-style-type: none"> - Ghost Town of Hamlin Informational Site, Ludington St. Park (Hamlin Township) - Big Sable Point Light Station, Ludington State Park (Hamlin Township) - Lake Michigan Beach House, Ludington State Park (Hamlin Township)

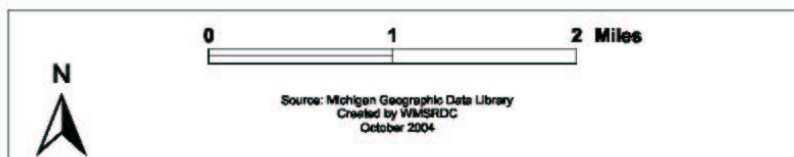
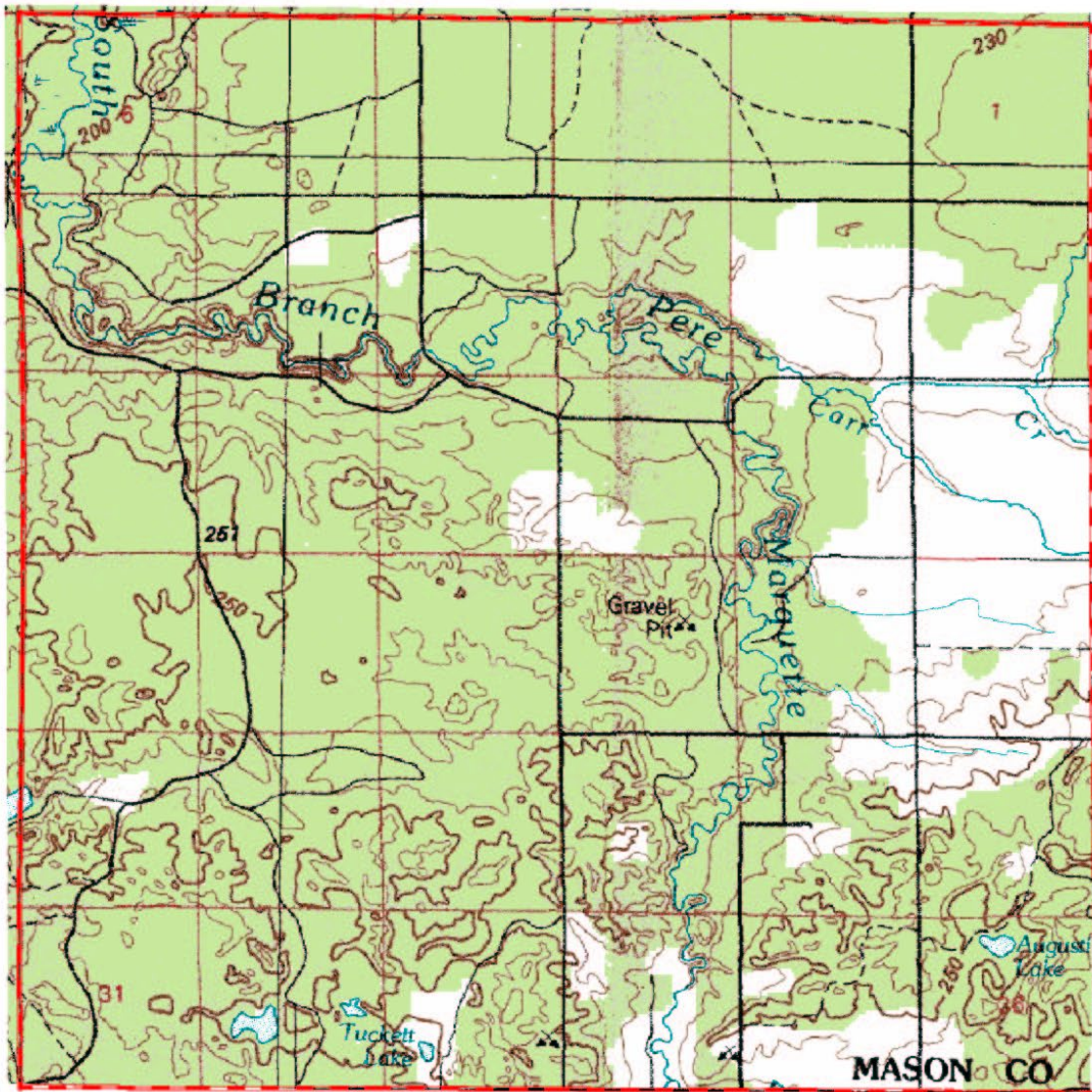
Hamlin Township



LOGAN TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Pere Marquette, Lincoln		
Rivers	Pere Marquette River		
Notable features	Carr (former settlement), Manistee National Forest areas, and		
Land description	Mainly forested with scattered residential. Some agricultural land east of the Pere Marquette River		
2. Land Value: 2022 Real and Personal Equalized Valuations		Source: Mason County Equalization Report 2022	
Agricultural	\$4,393,800	Industrial	\$0
Commercial	\$349,400	Residential	\$35,792,400
Total personal	\$466,400		
3. Population Characteristics		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	259	% with disability	20.1 %
% change 2010 to 2020*	+ 5.4 %	% in poverty	8.1 %
Median age	62.6	ALICE households, 2021**	29 %
% under 18 years old	7.3 %	Avg. daily commute	29.8 minutes
% over 65 years old	43.2 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	206
Campground & RV sites*	88	Peak seasonal population	1,847
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing		Source: 2021 American Community Survey 5-year Estimates	
Housing units	345	Single units	209
Occupied housing units	139	Multi-units in structure	0
Vacant housing units	206	Mobile homes or other	136
6. Public Services			
Fire	Carr Community Fire Department, 4930 S. Masten Rd.		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	- None identified		
Railroads	- None identified		
Bridges	- Walhalla Rd. bridge over Pere Marquette River South Branch - Masten Rd. bridge over Carr Creek		
Airports	- None identified		
Shelters	Ruby Creek Conservation & Recreation Club, 8152 E Washington Rd, Branch, MI		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	- None identified		

8. Economic Assets	
Major employers	- <i>None identified</i>
Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- <i>None identified</i>
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Logan Township Hall, 3975 Tyndall Rd, Branch, MI
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

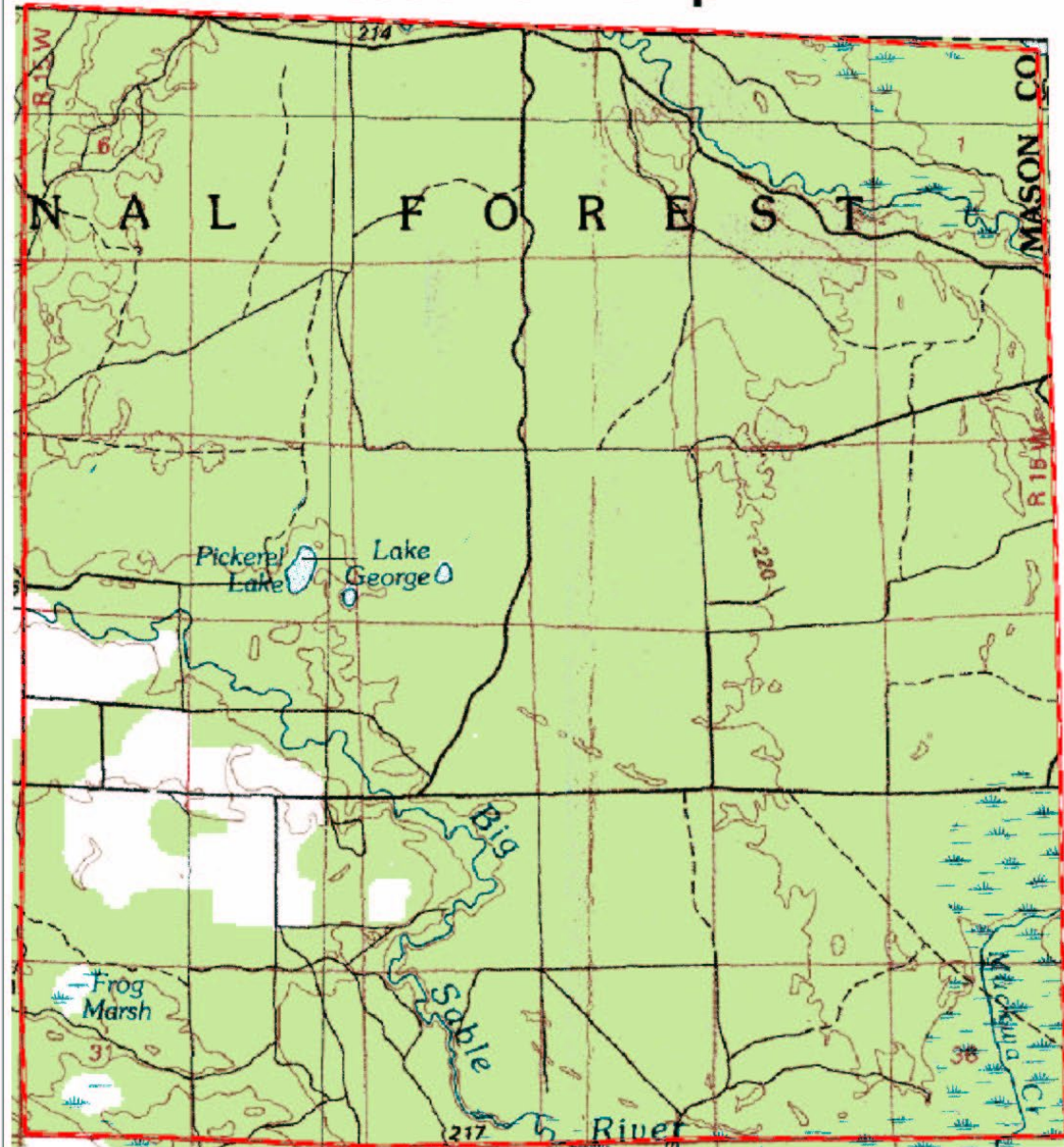
Logan Township



MEADE TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Pickerel Lake		
Rivers	Big Sable River, Little Manistee River		
Notable features	Manistee National Forest		
Land description	Heavily forested and very little development		
2. Land Value: 2022 Real and Personal Equalized Valuations			
Source: Mason County Equalization Report 2022			
Agricultural	\$0	Industrial	\$0
Commercial	\$0	Residential	\$23,607,300
Total personal	\$267,300		
3. Population Characteristics			
Source: 2021 American Community Survey 5-year Estimates, unless noted			
Population, 2021	144	% with disability	9.1 %
% change 2010 to 2020*	- 1.1 %	% in poverty	19.4 %
Median age	55.2	ALICE households, 2021**	29 %
% under 18 years old	18.8 %	Avg. daily commute	36.4 minutes
% over 65 years old	26.4 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population			
Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)			
Hotel rooms*	0	Vacant housing units**	91
Campground & RV sites*	0	Peak seasonal population	690
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing			
Source: 2021 American Community Survey 5-year Estimates			
Housing units	158	Single units	129
Occupied housing units	67	Multi-units in structure	4
Vacant housing units	91	Mobile homes or other	24
6. Public Services			
Fire	- None identified		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	- None identified		
Railroads	- None identified		
Bridges	- None identified		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	- None identified		
8. Economic Assets			
Major employers	- None identified		

Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- <i>None identified</i>
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Meade Township Hall, 5435 E Free Soil Rd, Free Soil, MI
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

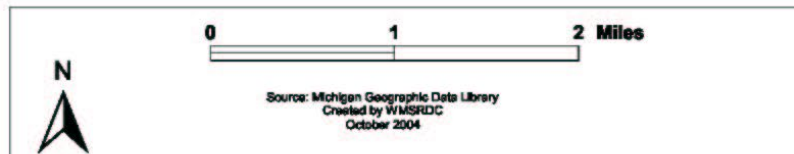
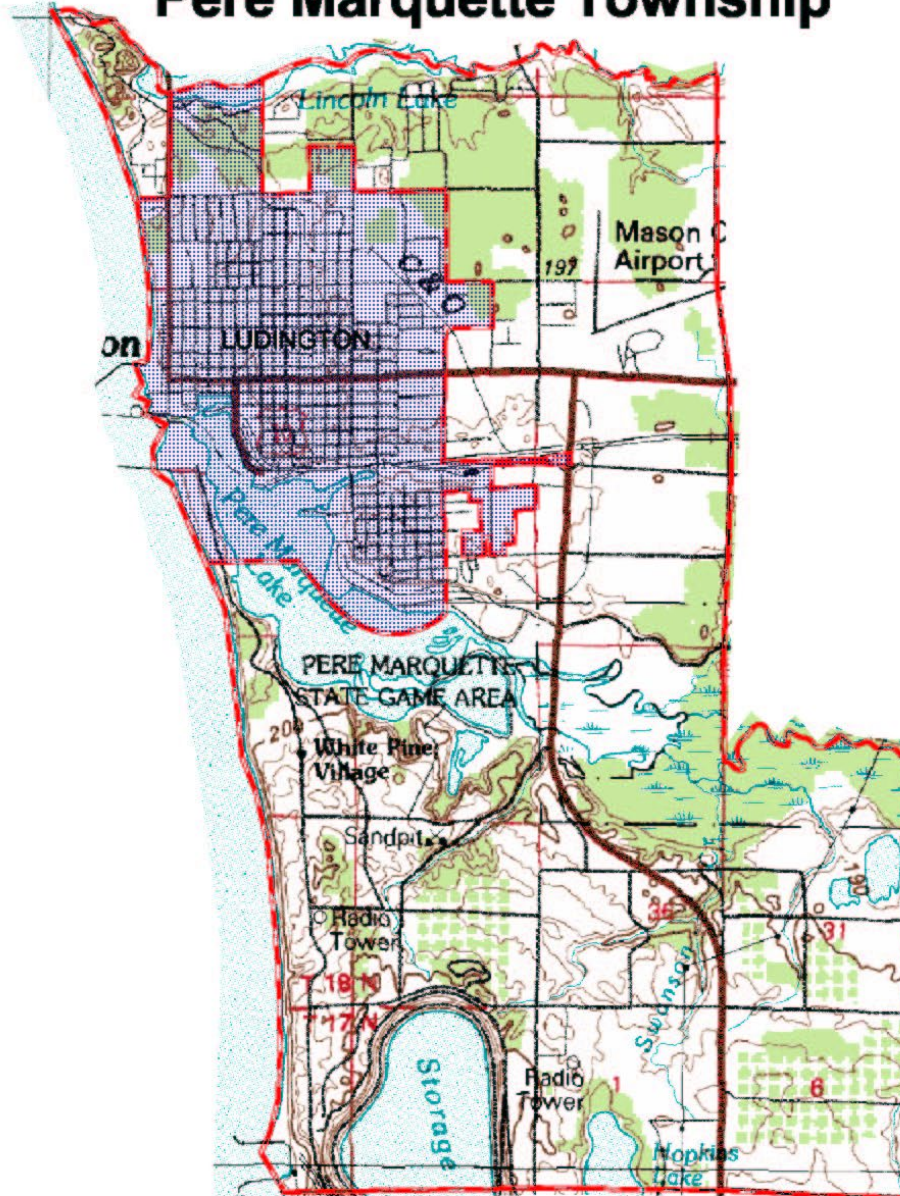
Meade Township



PERE MARQUETTE TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Hopkins Lake, Lincoln Lake, Pere Marquette Lake		
Rivers	Pere Marquette River		
Notable features	Lake Michigan shoreline and dune environment, Ludington Pumped Storage Plan Reservoir, Ludington is located mostly within the township		
Land description	Diverse land uses and topography, including urbanized and rural undeveloped areas		
2. Land Value: 2022 Real and Personal Equalized Valuations			
		Source: Mason County Equalization Report 2022	
Agricultural	\$2,459,600	Industrial	\$381,780,200
Commercial	\$44,317,800	Residential	\$185,693,728
Total personal	\$167,764,800		
3. Population Characteristics			
		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	2,557	% with disability	15.1 %
% change 2010 to 2020*	+ 2.1 %	% in poverty	7.6 %
Median age	49.0	ALICE households, 2021**	29 %
% under 18 years old	19.9 %	Avg. daily commute	15.0 minutes
% over 65 years old	23.6 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population			
		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	277	Vacant housing units**	341
Campground & RV sites*	649	Peak seasonal population	7,753
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing			
		Source: 2021 American Community Survey 5-year Estimates	
Housing units	1,336	Single units	1,225
Occupied housing units	995	Multi-units in structure	48
Vacant housing units	341	Mobile homes or other	63
6. Public Services			
Fire	Pere Marquette Township Fire Department, 1040 S. Pere Marquette Hwy		
Police	- None identified		
Wastewater	City of Ludington		
Community Water Systems	Pere Marquette Township - wells		
Public transportation	Ludington Mass Transportation Authority, 5545 Carr Street		
Other	- None identified		
7. Critical Infrastructure			
Major roads	- US-31, US-10 - SR 116 - Pere Marquette Highway		
Railroads	Marquette Rail		
Bridges	- US-31 over Pere Marquette River - Lakeshore Dr. (SR-116) over Lincoln Lake - Pere Marquette Highway over Pere Marquette River South Branch, Pere Marquette River North Branch - Jebavy over Lincoln River		
Airports	Mason County Airport, 5300 W. US-10		
Shelters	Calvary Baptist Church, 220 N. Jebavy Drive		
Schools	- Ludington Elementary, 5771 W. Bryant Rd., Ludington, MI - Ludington Early Childhood, 5771 W. Bryant Rd, Ludington, MI		

Community medical facilities, Hospitals	- <i>None identified</i>
Ambulance service	Life EMS of Mason County, 4910 W 1 st St.
Dams	Ludington Pumped Storage Plant and Dam
8. Economic Assets	
Major employers	UACJ Automotive/Whitehall Industries, 5175 W 6 th St
Power generation	- Ludington Pumped Storage Plant and Dam - Michigan Power, L.P. (natural gas cogeneration facility), 5795 W. 6 th St.
Electric transmission	Consumers Energy Power Line
Pipelines	- Natural Gas Pipeline - H2S Gas Pipeline - Brine Pipeline
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Pere Marquette Township Hall, 1699 S. Pere Marquette Hwy
Festivals:	Western Michigan Fair (August)
Historic Sites:	Marquette's Death Informational Site, S Lakeshore Drive @ Buttersville peninsula

Pere Marquette Township

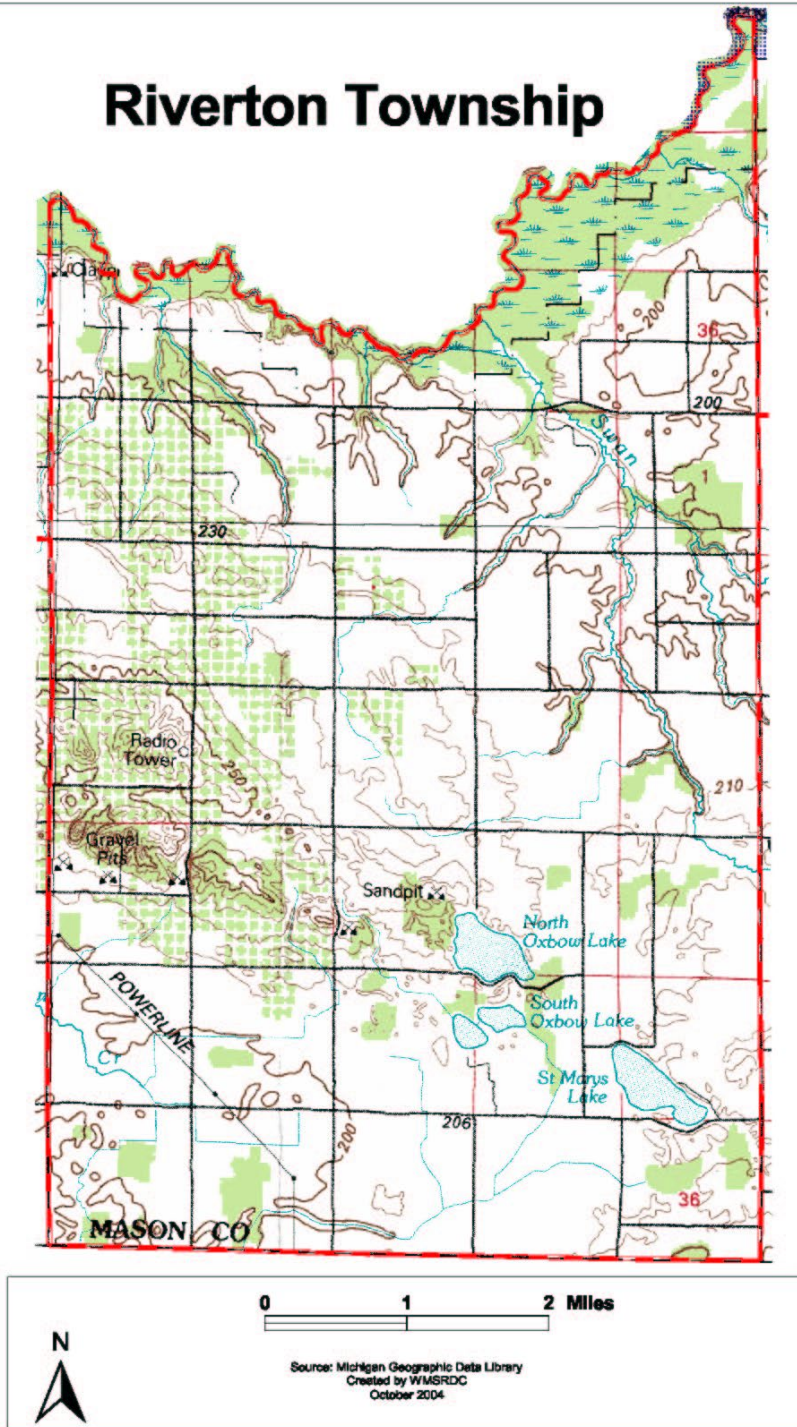


RIVERTON TOWNSHIP Community Profile			
1. Physical Features			
Lakes	North Oxbow Lake, Saint Mary’s Lake		
Rivers	Pere Marquette River		
Notable features	Agricultural community		
Land description	Mainly agricultural with scattered residential		
2. Land Value: 2022 Real and Personal Equalized Valuations			
Source: Mason County Equalization Report 2022			
Agricultural	\$26,844,700	Industrial	\$1,709,000
Commercial	\$0	Residential	\$37,505,700
Total personal	\$32,725,500		
3. Population Characteristics			
Source: 2021 American Community Survey 5-year Estimates, unless noted			
Population, 2021	1,295	% with disability	17.7 %
% change 2010 to 2020*	+ 6.9 %	% in poverty	18.7 %
Median age	41.5	ALICE households, 2021**	29 %
% under 18 years old	21.1 %	Avg. daily commute	21.5 minutes
% over 65 years old	18.1 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population			
Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)			
Hotel rooms*	0	Vacant housing units**	68
Campground & RV sites*	41	Peak seasonal population	1,867
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing			
Source: 2021 American Community Survey 5-year Estimates			
Housing units	525	Single units	461
Occupied housing units	457	Multi-units in structure	6
Vacant housing units	68	Mobile homes or other	58
6. Public Services			
Fire	Riverton Township Fire Department, 2104 W Hawley Rd., Ludington, MI		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	- None identified		
Railroads	- None identified		
Bridges	- Chauvez Rd over Swan Creek - Scottville Rd over Swan Creek		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	West Riverton Cemetery Dam		

8. Economic Assets	
Major employers	Indian Summer Co-op, 3958 W Chauvez Rd., Ludington, MI
Power generation	Lake Winds Energy Park, 56 wind turbines (Riverton and Summit Twps)
Electric transmission	Consumers Energy Power Line
Pipelines	- Natural Gas Pipeline - H2S Gas Pipeline
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Riverton Township Hall, 2122 W. Hawley Rd
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

Land Use and Natural Features Map (USGS Quad.)

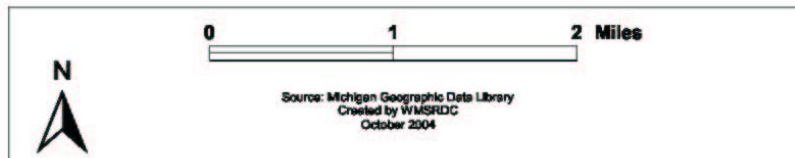
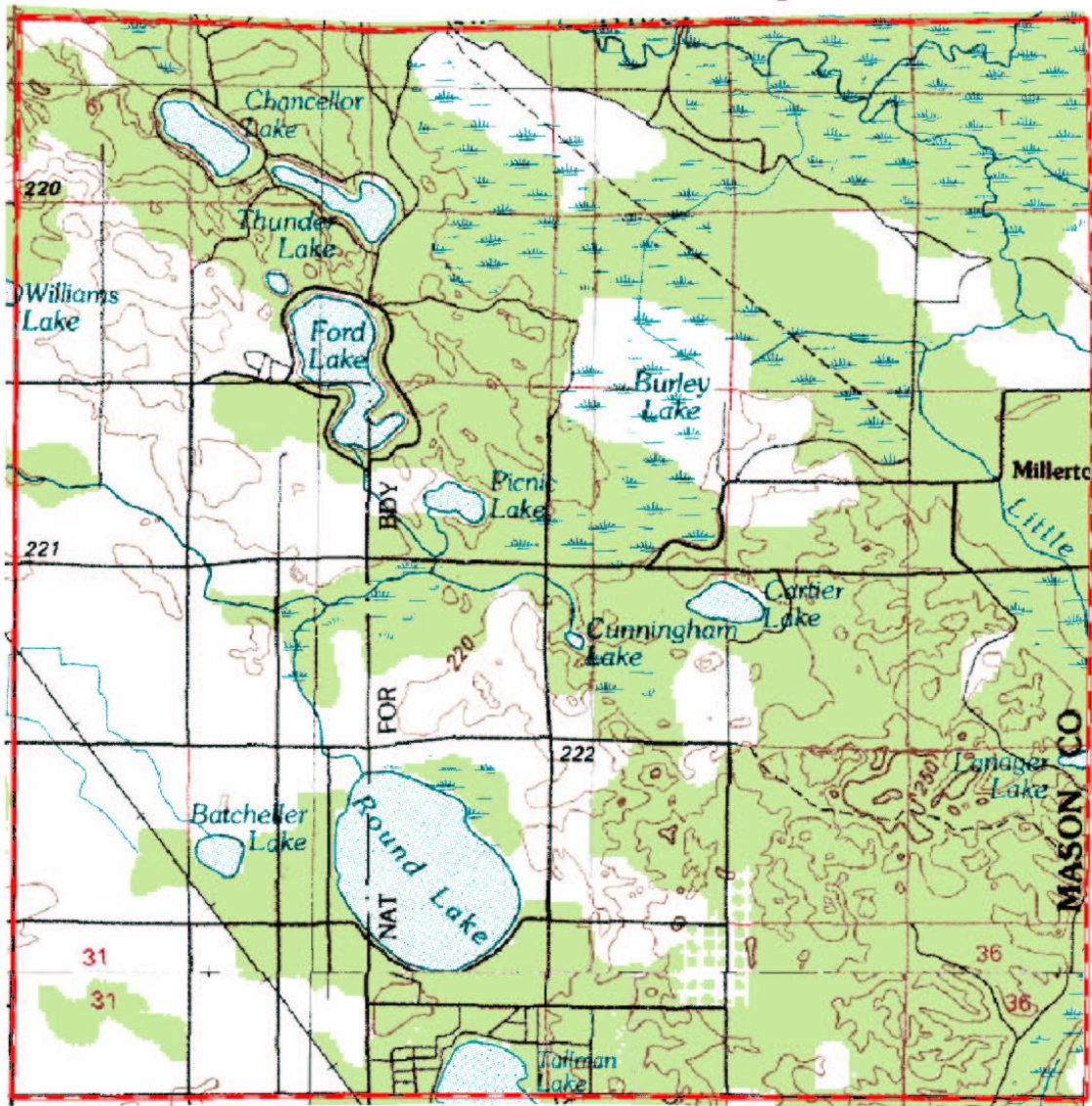
Riverton Township



SHERIDAN TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Blue Lake, Cartier Lake, Ford Lake, Round Lake, Tallman Lake, Thunder Lake		
Rivers	Big Sable River, Lincoln River		
Notable features	Manistee National Forest		
Land description	Agriculture to the west, forests to the east, and numerous lakes with residential/cottage development in between		
2. Land Value: 2022 Real and Personal Equalized Valuations			
		Source: Mason County Equalization Report 2022	
Agricultural	\$4,497,175	Industrial	\$0
Commercial	\$0	Residential	\$78,727,518
Total personal	\$874,500		
3. Population Characteristics			
		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	1,160	% with disability	17.8 %
% change 2010 to 2020*	- 2.6 %	% in poverty	12.4 %
Median age	43.9	ALICE households, 2021**	29 %
% under 18 years old	25.5 %	Avg. daily commute	16.6 minutes
% over 65 years old	21.4 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population			
		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	0	Vacant housing units**	562
Campground & RV sites*	70	Peak seasonal population	4,812
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing			
		Source: 2021 American Community Survey 5-year Estimates	
Housing units	1,001	Single units	832
Occupied housing units	439	Multi-units in structure	0
Vacant housing units	562	Mobile homes or other	169
6. Public Services			
Fire	- None identified		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	- None identified		
Railroads	Marquette Rail		
Bridges	- None identified		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	- None identified		

8. Economic Assets	
Major employers	- <i>None identified</i>
Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- <i>None identified</i>
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Sheridan Township Hall, 6407 Dewey Rd., Fountain, MI
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

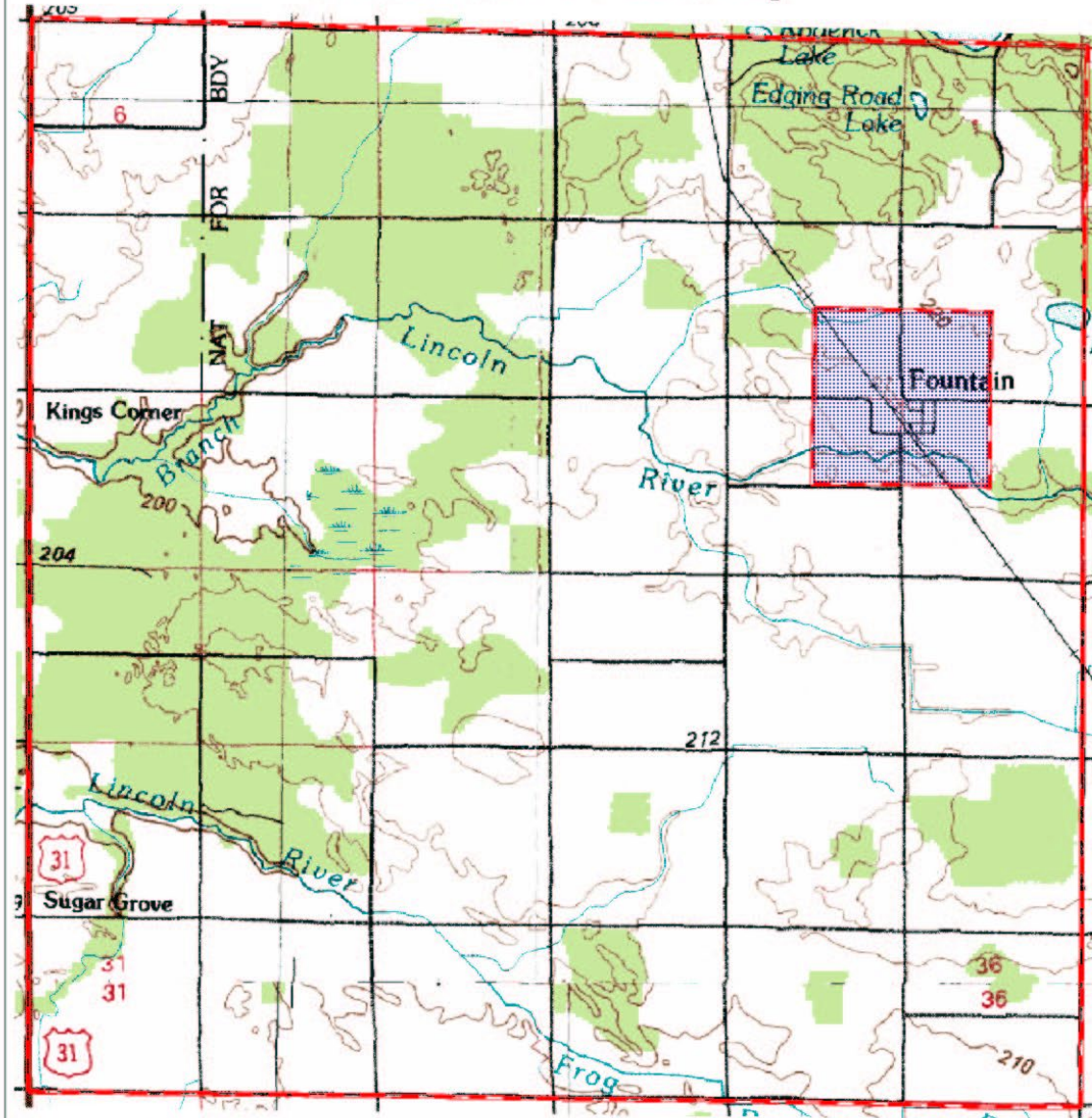
Sheridan Township



SHERMAN TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Crystal Lake, Ryerson Lake, Robinson Lake, numerous other small lakes		
Rivers	Lincoln River		
Notable features	Contains Fountain Village, Manistee National Forest in the northern portion		
Land description	Agriculture, scattered residential, and natural growth		
2. Land Value: 2022 Real and Personal Equalized Valuations			
Source: Mason County Equalization Report 2022			
Agricultural	\$8,216,500	Industrial	\$262,100
Commercial	\$447,800	Residential	\$42,121,500
Total personal	\$1,229,400		
3. Population Characteristics			
Source: 2021 American Community Survey 5-year Estimates, unless noted			
Population, 2021	957	% with disability	21.4 %
% change 2010 to 2020*	- 5.0 %	% in poverty	23.9 %
Median age	45.7	ALICE households, 2021**	29 %
% under 18 years old	21.5 %	Avg. daily commute	23.1 minutes
% over 65 years old	18.2 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population			
Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)			
Hotel rooms*	0	Vacant housing units**	149
Campground & RV sites*	0	Peak seasonal population***	1,851
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	***includes Village of Fountain
5. Housing			
Source: 2021 American Community Survey 5-year Estimates			
Housing units	540	Single units	447
Occupied housing units	391	Multi-units in structure	0
Vacant housing units	149	Mobile homes or other	93
6. Public Services			
Fire	- None identified		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	US-31		
Railroads	Marquette Rail		
Bridges	- US-31 over Lincoln River South Branch and Lincoln River North Branch - Fountain Rd. over Lincoln River North Branch - Custer Rd. over Lincoln River North Branch		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	Gun Lake Outlet Control Structure		

8. Economic Assets	
Major employers	- <i>None identified</i>
Power generation	- <i>None identified</i>
Electric transmission	- <i>None identified</i>
Pipelines	- <i>None identified</i>
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Sherman Township Hall, 3854 Main St. (Fountain)
Festivals:	- Horse Pull, Memorial Day Weekend
Historic Sites:	- <i>None identified</i>

Sherman Township

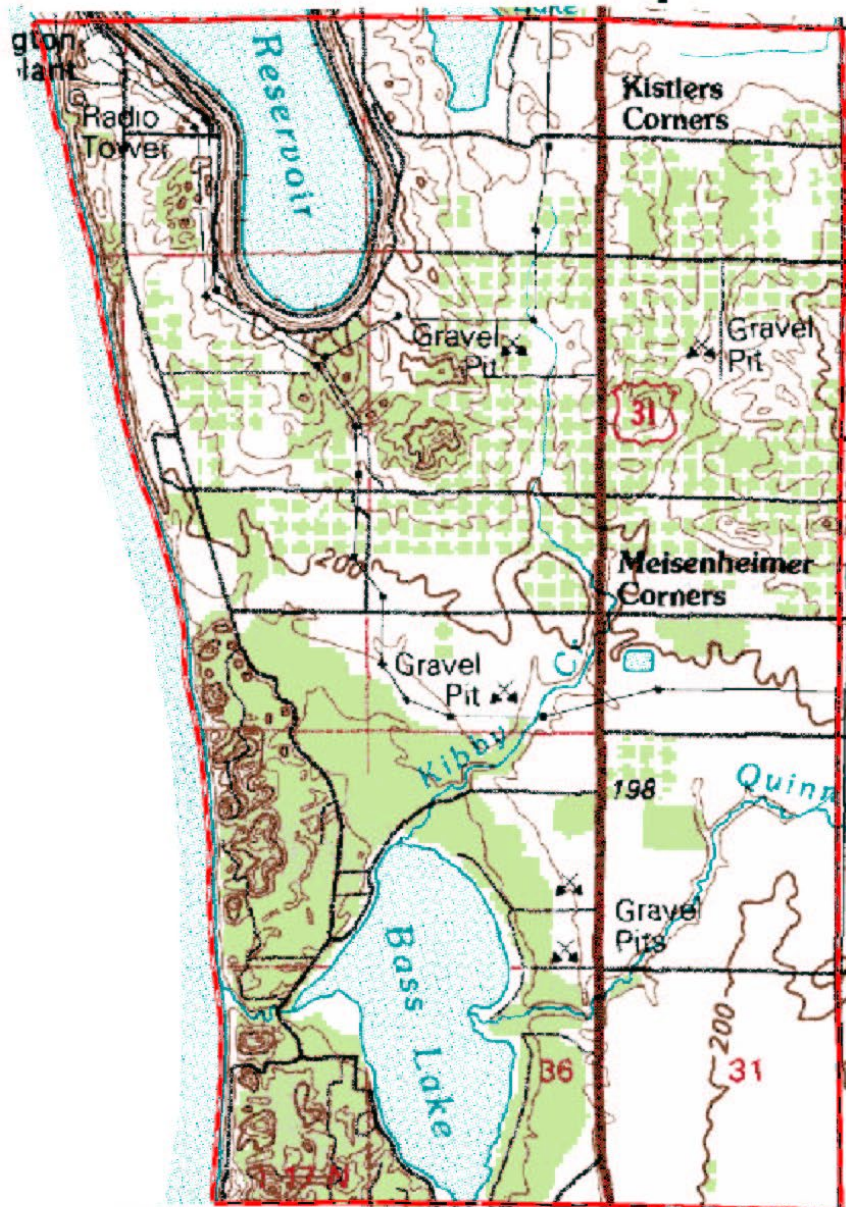


SUMMIT TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Bass Lake, Hopkins Lake		
Rivers	- None identified		
Notable features	Lake Michigan shoreline and dune environment, Ludington Pumped Storage Plant Reservoir		
Land description	Mostly rural & agricultural with lakefront residential concentrations		
2. Land Value: 2022 Real and Personal Equalized Valuations			
		Source: Mason County Equalization Report 2022	
Agricultural	\$6,258,700	Industrial	\$72,424,100
Commercial	\$2,842,300	Residential	\$145,820,858
Total personal	\$23,769,700		
3. Population Characteristics			
		Source: 2021 American Community Survey 5-year Estimates, unless noted	
Population, 2021	1,092	% with disability	14.2 %
% change 2010 to 2020*	+ 7.7 %	% in poverty	4.5 %
Median age	51.9	ALICE households, 2021**	29 %
% under 18 years old	19.3 %	Avg. daily commute	18.1 minutes
% over 65 years old	21.6 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population			
		Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)	
Hotel rooms*	57	Vacant housing units**	490
Campground & RV sites*	456	Peak seasonal population	5,970
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing			
		Source: 2021 American Community Survey 5-year Estimates	
Housing units	941	Single units	871
Occupied housing units	451	Multi-units in structure	0
Vacant housing units	490	Mobile homes or other	70
6. Public Services			
Fire	- None identified		
Police	- None identified		
Wastewater	- None identified		
Community Water Systems	Heritage Hills Mobile Home Village		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	US-31		
Railroads	- None identified		
Bridges	- S Lakeshore Dr. over Bass Lake - Pere Marquette Highway over Quinn Creek		
Airports	- None identified		
Shelters	- None identified		
Schools	- None identified		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		
Dams	- Bass Lake Dam - Ludington Pumped Storage Plant and Dam		

8. Economic Assets	
Major employers	- <i>None identified</i>
Power generation	Lake Winds Energy Park, 56 wind turbines (Riverton and Summit Twps)
Electric transmission	Consumers Energy Power Line
Pipelines	- <i>None identified</i>
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	Summit Township Hall, 4966 W. Lattin Rd., Ludington, MI
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

Land Use and Natural Features Map (USGS Quad.)

Summit Township



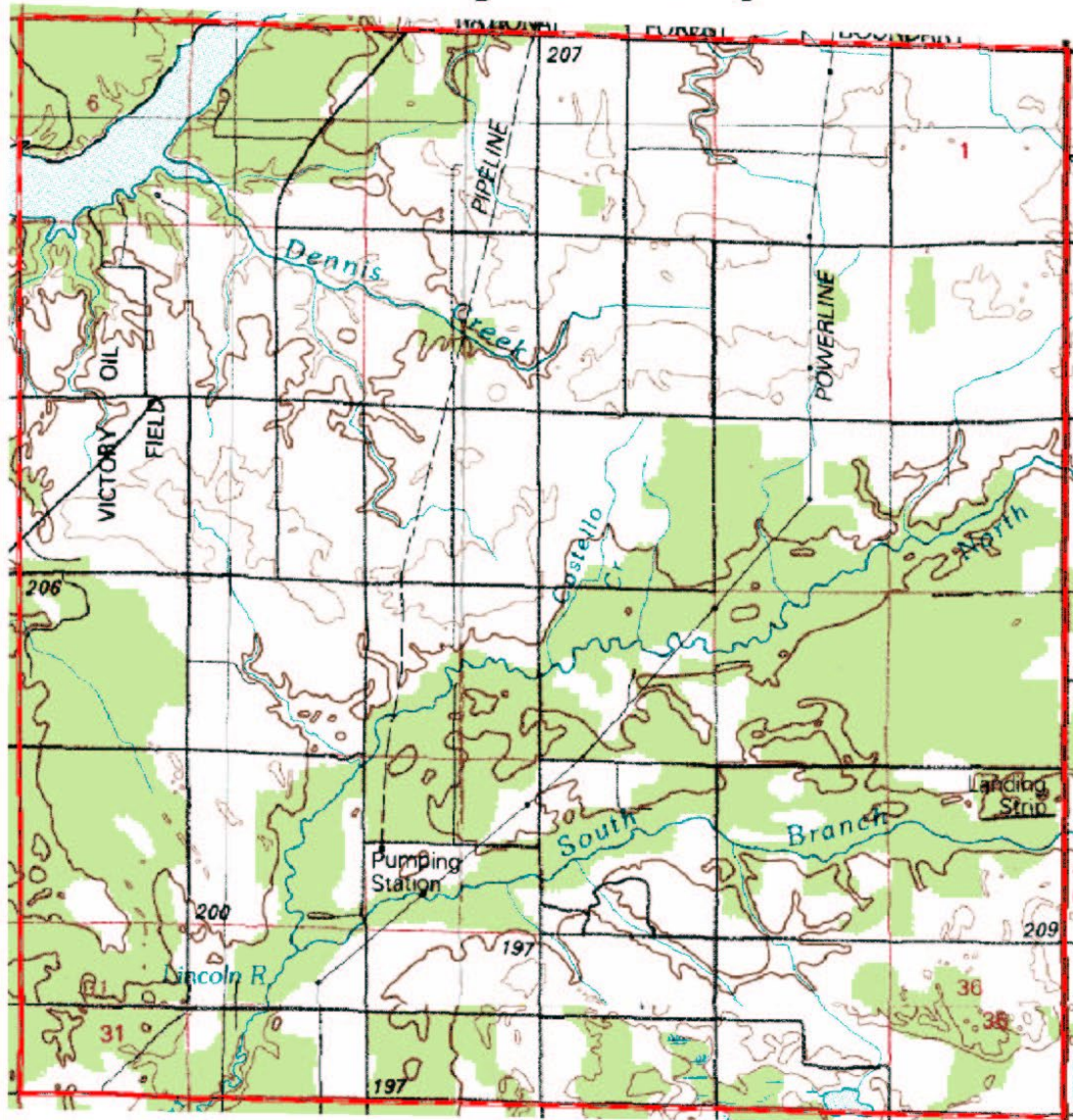
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Source: Michigan Geographic Data Library
Created by WMSRD/C
October 2004

VICTORY TOWNSHIP Community Profile			
1. Physical Features			
Lakes	Hamlin Lake		
Rivers	Lincoln River		
Notable features	Home to West Shore Community College		
Land description	Rural with scattered residential throughout. Roughly the north half is agricultural with larger contiguous forests across the southern half.		
2. Land Value: 2022 Real and Personal Equalized Valuations			
		Source: Mason County Equalization Report 2022	
Agricultural	\$12,966,500	Industrial	\$0
Commercial	\$1,427,800	Residential	\$58,999,100
Total personal	\$3,499,500		
3. Population Characteristics			
Source: 2021 American Community Survey 5-year Estimates, unless noted			
Population, 2021	1,481	% with disability	19.7 %
% change 2010 to 2020*	+ 1.7 %	% in poverty	9.9 %
Median age	43.4	ALICE households, 2021**	29 %
% under 18 years old	16.0 %	Avg. daily commute	21.9 minutes
% over 65 years old	21.4 %		
* US decennial census figures		**Asset Limited, Income Constrained, Employed (United Way of Michigan)	
4. Peak Seasonal Population			
Peak seasonal population = population + (hotel rooms x2) + (camp/RV sites x4) + (vacant houses x6)			
Hotel rooms*	0	Vacant housing units**	64
Campground & RV sites*	99	Peak seasonal population	2,261
* WMSRDC research conducted in 2022		** 2021 American Community Survey 5-year Estimates	
5. Housing			
Source: 2021 American Community Survey 5-year Estimates			
Housing units	644	Single units	524
Occupied housing units	580	Multi-units in structure	8
Vacant housing units	64	Mobile homes or other	112
6. Public Services			
Fire	- None identified		
Police	- None identified		
Wastewater	- None identified		
Water (source)	- None identified		
Public transportation	- None identified		
Other	- None identified		
7. Critical Infrastructure			
Major roads	US-31		
Railroads	- None identified		
Bridges	- US-31 over Lincoln River South Branch and Lincoln River North Branch - Stiles Rd over Lincoln River South Branch		
Airports	- None identified		
Shelters	- None identified		
Schools	Victory Early Childhood Center, 4171 N Stiles Rd., Scottville, MI West Shore Community College, 3000 N Stiles Rd., Scottville, MI		
Community medical facilities, Hospitals	- None identified		
Ambulance service	- None identified		

Dams	West Shore Community College Dam
8. Economic Assets	
Major employers	West Shore Community College, 3000 N Stiles Rd
Power generation	- <i>None identified</i>
Electric transmission	Consumers Energy Power Line
Pipelines	- Natural Gas Pipeline - H2S Gas Pipeline - Brine Pipeline
Commercial transportation	- <i>None identified</i>
9. Other Assets, Infrastructure, etc.	
Community facilities:	- Michigan State University Extension Office, 3000 N Stiles Rd. - Victory Township Hall, 4411 N. Stiles Rd.
Festivals:	- <i>None identified</i>
Historic Sites:	- <i>None identified</i>

Victory Township



Appendix B:
HAZARD PROFILES AND EVALUATIONS

Hazard Identification Profile

Mason County

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- March 2, 1977: Federal emergency declaration (#3035)
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer, 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: (see individual communities) **FIRM Map Date:** (see individual communities)

Flood Insurance Policies In-Force: 58

Total Flood Insurance Coverage: \$16,318,500

Floodplains and Flood-prone Areas: (see individual communities)

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out. Local declaration of emergency for Riverton, Summit, Pere Marquette, and Amber townships.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards:

- Extreme high water levels in the Great Lakes: 1929, 1952, 1973, 1986, and 1997.
- Extreme low water levels in the Great Lakes: 1926, 1934, 1964, 2003, and 2013.
- Rip current incidents on Lake Michigan, 2002-2012: 77 fatalities, 230 rescues.
- June 1986: Record high water level on Lake Michigan.
- July 13, 1938: Seiche/storm surge on Lake Michigan. 3 drowned in Holland, 1 in Muskegon, and 1 near Pentwater.
- 2013: Record low water level on Lake Michigan.
- July 2019: Three swimmer drownings along Lake Michigan shoreline. 1 at Ludington Stearns Park, 2 at Hamlin Lake/ Sable River outlet.
- 2019-21: Lengthy high water event on Lake Michigan. High water record in 2020. Extensive shoreline erosion and property damage along Lake Michigan shoreline. Roughly-estimated \$4.5 million in public and private damages in the City of Ludington.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- July 13, 2000: 1" hail. \$20k property damage, \$10k crop damage, Scottville.
- May 17, 2001: .88" hail. \$10k property damage, \$10k crop damage, Riverton Township.
- October 3, 2006: .75" hail. \$15k property damage, \$15k crop damage. Hamlin Township.
- May 3, 2012: 1.75" hail. \$25k property damage, Scottville.
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning:

- August 13, 1995: Lightning. \$30k property damage, Ludington.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- September 16, 1997: Severe thunderstorm winds. \$25k property damage, Ludington; \$10k, Fountain.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 1, 2000: Severe thunderstorm winds. \$25k property damage, Ludington.

- September 11, 2000: Severe thunderstorm winds. \$25k property damage, Scottville.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- July 24, 2005: Severe thunderstorm winds. \$40k property damage, Freesoil; \$20k, Scottville.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- August 2, 2012: Severe thunderstorm winds. \$100k property damage, Hamlin Township.
- April 12, 2014: Thunderstorm wind. \$500k damage, Riverton & Summit townships.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes:

Number of tornadoes 1950-2022: 5 (0 deaths, 8 injuries)

- April 12, 1972: Tornado (F2). 8 injuries, \$2.5m property damage, Eden Township.
- June 12, 2008: Tornado (EF1). No damage, injuries, or fatalities reported, Grant Township.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).
- March 20, 2012: 40-acre wildfire sparked by bonfire remnants, Custer Township.

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63
- June 11, 1881: Conflagration destroyed 67 buildings in Ludington.
- February 28, 1993: Structural fire in Ludington. 9 fatalities.
- November 22, 2021: Structural fire in Sheridan Township. 1 fatality.

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in 2022: 13

- April 5, 1970: Accidental spill of cyanide acid into the Ludington sewer system.

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCEM events showing downed power lines or power outages in Mason County, 1997-2023: 34
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- September 11, 2000: Power outage. 305 customers in Ludington and 190 customers in Scottville.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.
- April 20, 2017: A downed high voltage line cut power to most of Ludington (thunderstorms).

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

- **29 wells “Active” for either: Part 625 Disposal (12), Natural Brine (12), Brine Disposal (3), Part 625 Test Well (1), or Gas Injection (1)**
- **82 wells with some level of “H2S Concern” in the townships of: Amber (2), Eden (5), Grant (7), Hamlin (29), Riverton (3), and Victory (36).**
- May 13, 1994: Blown gasket at a compression station allowed hydrogen sulfide emissions causing a number of self-evacuations and at least 11 emergency hospitalizations, Victory Township.
- January 5, 1996: Stuck valve caused 18 emergency calls, Victory Township.

2.10 Pipeline Accidents:

- February 1995: Pipeline rupture. 1 evacuation, Victory Township.
- April 1995: Pipeline rupture. 30 evacuations, Victory Township.
- July 1996: Pipeline rupture. Self-evacuations, Victory Township.
- August 1996: Pipeline rupture. Self-evacuations, Victory Township.
- September 1996: Accident involving pipeline replacement. 1 injury, Victory Township.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances:

- Summer 1970 and 1971: Protest demonstrations in Ludington City Park. Over 100 arrests.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

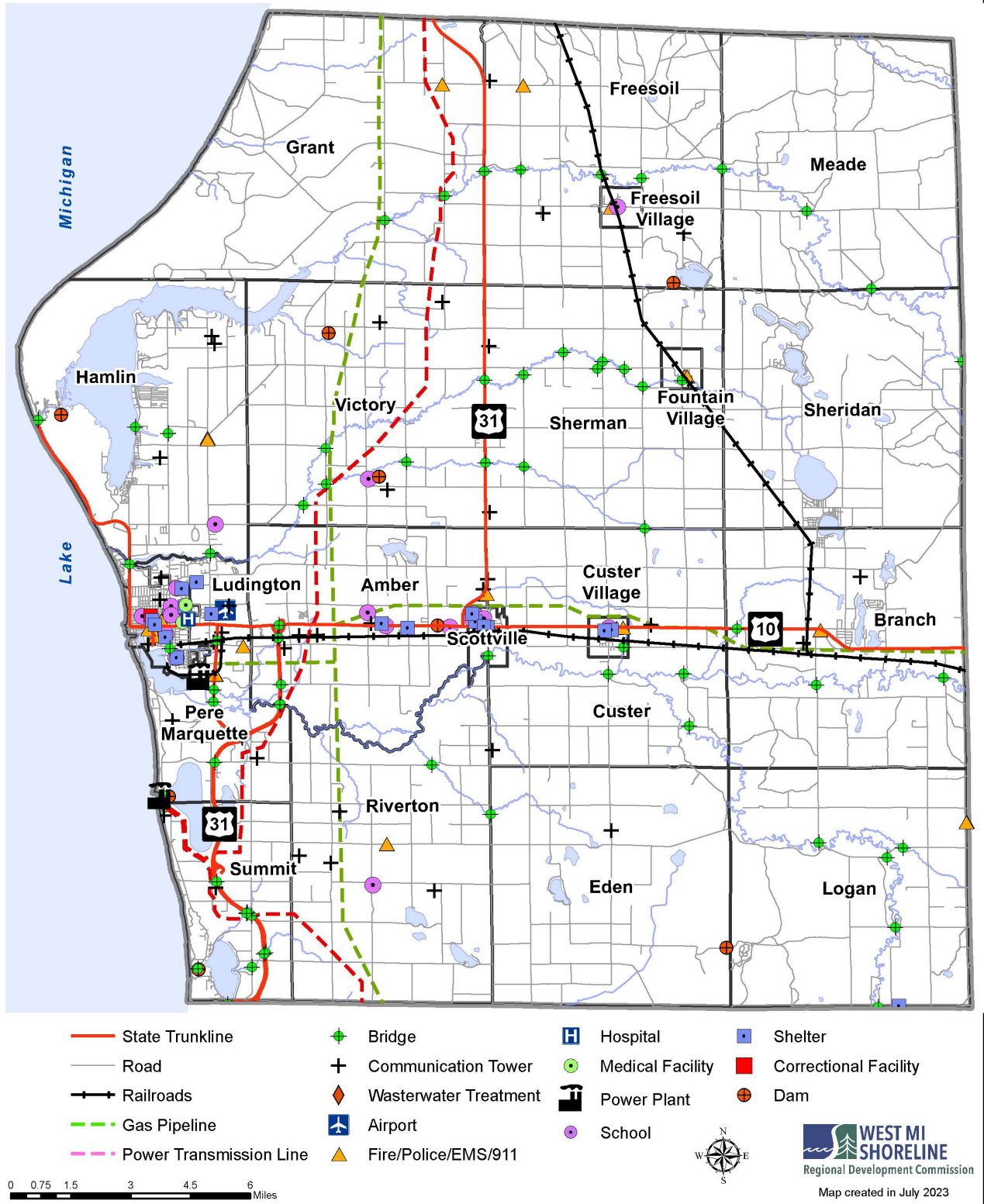
	Mason County Hazard Rating	Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	2	3	13	26
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	2	1	8	24
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	3	2	2	1	11	33
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	2	9	27
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	2	1	2	2	9	18
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	2	1	2	3	10	20
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	2	1	1	1	6	12
2.06	HAZMAT – Transportation	2	2	1	1	9	18
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	1	1	1	1	6	6
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	1	1	1	1	6	6
2.11	Transportation Accidents	3	1	1	2	7	21
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	3	1	1	1	6	18
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Mason County
Hazard Ranking**

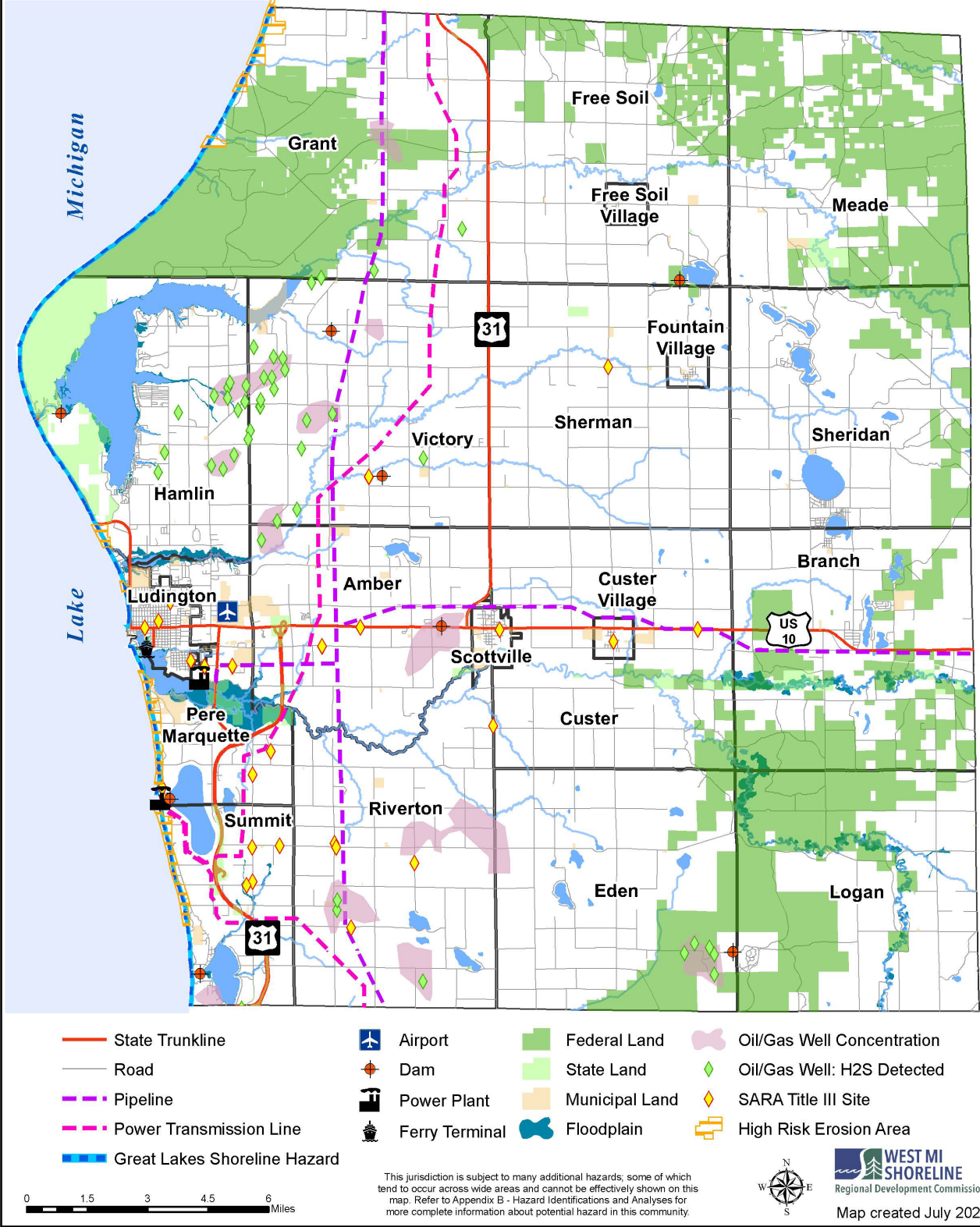
$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Great Lakes Shoreline	3	11	33
3	Wildfire	3	11	33
5	Extreme Temperatures	3	10	30
6	Fire – Structural	3	9	27
6	Invasive Species	3	9	27
6	Public Health Emergencies	3	9	27
9	Drought	2	13	26
10	Energy Emergencies	3	8	24
10	Flooding: Riverine/Urban	3	8	24
10	Infrastructure Failures	3	8	24
10	Lightning	3	8	24
14	Transportation Accidents	3	7	21
15	Dam failure	2	10	20
16	Civil Disturbances	3	6	18
16	HAZMAT – Transportation	2	9	18
16	Tornadoes	2	9	18
19	Space Weather	2	8	16
20	Catastrophic Incidents	2	7	14
21	Hail	2	6	12
21	HAZMAT – Fixed Site	2	6	12
21	Oil/Natural Gas Well Accidents	2	6	12
21	Terrorism & Similar Criminal Acts	2	6	12
25	Celestial Impacts	1	8	8
25	Fog	2	4	8
27	Fire – Scrap Tires	1	6	6
27	Nuclear Power Emergencies	1	6	6
27	Pipeline Accidents	1	6	6
27	Subsidence	1	6	6
	Earthquake	0	-	-
	Nuclear Attack	0	-	-

MASON COUNTY Critical Facilities



MASON COUNTY Potential Hazards



Hazard Identification Profile

City of Ludington

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer, 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$5m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: 08/24/21

Flood Insurance Policies In-Force: 5

Total Flood Insurance Coverage: \$1,478,000

Floodplains and Flood-prone Areas: Lake Michigan shoreline, Pere Marquette Lake and Lincoln Lake shorelines

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out across Mason County.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards:

- Extreme high water levels in the Great Lakes: 1929, 1952, 1973, 1986, and 1997.
- Extreme low water levels in the Great Lakes: 1926, 1934, 1964, 2003, and 2013.
- Rip current incidents on Lake Michigan, 2002-2012: 77 fatalities, 230 rescues.
- June 1986: Record high water level on Lake Michigan.
- July 13, 1938: Seiche/storm surge on Lake Michigan. 3 drowned in Holland, 1 in Muskegon, and 1 near Pentwater.
- 2013: Record low water level on Lake Michigan.
- **July 2019: Three swimmer drownings along Lake Michigan shoreline. 1 at Ludington Stearns Park, 2 at Hamlin Lake/ Sable River outlet.**
- 2019-21: Lengthy high water event on Lake Michigan. High water record in 2020. Extensive shoreline erosion and property damage along Lake Michigan shoreline. ***Roughly-estimated \$4.5 million in public and private damages in the City of Ludington.***

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species: - Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning:

- **August 13, 1995: Lightning. \$30k property damage, Ludington.**

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- **September 16, 1997: Severe thunderstorm winds. \$25k property damage, Ludington; \$10k, Fountain.**
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- **June 1, 2000: Severe thunderstorm winds. \$25k property damage, Ludington.**
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.

- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two dam failures documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63
- **June 11, 1881: Conflagration destroyed 67 buildings in Ludington.**
- **February 28, 1993: Structural fire in Ludington. 9 fatalities.**

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

- **April 5, 1970: Accidental spill of cyanide acid into the Ludington sewer system.**

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- **September 11, 2000: Power outage. 305 customers in Ludington, 190 in Scottville.**
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- **June 12, 2008: Several trees and power lines downed (thunderstorms), Ludington and Hamlin Township.**
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- **July 25, 2012: Several trees and power lines blown down (thunderstorms), Ludington.**
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.
- **April 20, 2017: A downed high voltage line cut power to most of Ludington (thunderstorms).**

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents: 996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances:

- **Summer 1970 and 1971: Protest demonstrations in Ludington City Park. Over 100 arrests.**

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

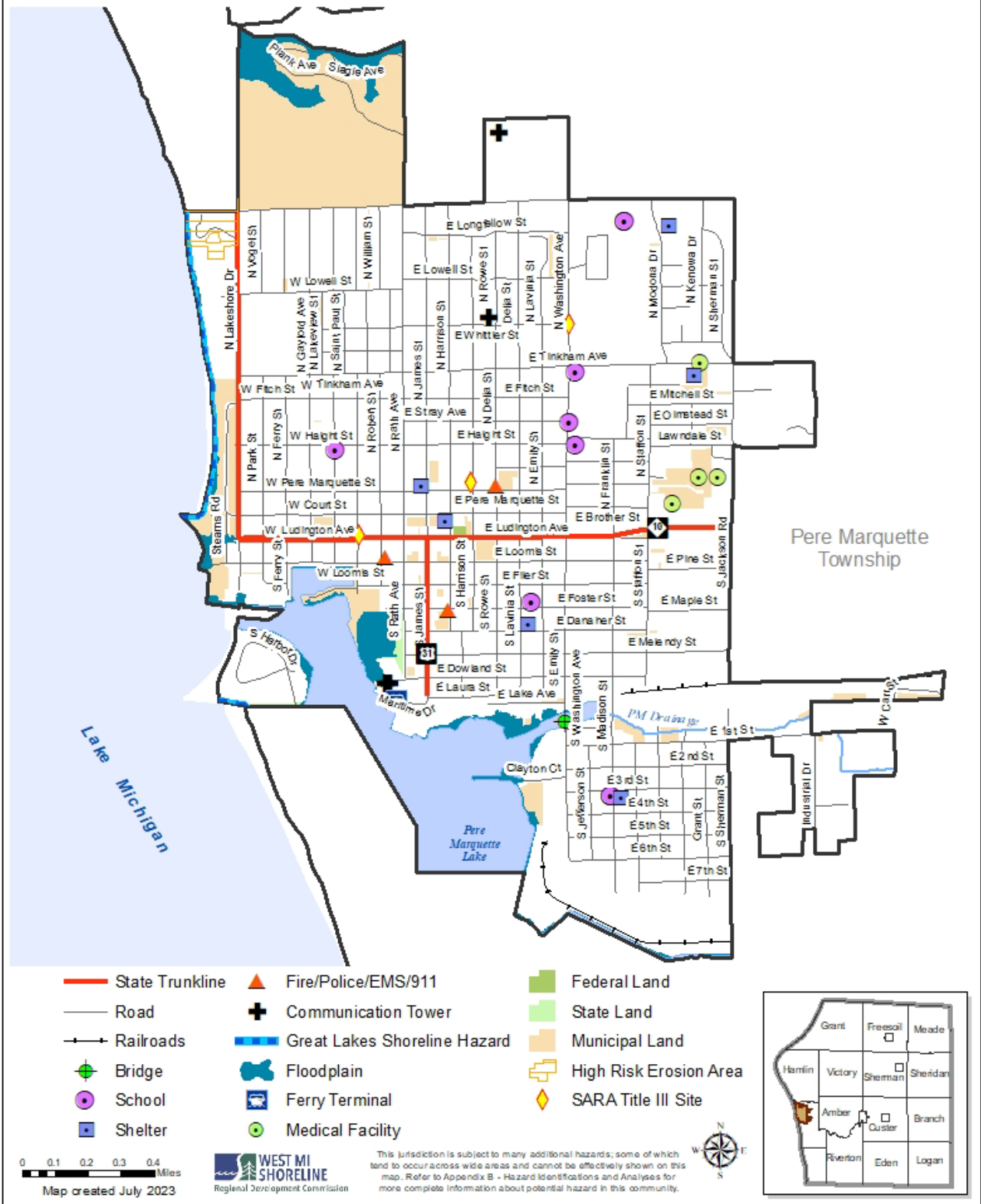
City of Ludington Hazard Rating		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	2	1	8	24
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	3	2	2	1	11	33
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	2	2	2	2	12	24
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	1	1	1	3	8	8
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	0	-	-	-	-	-
2.04	Fire – Structural	3	1	2	3	10	30
2.05	HAZMAT – Fixed Site	2	1	1	2	7	14
2.06	HAZMAT – Transportation	2	2	1	2	10	20
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	1	1	1	1	6	6
2.09	Oil/Natural Gas Well Accidents	0	-	-	-	-	-
2.10	Pipeline Accidents	0	-	-	-	-	-
2.11	Transportation Accidents	2	1	1	2	7	14
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	3	1	1	1	6	18
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**City of Ludington
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Great Lakes Shoreline	3	11	33
4	Extreme Temperatures	3	10	30
4	Fire – Structural	3	10	30
6	Public Health Emergencies	3	9	27
7	Energy Emergencies	3	8	24
7	Flooding: Riverine/Urban	3	8	24
7	Infrastructure Failures	3	8	24
7	Invasive Species	3	8	24
7	Lightning	3	8	24
7	Wildfire	2	12	24
13	Drought	2	11	22
14	HAZMAT – Transportation	2	10	20
15	Civil Disturbances	3	6	18
16	Space Weather	2	8	16
17	Tornadoes	1	15	15
18	Catastrophic Incidents	2	7	14
18	HAZMAT – Fixed Site	2	7	14
28	Transportation Accidents	2	7	14
21	Hail	2	6	12
22	Celestial Impacts	1	8	8
22	Dam failure	1	8	8
22	Fog	2	4	8
25	Nuclear Power Emergencies	1	6	6
25	Subsidence	1	6	6
25	Terrorism & Similar Criminal Acts	1	6	6
	Earthquake	0	-	-
	Fire – Scrap Tires	0	-	-
	Nuclear Attack	0	-	-
	Oil/Natural Gas Well Accidents	0	-	-
	Pipeline Accidents	0	-	-

City of Ludington, Mason County Critical Facilities and Potential Hazards



Hazard Identification Profile

City of Scottville

1. **NATURAL HAZARDS**

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer, 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: N/A

FIRM Map Date: N/A

Flood Insurance Policies In-Force: 0

Total Flood Insurance Coverage: \$0

Floodplains and Flood-prone Areas: Pere Marquette River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out across Mason County.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- **July 13, 2000: 1" hail. \$20k property damage, \$10k crop damage, Scottville.**
- **May 3, 2012: 1.75" hail. \$25k property damage, Scottville.**
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- **September 11, 2000: Severe thunderstorm winds. \$25k property damage, Scottville.**
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- **July 24, 2005: Severe thunderstorm winds. \$40k property damage, Freesoil; \$20k, Scottville.**
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDCE events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- **September 11, 2000: Power outage. 305 customers in Ludington and 190 customers in Scottville.**
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- **September 13, 2005: Many trees and power lines blown down (thunderstorms), Scottville.**
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

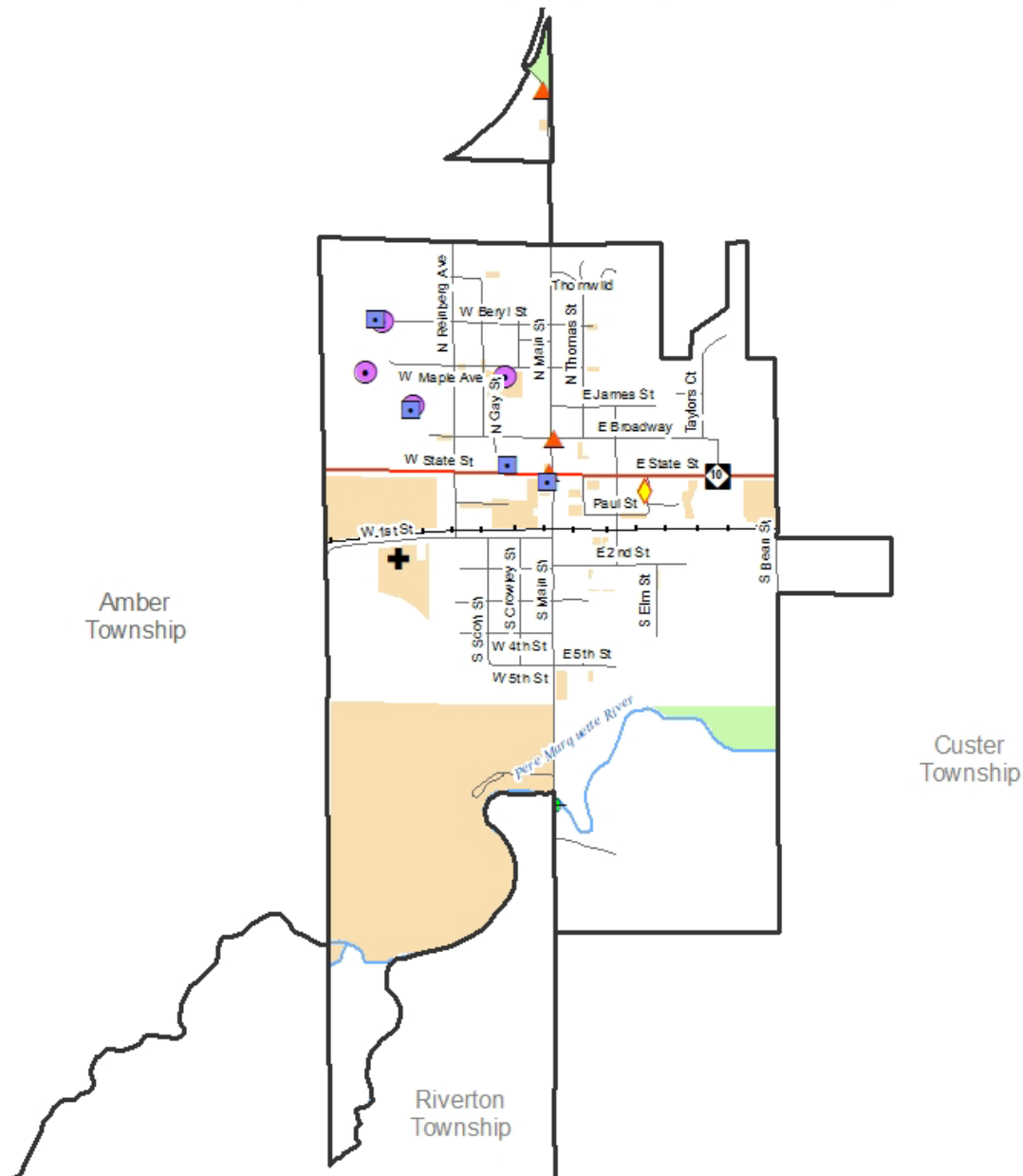
City of Scottville Hazard Rating		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	1	1	6	18
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	2	2	2	2	12	24
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	3	10	30
2.05	HAZMAT – Fixed Site	2	1	1	2	7	14
2.06	HAZMAT – Transportation	2	2	1	2	10	20
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	1	1	1	2	7	7
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12
1.01a	Celestial Impacts	1	2	0	2	8	8

**City of Scottville
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Extreme Temperatures	3	10	30
3	Fire – Structural	3	10	30
5	Public Health Emergencies	3	9	27
6	Energy Emergencies	3	8	24
6	Infrastructure Failures	3	8	24
6	Invasive Species	3	8	24
6	Lightning	3	8	24
6	Wildfire	2	12	24
11	Drought	2	11	22
12	HAZMAT – Transportation	2	10	20
13	Flooding: Riverine/Urban	3	6	18
14	Space Weather	2	8	16
15	Tornadoes	1	15	15
16	Catastrophic Incidents	2	7	14
16	HAZMAT – Fixed Site	2	7	14
18	Civil Disturbances	2	6	12
18	Hail	2	6	12
18	Oil/Natural Gas Well Accidents	2	6	12
18	Terrorism & Similar Criminal Acts	2	6	12
18	Transportation Accidents	2	6	12
23	Celestial Impacts	1	8	8
23	Fog	2	4	8
25	Pipeline Accidents	1	7	7
26	Fire – Scrap Tires	1	6	6
26	Subsidence	1	6	6
	Dam failure	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-

City of Scottville, Mason County Critical Facilities and Potential Hazards

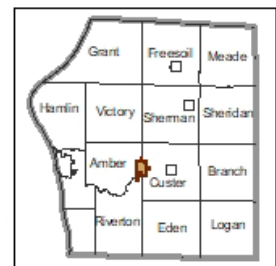


- State Trunkline
- Road
- Railroads
- + Communication Tower
- Bridge
- School
- Fire/Police/EMS/911
- Shelter
- State Land
- Municipal Land
- SARA Title III Site

0 0.1 0.2 0.3 0.4 Miles
Map created July 2023



This jurisdiction is subject to many additional hazards; some of which tend to occur across wide areas and cannot be effectively shown on this map. Refer to Appendix B - Hazard Identifications and Analyses for more complete information about potential hazard in this community.



Hazard Identification Profile Village of Custer

1. **NATURAL HAZARDS**

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer, 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: N/A

FIRM Map Date: N/A

Flood Insurance Policies In-Force: 0

Total Flood Insurance Coverage: \$0

Floodplains and Flood-prone Areas: N/A

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

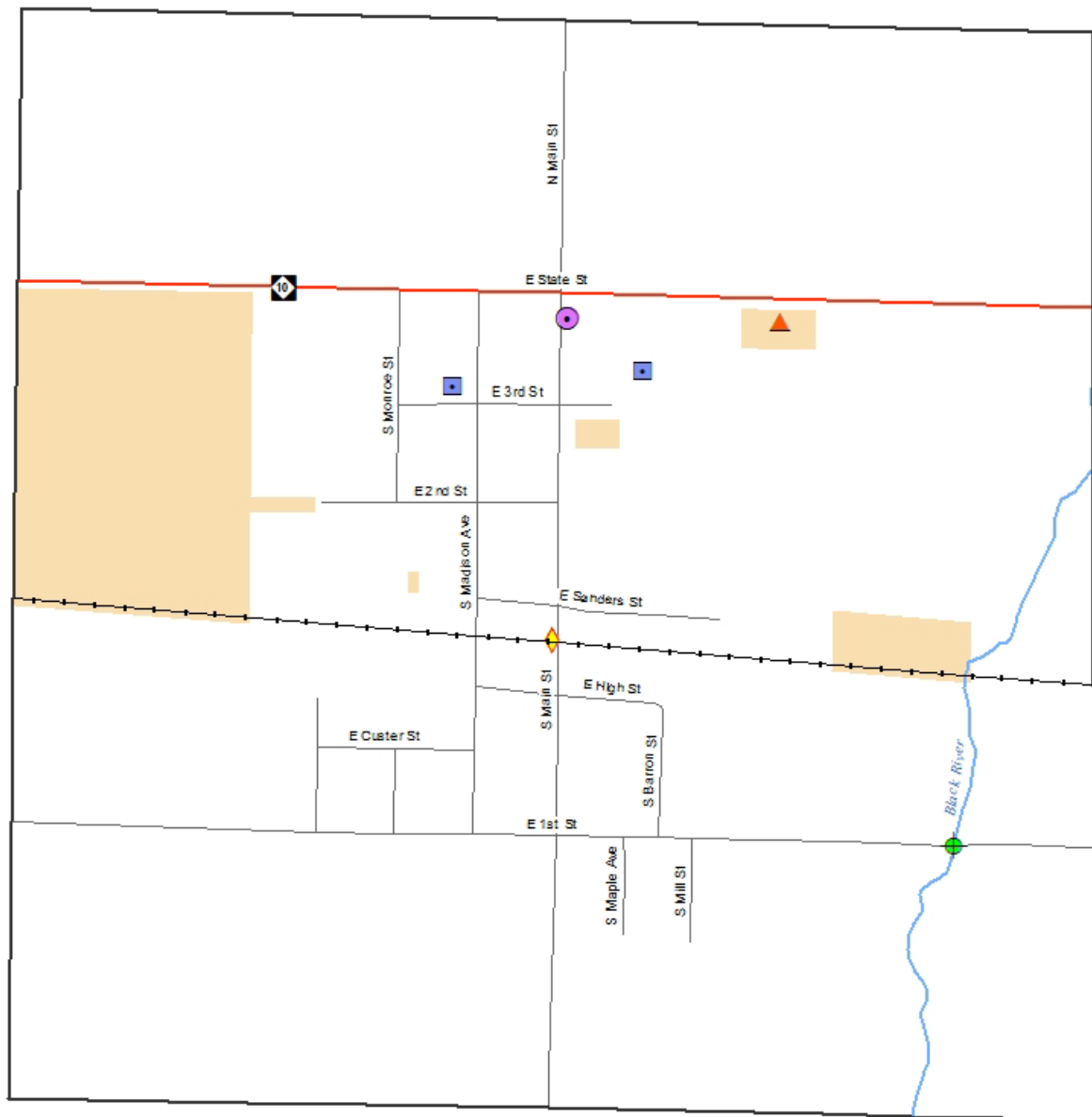
	Village of Custer Hazard Rating	Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	2	1	1	1	6	12
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	2	2	2	2	12	24
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	0	-	-	-	-	-
2.04	Fire – Structural	3	1	2	3	10	30
2.05	HAZMAT – Fixed Site	2	1	1	2	7	14
2.06	HAZMAT – Transportation	2	2	1	2	10	20
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	0	-	-	-	-	-
2.10	Pipeline Accidents	1	1	1	2	7	7
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Village of Custer
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Extreme Temperatures	3	10	30
3	Fire – Structural	3	10	30
5	Public Health Emergencies	3	9	27
6	Energy Emergencies	3	8	24
6	Infrastructure Failures	3	8	24
6	Invasive Species	3	8	24
6	Lightning	3	8	24
6	Wildfire	2	12	24
11	Drought	2	11	22
12	HAZMAT – Transportation	2	10	20
13	Space Weather	2	8	16
14	Tornadoes	1	15	15
15	Catastrophic Incidents	2	7	14
15	HAZMAT – Fixed Site	2	7	14
17	Civil Disturbances	2	6	12
17	Flooding: Riverine/Urban	2	6	12
17	Hail	2	6	12
17	Terrorism & Similar Criminal Acts	2	6	12
17	Transportation Accidents	2	6	12
22	Celestial Impacts	1	8	8
22	Fog	2	4	8
24	Pipeline Accidents	1	7	7
25	Subsidence	1	6	6
	Dam failure	0	-	-
	Earthquake	0	-	-
	Fire – Scrap Tires	0	-	-
	Great Lakes Shoreline	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-
	Oil/Natural Gas Well Accidents	0	-	-

Village of Custer, Mason County Critical Facilities and Potential Hazards

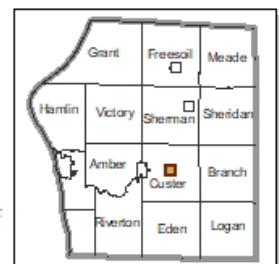


- State Trunkline
- Road
- +— Railroads
- + Bridge
- School
- ▲ Fire/Police/EMS/911
- Shelter
- Municipal Land
- ◆ SARA Title III Site

0 0.045 0.09 0.135 0.18 Miles
Map created July 2023



This jurisdiction is subject to many additional hazards; some of which tend to occur across wide areas and cannot be effectively shown on this map. Refer to Appendix B - Hazard Identifications and Analyses for more complete information about potential hazard in this community.



Hazard Identification Profile Village of Fountain

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer, 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: N/A

FIRM Map Date: N/A

Flood Insurance Policies In-Force: 0

Total Flood Insurance Coverage: \$0

Floodplains and Flood-prone Areas: North Branch Lincoln River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- **September 16, 1997: Severe thunderstorm winds. \$25k property damage, Ludington; \$10k, Fountain.**
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- **September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.**
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

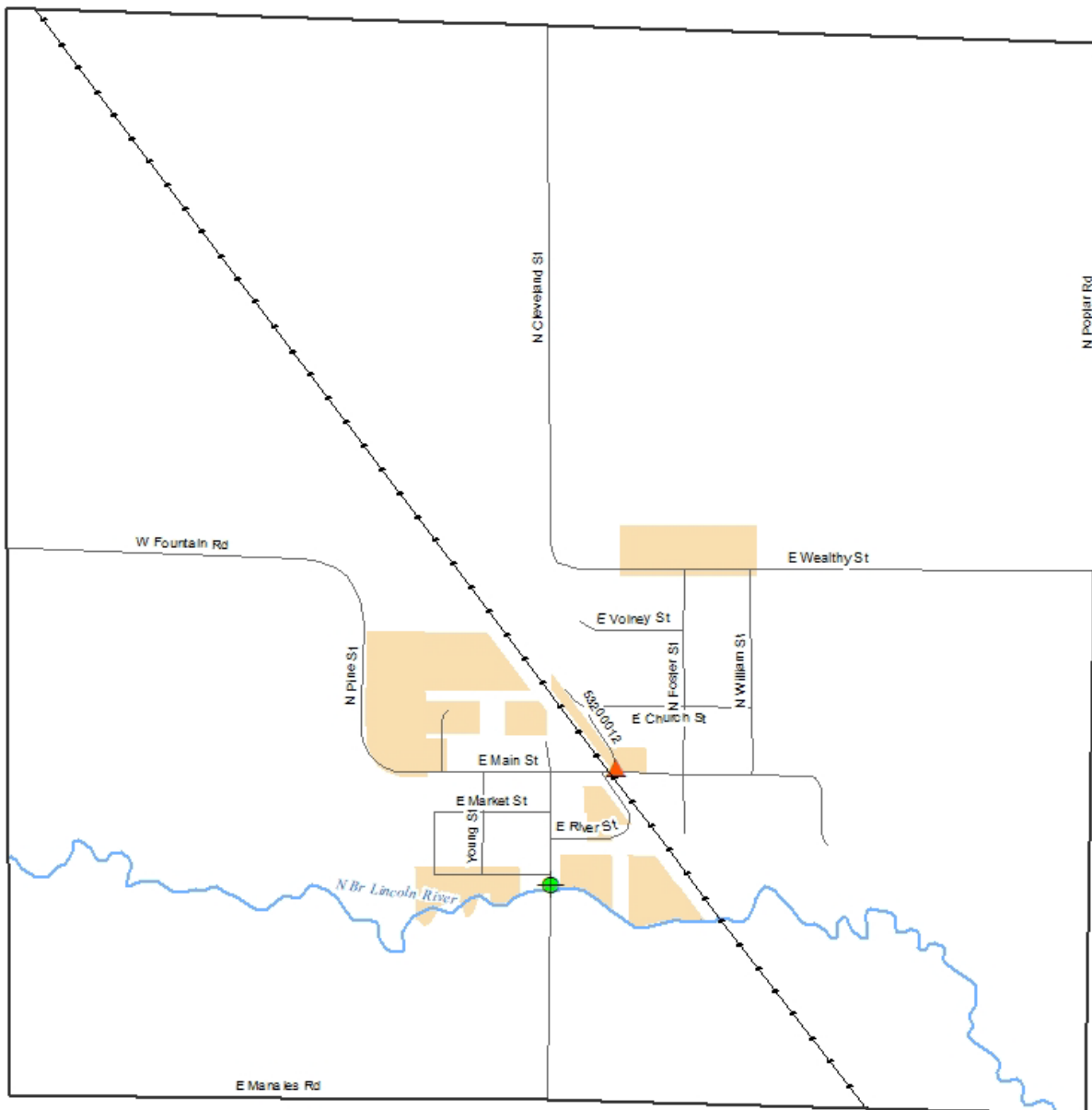
	Village of Fountain Hazard Rating	Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	2	1	1	1	6	12
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	2	2	2	2	12	24
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	3	10	30
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	2	1	1	2	7	14
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	0	-	-	-	-	-
2.10	Pipeline Accidents	0	-	-	-	-	-
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Village of Fountain
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Extreme Temperatures	3	10	30
3	Fire – Structural	3	10	30
5	Public Health Emergencies	3	9	27
6	Energy Emergencies	3	8	24
6	Infrastructure Failures	3	8	24
6	Invasive Species	3	8	24
6	Lightning	3	8	24
6	Wildfire	2	12	24
11	Drought	2	11	22
12	Space Weather	2	8	16
13	Tornadoes	1	15	15
14	Catastrophic Incidents	2	7	14
14	HAZMAT – Transportation	2	7	14
16	Civil Disturbances	2	6	12
16	Flooding: Riverine/Urban	2	6	12
16	Hail	2	6	12
16	Terrorism & Similar Criminal Acts	2	6	12
16	Transportation Accidents	2	6	12
21	Celestial Impacts	1	8	8
21	Fog	2	4	8
23	Fire – Scrap Tires	1	6	6
23	Subsidence	1	6	6
	Dam failure	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	HAZMAT – Fixed Site	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-
	Oil/Natural Gas Well Accidents	0	-	-
	Pipeline Accidents	0	-	-

Village of Fountain, Mason County Critical Facilities and Potential Hazards

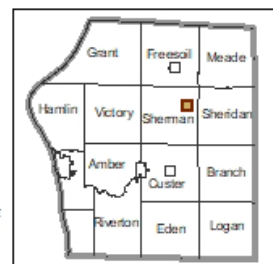


- Road
- Railroads
- Bridge
- ▲ Fire/Police/EMS/911
- Municipal Land

0 0.045 0.09 0.135 0.18 Miles
Map created July 2023



This jurisdiction is subject to many additional hazards; some of which tend to occur across wide areas and cannot be effectively shown on this map. Refer to Appendix B - Hazard Identifications and Analyses for more complete information about potential hazard in this community.



Hazard Identification Profile Village of Free Soil

1. **NATURAL HAZARDS**

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: N/A

FIRM Map Date: N/A

Flood Insurance Policies In-Force: 0

Total Flood Insurance Coverage: \$0

Floodplains and Flood-prone Areas: N/A

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- **July 24, 2005: Severe thunderstorm winds. \$40k property damage, Free Soil; \$20k, Scottville.**
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

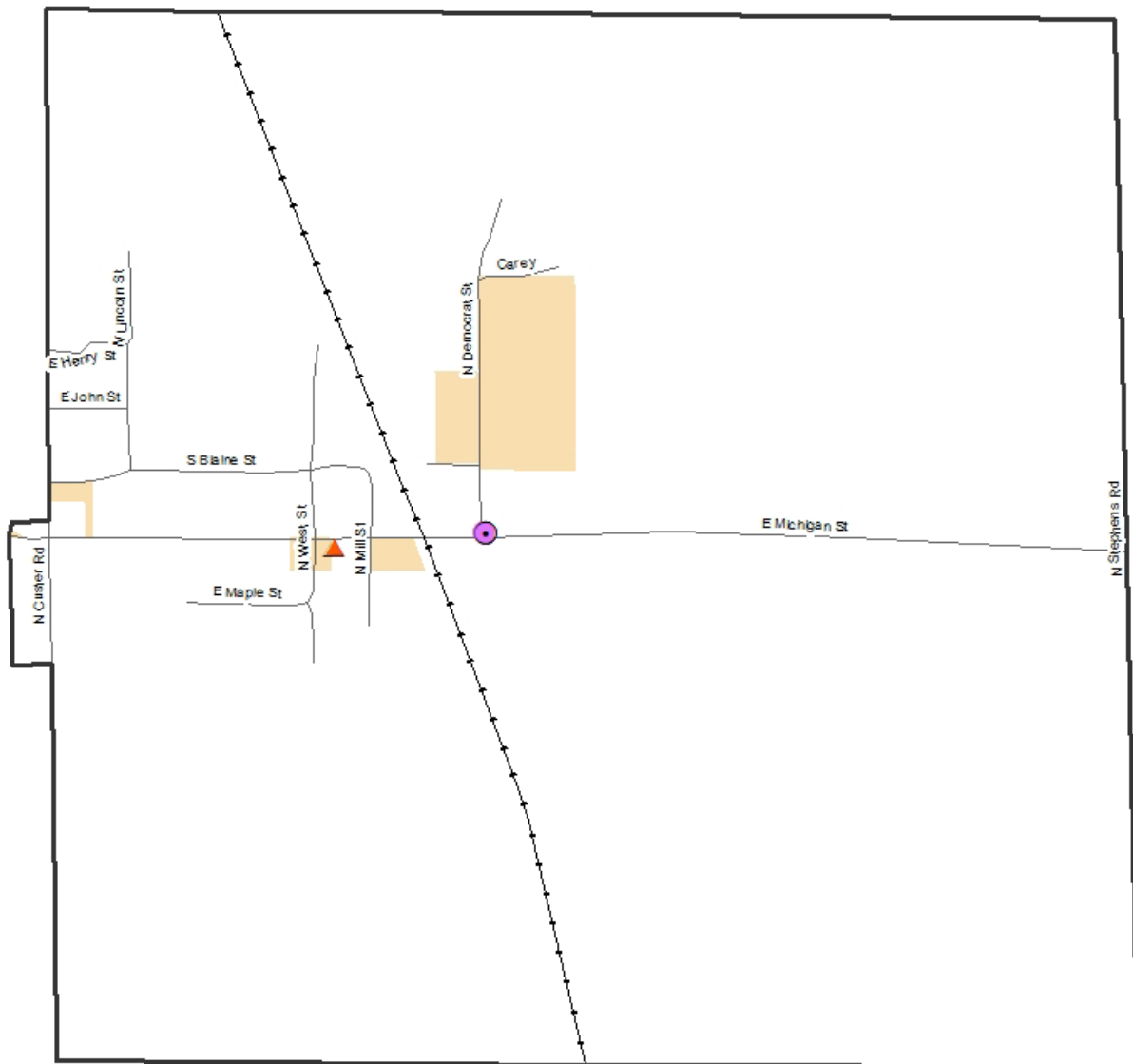
	Village of Free Soil Hazard Rating	Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	2	1	1	1	6	12
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	2	2	2	2	12	24
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	3	10	30
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	2	1	1	2	7	14
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	0	-	-	-	-	-
2.10	Pipeline Accidents	0	-	-	-	-	-
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Village of Free Soil
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Extreme Temperatures	3	10	30
3	Fire – Structural	3	10	30
5	Public Health Emergencies	3	9	27
6	Energy Emergencies	3	8	24
6	Infrastructure Failures	3	8	24
6	Invasive Species	3	8	24
6	Lightning	3	8	24
6	Wildfire	2	12	24
11	Drought	2	11	22
12	Space Weather	2	8	16
13	Tornadoes	1	15	15
14	Catastrophic Incidents	2	7	14
14	HAZMAT – Transportation	2	7	14
16	Civil Disturbances	2	6	12
16	Flooding: Riverine/Urban	2	6	12
16	Hail	2	6	12
16	Terrorism & Similar Criminal Acts	2	6	12
16	Transportation Accidents	2	6	12
21	Celestial Impacts	1	8	8
21	Fog	2	4	8
23	Fire – Scrap Tires	1	6	6
23	Subsidence	1	6	6
	Dam failure	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	HAZMAT – Fixed Site	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-
	Oil/Natural Gas Well Accidents	0	-	-
	Pipeline Accidents	0	-	-

Free Soil Village, Mason County Critical Facilities and Potential Hazards

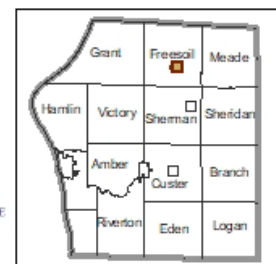


- Road
- +— Railroads
- School
- ▲ Fire/Police/EMS/911
- Municipal Land

0 0.045 0.09 0.135 0.18 Miles
Map created July 2023

WEST MI SHORELINE
Regional Development Commission

This jurisdiction is subject to many additional hazards; some of which tend to occur across wide areas and cannot be effectively shown on this map. Refer to Appendix B - Hazard Identifications and Analyses for more complete information about potential hazard in this community.



Hazard Identification Profile

Amber Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: 08/24/21

Flood Insurance Policies In-Force: N/A

Total Flood Insurance Coverage: N/A

Floodplains and Flood-prone Areas: Pere Marquette River, Lincoln River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- **June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out. Local declaration of emergency for Riverton, Summit, Pere Marquette, and Amber townships.**
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

- 996 oil and gas test well surface hole locations within Mason County.
- 2 wells with some level of "H2S Concern" in Amber Township

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

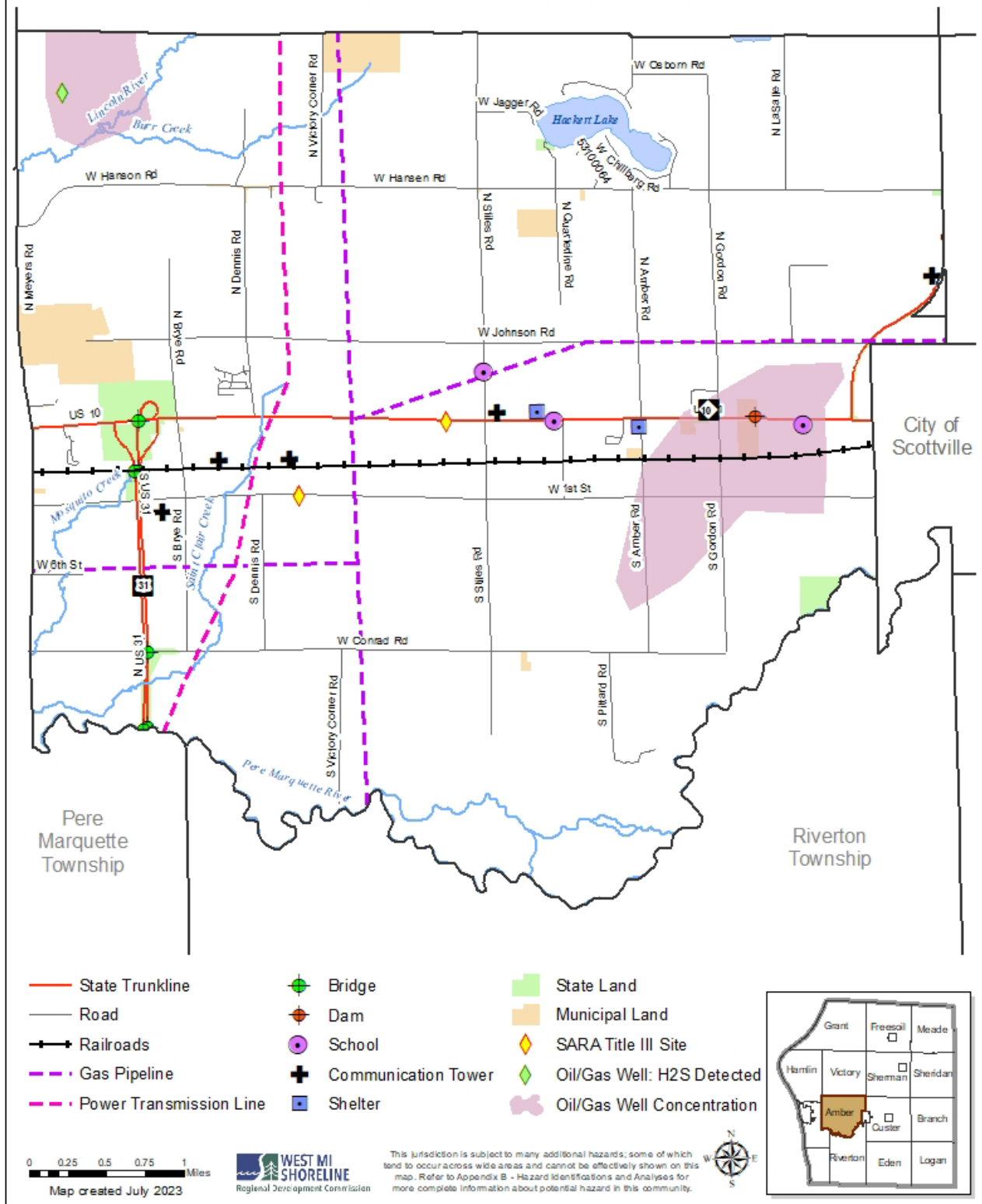
Amber Township Hazard Rating		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	1	1	6	18
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	1	2	2	9	27
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	2	1	1	2	7	14
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	2	1	1	1	6	12
2.06	HAZMAT – Transportation	2	1	1	2	7	14
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	1	1	2	2	9	9
2.11	Transportation Accidents	2	1	1	2	7	14
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

Amber Township Hazard Ranking

$$\begin{matrix} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{matrix} \times \begin{matrix} \text{Impacts} \\ \text{Total} \end{matrix} = \begin{matrix} \text{Hazard} \\ \text{Score} \end{matrix}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Extreme Temperatures	3	10	30
4	Fire – Structural	3	9	27
4	Public Health Emergencies	3	9	27
4	Wildfire	3	9	27
7	Energy Emergencies	3	8	24
7	Infrastructure Failures	3	8	24
7	Invasive Species	3	8	24
7	Lightning	3	8	24
11	Drought	2	11	22
12	Flooding: Riverine/Urban	3	6	18
13	Space Weather	2	8	16
14	Tornadoes	1	15	15
15	Catastrophic Incidents	2	7	14
15	Dam failure	2	7	14
15	HAZMAT – Transportation	2	7	14
15	Transportation Accidents	2	7	14
19	Civil Disturbances	2	6	12
19	Hail	2	6	12
19	HAZMAT – Fixed Site	2	6	12
19	Oil/Natural Gas Well Accidents	2	6	12
19	Terrorism & Similar Criminal Acts	2	6	12
24	Pipeline Accidents	1	9	9
25	Celestial Impacts	1	8	8
25	Fog	2	4	8
27	Fire – Scrap Tires	1	6	6
27	Subsidence	1	6	6
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-

Amber Township, Mason County Critical Facilities and Potential Hazards



Hazard Identification Profile

Branch Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: 07/16/14

Flood Insurance Policies In-Force: N/A

Total Flood Insurance Coverage: N/A

Floodplains and Flood-prone Areas: Pere Marquette River, South Branch Pere Marquette River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

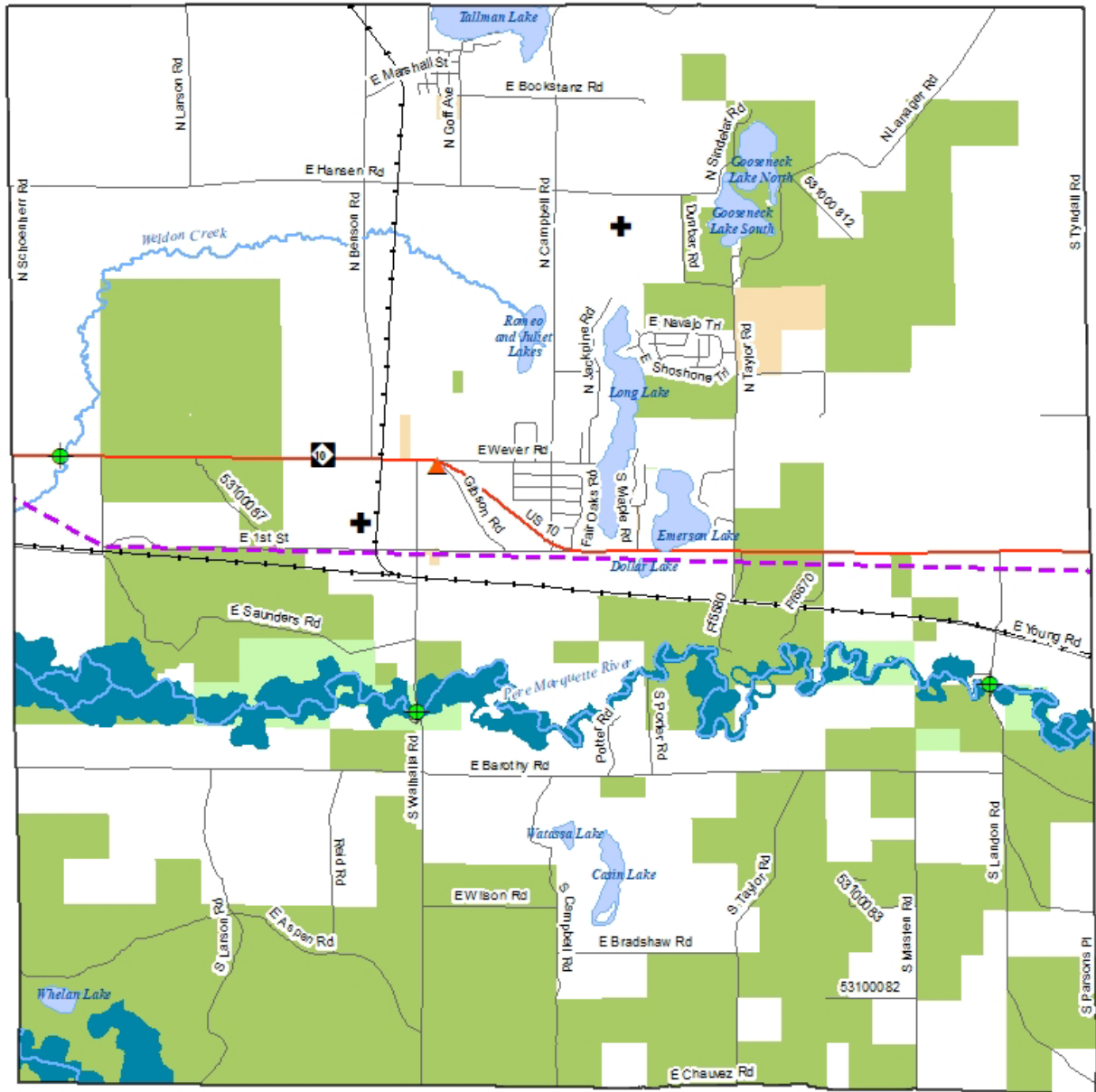
	Branch Township Hazard Rating	Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	1	1	6	18
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	2	1	1	2	7	14
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	0	-	-	-	-	-
2.10	Pipeline Accidents	1	1	1	2	7	7
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Branch Township
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Wildfire	3	11	33
4	Extreme Temperatures	3	10	30
5	Fire – Structural	3	9	27
5	Public Health Emergencies	3	9	27
7	Energy Emergencies	3	8	24
7	Infrastructure Failures	3	8	24
7	Invasive Species	3	8	24
7	Lightning	3	8	24
11	Drought	2	11	22
12	Flooding: Riverine/Urban	3	6	18
13	Space Weather	2	8	16
14	Tornadoes	1	15	15
15	Catastrophic Incidents	2	7	14
15	HAZMAT – Transportation	2	7	14
17	Civil Disturbances	2	6	12
17	Hail	2	6	12
17	Terrorism & Similar Criminal Acts	2	6	12
17	Transportation Accidents	2	6	12
21	Celestial Impacts	1	8	8
21	Fog	2	4	8
23	Pipeline Accidents	1	7	7
24	Fire – Scrap Tires	1	6	6
24	Subsidence	1	6	6
	Dam failure	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	HAZMAT – Fixed Site	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-
	Oil/Natural Gas Well Accidents	0	-	-

Branch Township, Mason County Critical Facilities and Potential Hazards

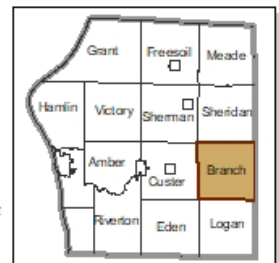


- State Trunkline
- Road
- +— Railroads
- - - Gas Pipeline
- Bridge
- ▲ Fire/Police/EMS/911
- + Communication Tower
- Federal Land
- State Land
- Municipal Land
- ~ Floodplain

0 0.25 0.5 0.75 1 Miles
Map created July 2023

WEST MI SHORELINE
Regional Development Commission

This jurisdiction is subject to many additional hazards; some of which tend to occur across wide areas and cannot be effectively shown on this map. Refer to Appendix B - Hazard Identifications and Analyses for more complete information about potential hazard in this community.



Hazard Identification Profile Custer Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Not Participating in NFIP

FIRM Map Date: 07/16/14

Flood Insurance Policies In-Force: 0

Total Flood Insurance Coverage: \$0

Floodplains and Flood-prone Areas: Pere Marquette River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).
- **March 20, 2012: 40-acre wildfire sparked by bonfire remnants, Custer Township.**

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

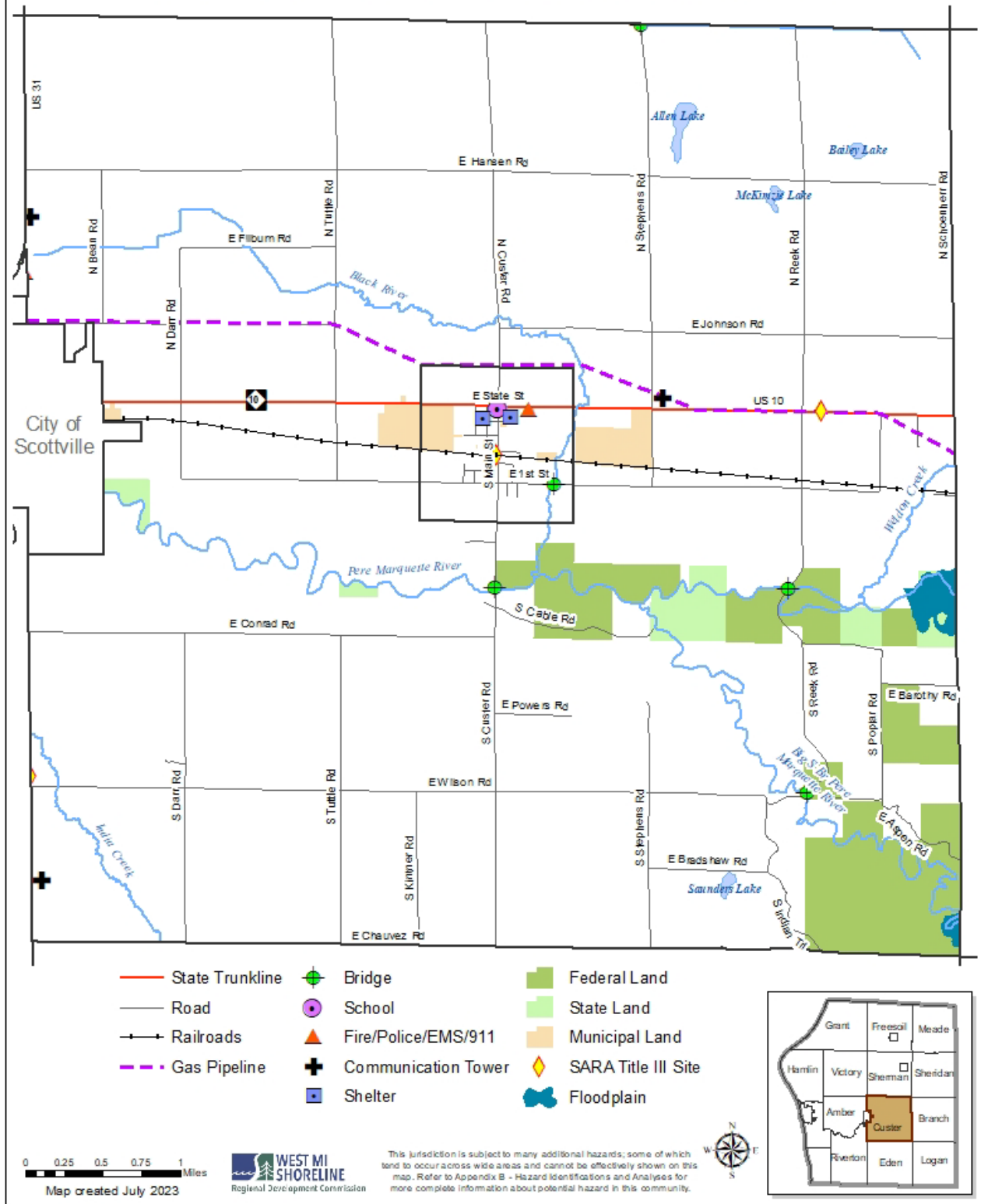
Custer Township Hazard Rating		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	2	3	13	26
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	1	1	6	18
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	1	1	1	1	6	6
2.06	HAZMAT – Transportation	2	1	1	2	7	14
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	1	2	1	1	9	9
2.10	Pipeline Accidents	1	1	1	2	7	7
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Custer Township
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Wildfire	3	11	33
4	Extreme Temperatures	3	10	30
5	Fire – Structural	3	9	27
5	Public Health Emergencies	3	9	27
7	Drought	2	13	26
8	Energy Emergencies	3	8	24
8	Infrastructure Failures	3	8	24
8	Invasive Species	3	8	24
8	Lightning	3	8	24
12	Flooding: Riverine/Urban	3	6	18
13	Space Weather	2	8	16
14	Tornadoes	1	15	15
15	Catastrophic Incidents	2	7	14
15	HAZMAT – Transportation	2	7	14
17	Civil Disturbances	2	6	12
17	Hail	2	6	12
17	Terrorism & Similar Criminal Acts	2	6	12
17	Transportation Accidents	2	6	12
21	Oil/Natural Gas Well Accidents	1	9	9
22	Celestial Impacts	1	8	8
22	Fog	2	4	8
24	Pipeline Accidents	1	7	7
25	Fire – Scrap Tires	1	6	6
25	HAZMAT – Fixed Site	1	6	6
25	Subsidence	1	6	6
	Dam failure	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-

Custer Township, Mason County Critical Facilities and Potential Hazards



Hazard Identification Profile

Eden Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: 07/16/14

Flood Insurance Policies In-Force: N/A

Total Flood Insurance Coverage: N/A

Floodplains and Flood-prone Areas: South Branch Pere Marquette River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes:

- *April 12, 1972: Tornado (F2). 8 injuries, \$2.5m property damage, Eden Township.*

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

- 996 oil and gas test well surface hole locations within Mason County.
- **5 wells with some level of "H2S Concern" in Eden Township.**

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

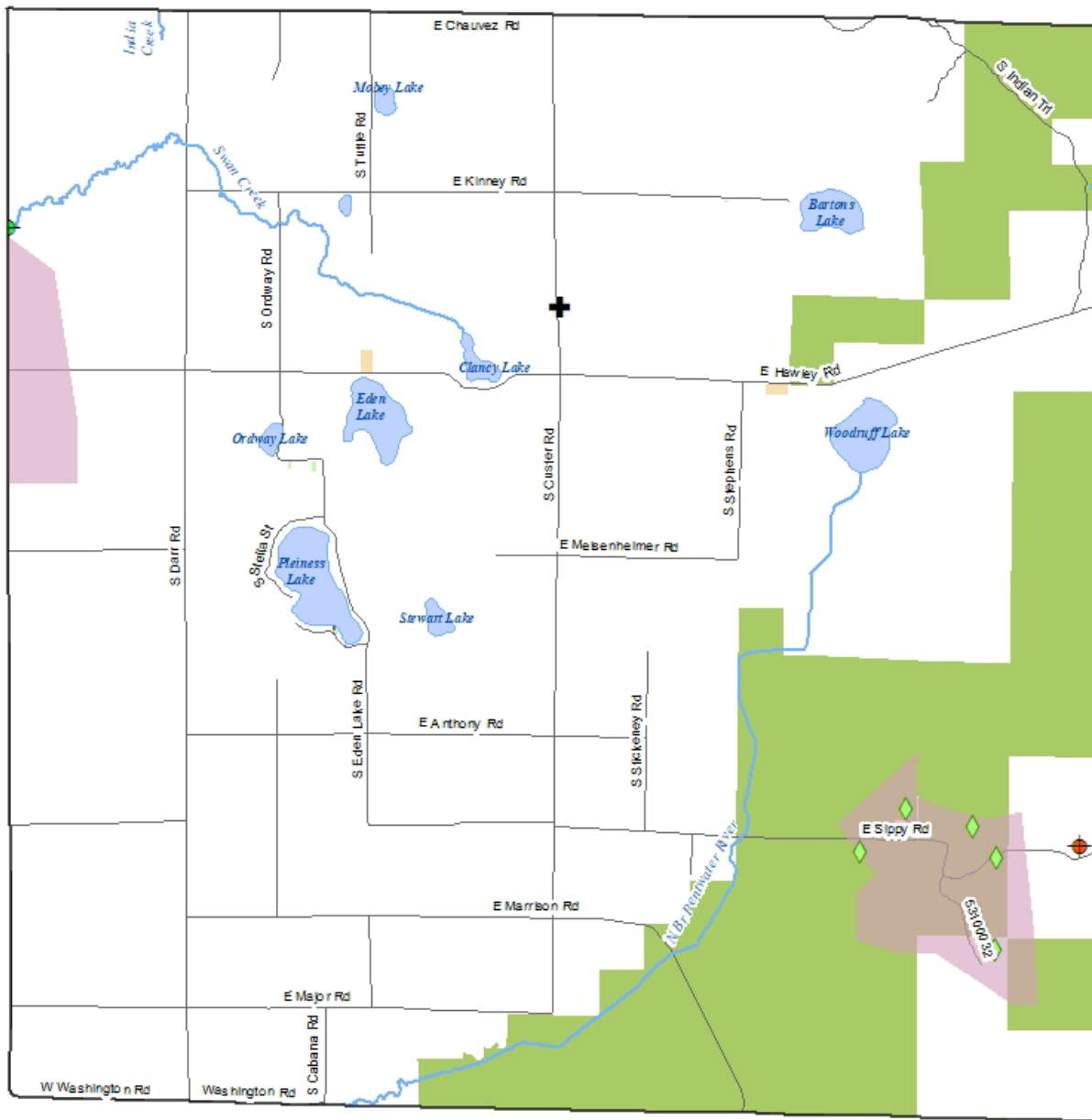
	Eden Township Hazard Rating	Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	2	3	13	26
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	2	1	1	1	6	12
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	2	1	8	16
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	2	1	1	1	6	12
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	1	1	1	1	6	6
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	0	-	-	-	-	-
2.11	Transportation Accidents	1	1	1	1	6	6
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

Eden Township Hazard Ranking

$$\begin{matrix} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{matrix} \times \begin{matrix} \text{Impacts} \\ \text{Total} \end{matrix} = \begin{matrix} \text{Hazard} \\ \text{Score} \end{matrix}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Wildfire	3	11	33
4	Extreme Temperatures	3	10	30
5	Fire – Structural	3	9	27
5	Public Health Emergencies	3	9	27
7	Drought	2	13	26
8	Energy Emergencies	3	8	24
8	Infrastructure Failures	3	8	24
8	Invasive Species	3	8	24
8	Lightning	3	8	24
12	Space Weather	2	8	16
13	Tornadoes	1	15	15
14	Catastrophic Incidents	2	7	14
15	Civil Disturbances	2	6	12
15	Dam failure	2	6	12
15	Flooding: Riverine/Urban	2	6	12
15	Hail	2	6	12
15	Oil/Natural Gas Well Accidents	2	6	12
15	Terrorism & Similar Criminal Acts	2	6	12
21	Celestial Impacts	1	8	8
21	Fog	2	4	8
23	Fire – Scrap Tires	1	6	6
23	HAZMAT – Transportation	1	6	6
23	Subsidence	1	6	6
23	Transportation Accidents	1	6	6
	HAZMAT – Fixed Site	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-
	Pipeline Accidents	0	-	-

Eden Township, Mason County Critical Facilities and Potential Hazards

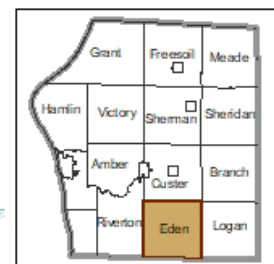


- | | | |
|---------------|------------------------------|------------------|
| — Road | ⛶ Communication Tower | ■ Federal Land |
| —+— Railroads | ◆ Oil/Gas Well: H2S Detected | ■ State Land |
| ⬮ Bridge | ⬮ Oil/Gas Well Concentration | ■ Municipal Land |
| ⬮ Dam | | |

0 0.25 0.5 0.75 1 Miles
Map created July 2023

WEST MI SHORELINE
Regional Development Commission

This jurisdiction is subject to many additional hazards; some of which tend to occur across wide areas and cannot be effectively shown on this map. Refer to Appendix B - Hazard Identifications and Analyses for more complete information about potential hazard in this community.



Hazard Identification Profile

Free Soil Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: N/A

FIRM Map Date: N/A

Flood Insurance Policies In-Force: 0

Total Flood Insurance Coverage: \$0

Floodplains and Flood-prone Areas: Big Sable River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- **July 24, 2005: Severe thunderstorm winds. \$40k property damage, Free Soil; \$20k, Scottville.**
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

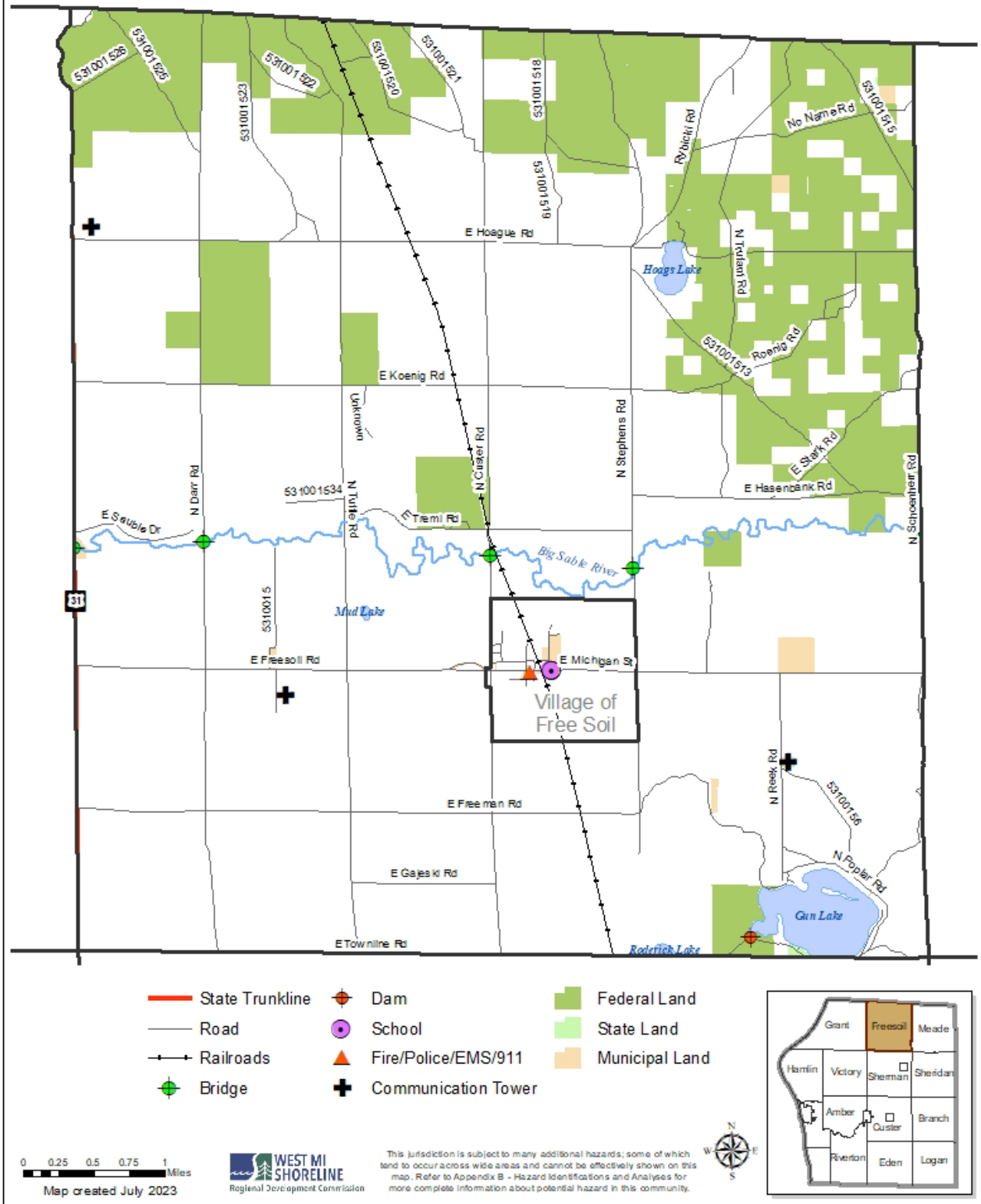
Free Soil Township Hazard Rating		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	1	1	6	18
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	1	1	1	1	6	6
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	2	1	1	2	7	14
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	1	1	1	1	6	6
2.10	Pipeline Accidents	0	-	-	-	-	-
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

Free Soil Township Hazard Ranking

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Wildfire	3	11	33
4	Extreme Temperatures	3	10	30
5	Fire – Structural	3	9	27
5	Public Health Emergencies	3	9	27
7	Energy Emergencies	3	8	24
7	Infrastructure Failures	3	8	24
7	Invasive Species	3	8	24
7	Lightning	3	8	24
11	Drought	2	11	22
12	Flooding: Riverine/Urban	3	6	18
13	Space Weather	2	8	16
14	Tornadoes	1	15	15
15	Catastrophic Incidents	2	7	14
15	HAZMAT – Transportation	2	7	14
17	Civil Disturbances	2	6	12
17	Hail	2	6	12
17	Terrorism & Similar Criminal Acts	2	6	12
17	Transportation Accidents	2	6	12
21	Celestial Impacts	1	8	8
21	Fog	2	4	8
23	Dam failure	1	6	6
23	Fire – Scrap Tires	1	6	6
23	Oil/Natural Gas Well Accidents	1	6	6
23	Subsidence	1	6	6
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	HAZMAT – Fixed Site	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-
	Pipeline Accidents	0	-	-

Free Soil Township and Village, Mason County Critical Facilities and Potential Hazards



Hazard Identification Profile

Grant Township

1. **NATURAL HAZARDS**

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Not Participating in NFIP

FIRM Map Date: 08/24/21

Flood Insurance Policies In-Force: 0

Total Flood Insurance Coverage: \$0

Floodplains and Flood-prone Areas: Lake Michigan shoreline, Big Sable River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards:

- Extreme high water levels in the Great Lakes: 1929, 1952, 1973, 1986, and 1997.
- Extreme low water levels in the Great Lakes: 1926, 1934, 1964, 2003, and 2013.
- Rip current incidents on Lake Michigan, 2002-2012: 77 fatalities, 230 rescues.
- June 1986: Record high water level on Lake Michigan.
- July 13, 1938: Seiche/storm surge on Lake Michigan. 3 drowned in Holland, 1 in Muskegon, and 1 near Pentwater.
- 2013: Record low water level on Lake Michigan.
- 2019-21: Lengthy high water event on Lake Michigan. High water record in 2020. Extensive shoreline erosion and property damage along Lake Michigan shoreline. Roughly-estimated \$4.5 million in public and private damages in the City of Ludington.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

- 996 oil and gas test well surface hole locations within Mason County.
- 7 wells with some level of "H2S Concern" in Grant Township.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

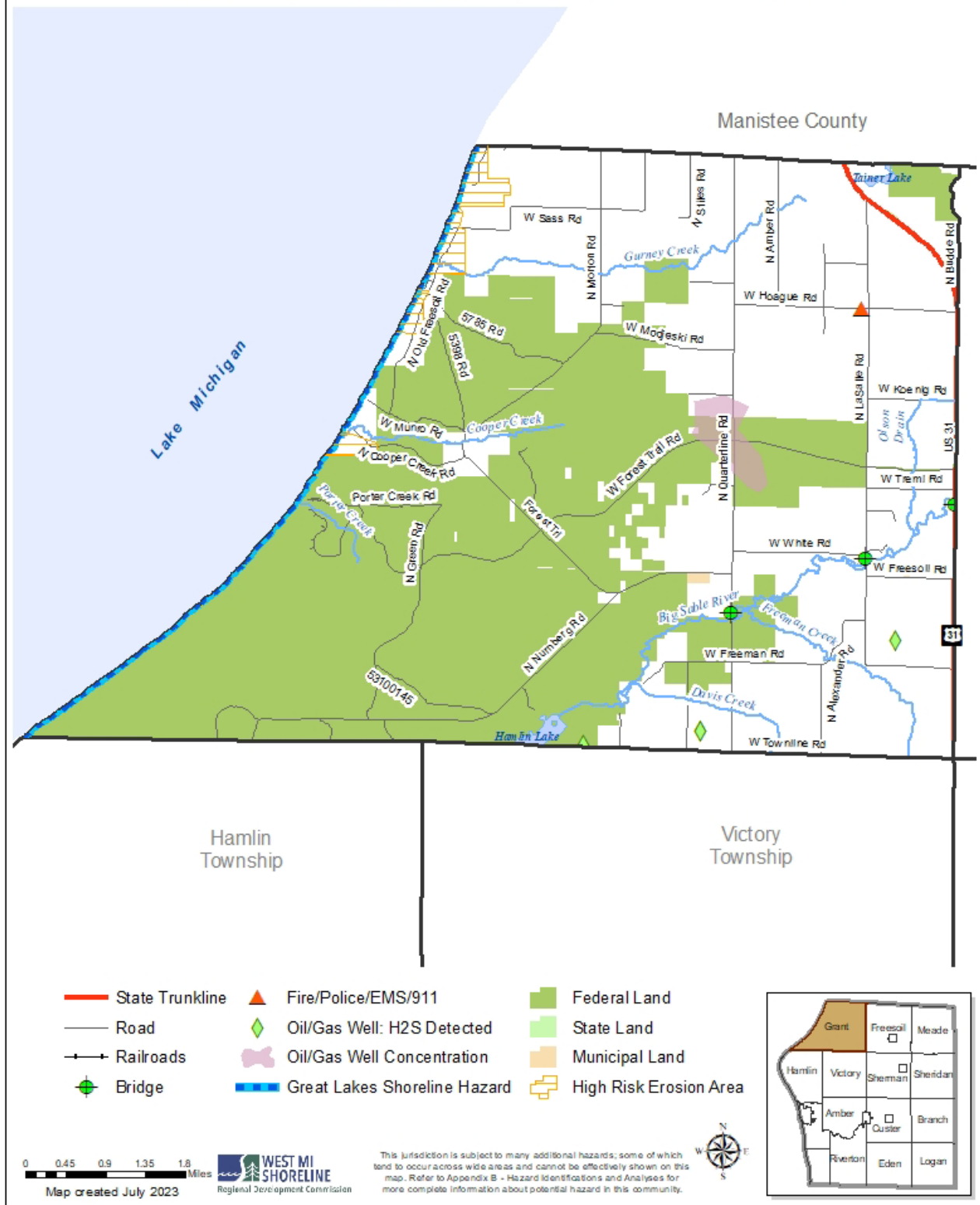
	Grant Township Hazard Rating	Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	1	1	6	18
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	3	2	2	1	11	33
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	2	1	1	1	6	12
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	1	1	1	1	6	6
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	1	1	1	2	7	7
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

Grant Township Hazard Ranking

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Great Lakes Shoreline	3	11	33
3	Wildfire	3	11	33
5	Extreme Temperatures	3	10	30
6	Fire – Structural	3	9	27
6	Public Health Emergencies	3	9	27
8	Energy Emergencies	3	8	24
8	Infrastructure Failures	3	8	24
8	Invasive Species	3	8	24
8	Lightning	3	8	24
12	Drought	2	11	22
13	Flooding: Riverine/Urban	3	6	18
14	Space Weather	2	8	16
15	Tornadoes	1	15	15
16	Catastrophic Incidents	2	7	14
17	Civil Disturbances	2	6	12
17	Hail	2	6	12
17	HAZMAT – Transportation	2	6	12
17	Oil/Natural Gas Well Accidents	2	6	12
17	Terrorism & Similar Criminal Acts	2	6	12
27	Transportation Accidents	2	6	12
23	Celestial Impacts	1	8	8
23	Fog	2	4	8
25	Pipeline Accidents	1	7	7
26	Fire – Scrap Tires	1	6	6
26	Nuclear Power Emergencies	1	6	6
26	Subsidence	1	6	6
	HAZMAT – Fixed Site	0	-	-
	Dam failure	0	-	-
	Earthquake	0	-	-
	Nuclear Attack	0	-	-

Grant Township, Mason County Critical Facilities and Potential Hazards



Hazard Identification Profile Hamlin Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: 08/24/21

Flood Insurance Policies In-Force: 16

Total Flood Insurance Coverage: \$4,138,000

Floodplains and Flood-prone Areas: Lake Michigan shoreline, Hamlin Lake shoreline and tributaries, Lincoln Lake, Lincoln River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards:

- Extreme high water levels in the Great Lakes: 1929, 1952, 1973, 1986, and 1997.
- Extreme low water levels in the Great Lakes: 1926, 1934, 1964, 2003, and 2013.
- Rip current incidents on Lake Michigan, 2002-2012: 77 fatalities, 230 rescues.
- June 1986: Record high water level on Lake Michigan.
- July 13, 1938: Seiche/storm surge on Lake Michigan. 3 drowned in Holland, 1 in Muskegon, and 1 near Pentwater.
- 2013: Record low water level on Lake Michigan.
- **July 2019: Three swimmer drownings along Lake Michigan shoreline. 1 at Ludington Stearns Park, 2 at Hamlin Lake/ Sable River outlet.**
- 2019-21: Lengthy high water event on Lake Michigan. High water record in 2020. Extensive shoreline erosion and property damage along Lake Michigan shoreline. Roughly-estimated \$4.5 million in public and private damages in the City of Ludington.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- **October 3, 2006: .75" hail. \$15k property damage. \$15k crop damage. Hamlin Township.**
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- **August 2, 2012: Severe thunderstorm winds. \$100k property damage, Hamlin Township.**
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.

- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- *June 12, 2008: Several trees and power lines downed (thunderstorms), Ludington and Hamlin Township.*
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

- 996 oil and gas test well surface hole locations within Mason County.
- **29 wells with some level of "H2S Concern" in Hamlin Township**

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

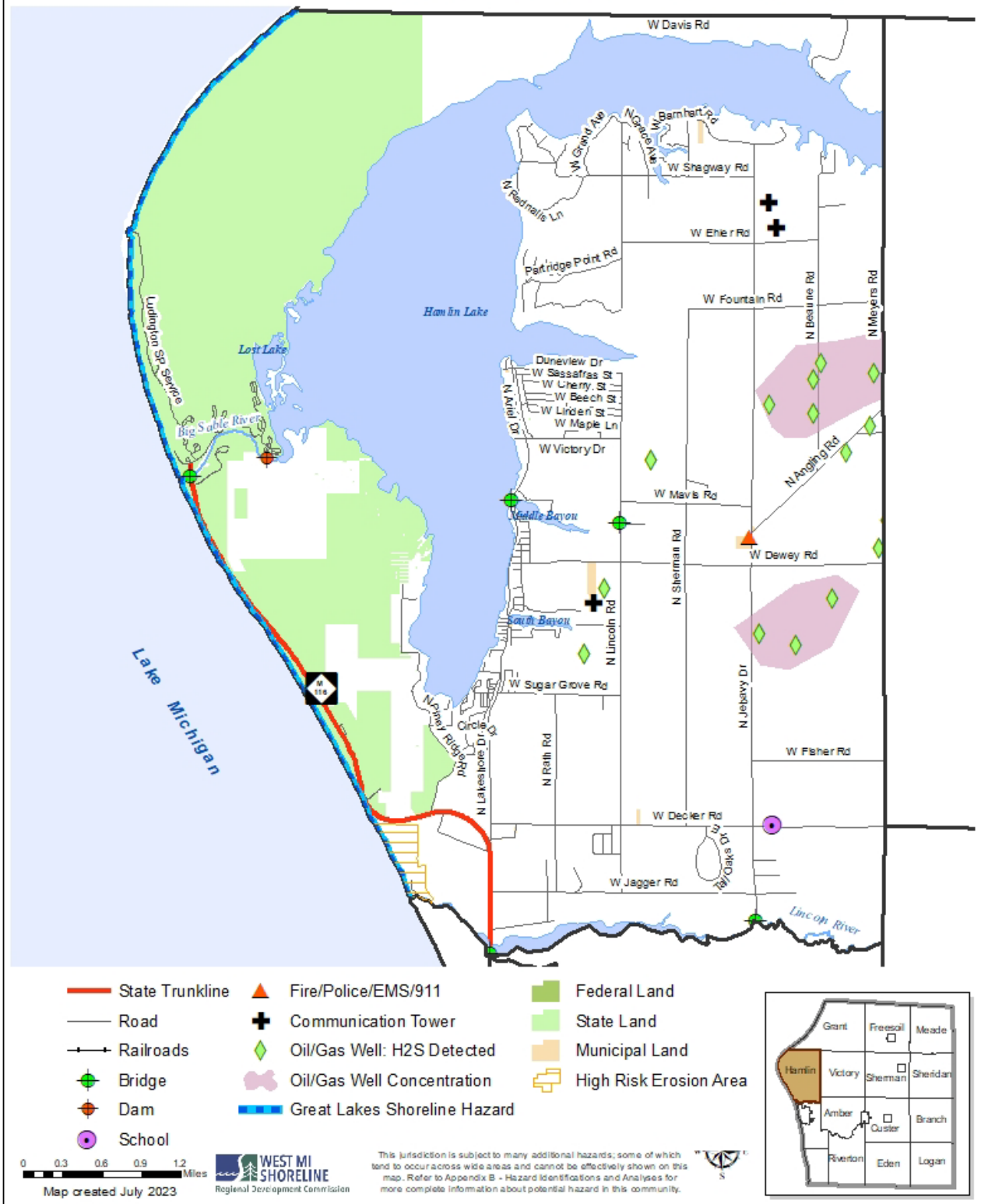
Hamlin Township Hazard Rating		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	2	1	8	24
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	3	2	2	1	11	33
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	2	1	2	3	10	20
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	1	1	1	1	6	6
2.06	HAZMAT – Transportation	1	1	1	1	6	6
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	1	1	1	1	6	6
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	1	1	2	2	9	9
2.11	Transportation Accidents	1	1	1	1	6	6
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

Hamlin Township Hazard Ranking

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Great Lakes Shoreline	3	11	33
3	Wildfire	3	11	33
5	Extreme Temperatures	3	10	30
6	Fire – Structural	3	9	27
6	Public Health Emergencies	3	9	27
8	Energy Emergencies	3	8	24
8	Flooding: Riverine/Urban	3	8	24
8	Infrastructure Failures	3	8	24
8	Invasive Species	3	8	24
8	Lightning	3	8	24
13	Drought	2	11	22
14	Dam failure	2	10	20
15	Space Weather	2	8	16
16	Tornadoes	1	15	15
17	Catastrophic Incidents	2	7	14
18	Civil Disturbances	2	6	12
18	Hail	2	6	12
18	Oil/Natural Gas Well Accidents	2	6	12
18	Terrorism & Similar Criminal Acts	2	6	12
22	Pipeline Accidents	1	9	9
23	Celestial Impacts	1	8	8
23	Fog	2	4	8
25	Fire – Scrap Tires	1	6	6
25	HAZMAT – Fixed Site	1	6	6
25	HAZMAT – Transportation	1	6	6
25	Nuclear Power Emergencies	1	6	6
25	Subsidence	1	6	6
25	Transportation Accidents	1	6	6
	Earthquake	0	-	-
	Nuclear Attack	0	-	-

Hamlin Township, Mason County **Critical Facilities and Potential Hazards**



Hazard Identification Profile

Logan Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: 07/16/12

Flood Insurance Policies In-Force: 3

Total Flood Insurance Coverage: \$631,500

Floodplains and Flood-prone Areas: South Branch Pere Marquette River, Carr Creek

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCEM events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

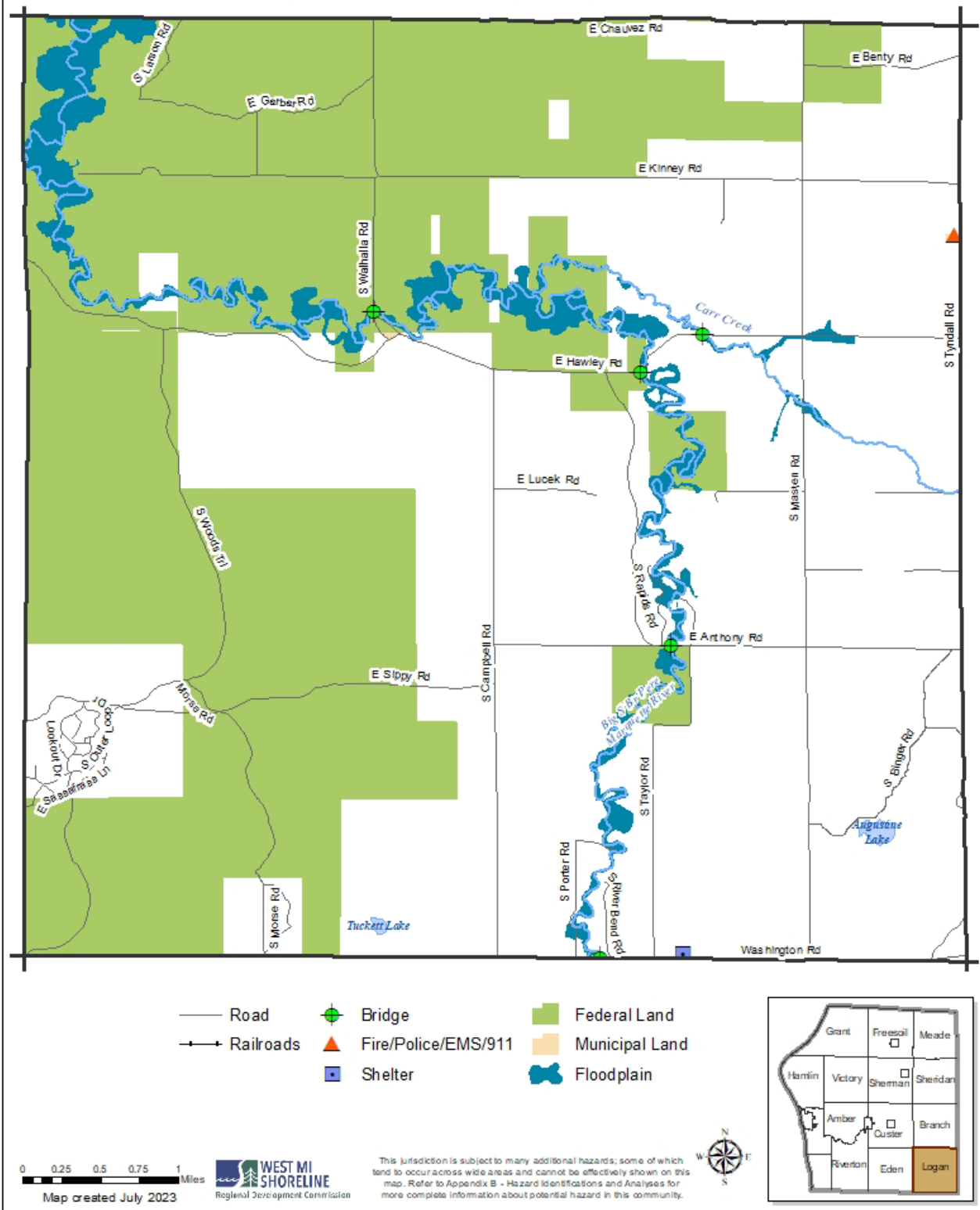
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1.01b	Space Weather	2	2	0	2	8	16
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1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	1	1	6	18
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
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1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
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2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	1	1	1	1	6	6
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	0	-	-	-	-	-
2.11	Transportation Accidents	1	1	1	1	6	6
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

Logan Township Hazard Ranking

$$\begin{matrix} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{matrix} \times \begin{matrix} \text{Impacts} \\ \text{Total} \end{matrix} = \begin{matrix} \text{Hazard} \\ \text{Score} \end{matrix}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Wildfire	3	11	33
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14	Tornadoes	1	15	15
15	Catastrophic Incidents	2	7	14
16	Civil Disturbances	2	6	12
16	Hail	2	6	12
16	Oil/Natural Gas Well Accidents	2	6	12
16	Terrorism & Similar Criminal Acts	2	6	12
20	Celestial Impacts	1	8	8
20	Fog	2	4	8
22	Fire – Scrap Tires	1	6	6
22	HAZMAT – Transportation	1	6	6
22	Subsidence	1	6	6
22	Transportation Accidents	1	6	6
	Dam failure	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	HAZMAT – Fixed Site	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-
	Pipeline Accidents	0	-	-

Logan Township, Mason County Critical Facilities and Potential Hazards



Hazard Identification Profile

Meade Township

1. **NATURAL HAZARDS**

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: No Special Flood Hazard Areas (NSFHA)

Flood Insurance Policies In-Force: 1

Total Flood Insurance Coverage: \$18,000

Floodplains and Flood-prone Areas: Big Sable River, Little Manistee River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

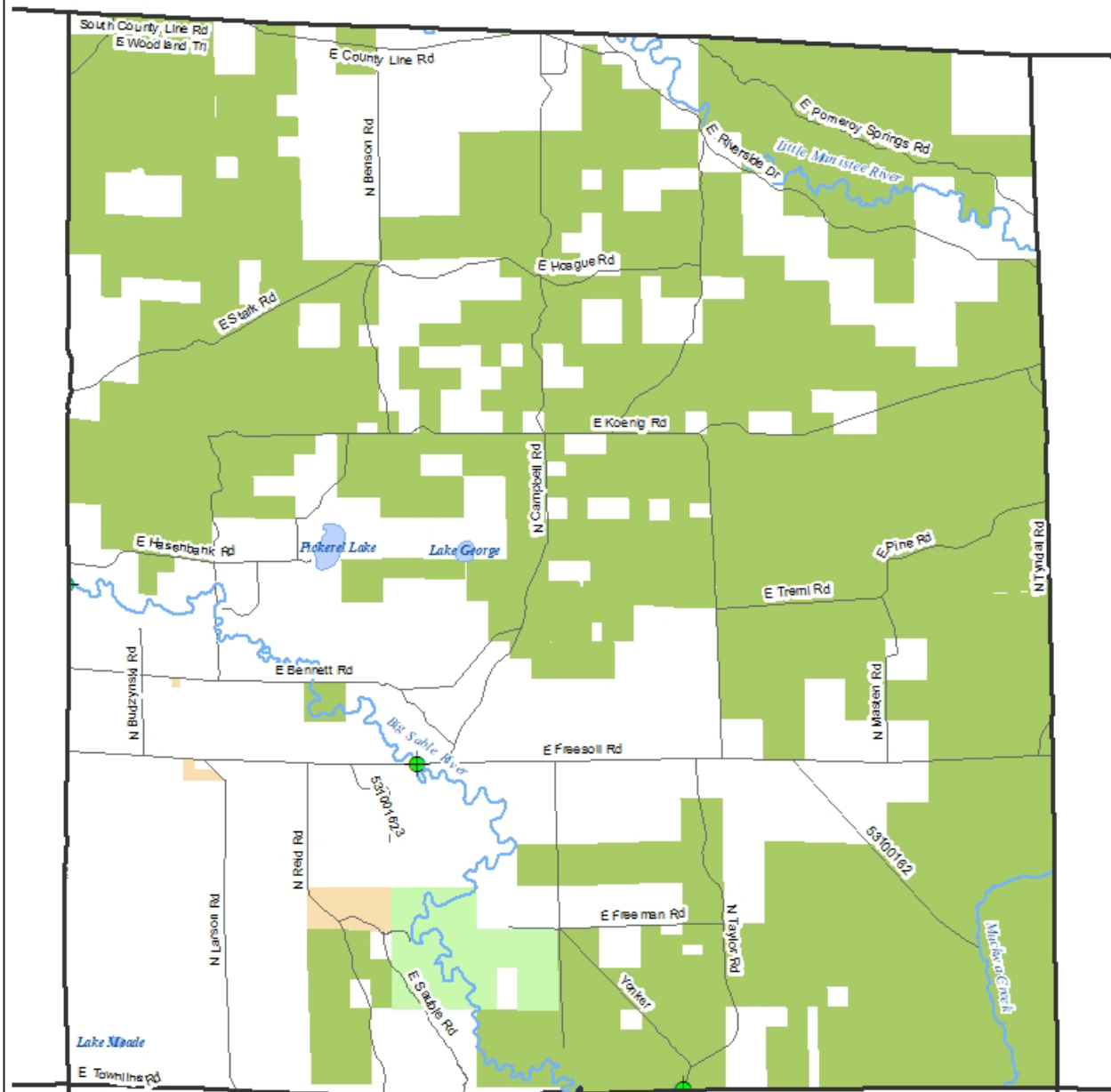
	Meade Township Hazard Rating	Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	2	10	20
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	2	1	8	24
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	1	1	1	1	6	6
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	1	1	1	1	6	6
2.10	Pipeline Accidents	0	-	-	-	-	-
2.11	Transportation Accidents	1	1	1	1	6	6
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Meade Township
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Wildfire	3	11	33
4	Extreme Temperatures	3	10	30
5	Fire – Structural	3	9	27
5	Public Health Emergencies	3	9	27
7	Energy Emergencies	3	8	24
7	Flooding: Riverine/Urban	3	8	24
7	Infrastructure Failures	3	8	24
7	Invasive Species	3	8	24
7	Lightning	3	8	24
12	Drought	2	10	20
13	Space Weather	2	8	16
14	Tornadoes	1	15	15
15	Catastrophic Incidents	2	7	14
16	Civil Disturbances	2	6	12
16	Hail	2	6	12
16	Terrorism & Similar Criminal Acts	2	6	12
19	Celestial Impacts	1	8	8
19	Fog	2	4	8
21	Fire – Scrap Tires	1	6	6
21	HAZMAT – Transportation	1	6	6
21	Oil/Natural Gas Well Accidents	1	6	6
21	Subsidence	1	6	6
21	Transportation Accidents	1	6	6
	HAZMAT – Fixed Site	0	-	-
	Dam failure	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-
	Pipeline Accidents	0	-	-

Meade Township, Mason County Critical Facilities and Potential Hazards

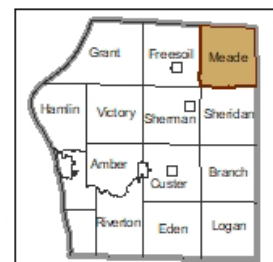


- Road
- +— Bridge
- +— Railroads
- Floodplain
- Federal Land
- State Land
- Municipal Land

0 0.25 0.5 0.75 1 Miles
Map created July 2023



This jurisdiction is subject to many additional hazards; some of which tend to occur across wide areas and cannot be effectively shown on this map. Refer to Appendix B - Hazard Identifications and Analyses for more complete information about potential hazard in this community.



Hazard Identification Profile Pere Marquette Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: 08/24/21

Flood Insurance Policies In-Force: 21

Total Flood Insurance Coverage: 7,094,000

Floodplains and Flood-prone Areas: Lake Michigan shoreline, Lincoln Lake shoreline, Pere Marquette Lake shoreline, Hopkins Lake shoreline, Lincoln River, Pere Marquette River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- **June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out. Local declaration of emergency for Riverton, Summit, Pere Marquette, and Amber townships.**
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards:

- Extreme high water levels in the Great Lakes: 1929, 1952, 1973, 1986, and 1997.
- Extreme low water levels in the Great Lakes: 1926, 1934, 1964, 2003, and 2013.
- Rip current incidents on Lake Michigan, 2002-2012: 77 fatalities, 230 rescues.
- June 1986: Record high water level on Lake Michigan.
- July 13, 1938: Seiche/storm surge on Lake Michigan. 3 drowned in Holland, 1 in Muskegon, and 1 near Pentwater.
- 2013: Record low water level on Lake Michigan.
- 2019-21: Lengthy high water event on Lake Michigan. High water record in 2020. Extensive shoreline erosion and property damage along Lake Michigan shoreline. Roughly-estimated \$4.5 million in public and private damages in the City of Ludington.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.

- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCEM events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

**Pere Marquette Township
Hazard Rating**

		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	2	1	8	24
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	3	2	2	1	11	33
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	1	2	1	8	24
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	2	2	2	3	13	26
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	2	1	1	2	7	14
2.06	HAZMAT – Transportation	2	1	1	2	7	14
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	1	1	1	1	6	6
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	1	1	1	2	7	7
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Pere Marquette Township
Hazard Ranking**

$$\begin{matrix} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{matrix} \times \begin{matrix} \text{Impacts} \\ \text{Total} \end{matrix} = \begin{matrix} \text{Hazard} \\ \text{Score} \end{matrix}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Great Lakes Shoreline	3	11	33
4	Extreme Temperatures	3	10	30
5	Fire – Structural	3	9	27
5	Public Health Emergencies	3	9	27
7	Dam failure	2	13	26
8	Energy Emergencies	3	8	24
8	Flooding: Riverine/Urban	3	8	24
8	Infrastructure Failures	3	8	24
8	Invasive Species	3	8	24
8	Lightning	3	8	24
8	Wildfire	3	8	24
14	Drought	2	11	22
15	Space Weather	2	8	16
16	Tornadoes	1	15	15
17	Catastrophic Incidents	2	7	14
17	HAZMAT – Fixed Site	2	7	14
17	HAZMAT – Transportation	2	7	14
20	Civil Disturbances	2	6	12
20	Hail	2	6	12
20	Oil/Natural Gas Well Accidents	2	6	12
20	Terrorism & Similar Criminal Acts	2	6	12
20	Transportation Accidents	2	6	12
25	Celestial Impacts	1	8	8
25	Fog	2	4	8
27	Pipeline Accidents	1	7	7
28	Fire – Scrap Tires	1	6	6
28	Nuclear Power Emergencies	1	6	6
28	Subsidence	1	6	6
	Earthquake	0	-	-
	Nuclear Attack	0	-	-

Pere Marquette Township, Mason County Critical Facilities and Potential Hazards

Legend:

- State Trunkline
- Road
- Railroads
- Bridge
- Dam
- Fire/Police/EMS/911
- Shelter
- Communication Tower
- Floodplain
- State Land
- Municipal Land
- High Risk Erosion Area
- SARA Title III Site

Scale: 0 0.25 0.5 0.75 1 Miles

Map created July 2023

WEST MI SHORELINE
Regional Development Commission

This jurisdiction is subject to many additional hazards; some of which tend to occur across wide areas and cannot be effectively shown on this map. Refer to Appendix B - Hazard Identifications and Analyses for more complete information about potential hazard in this community.

Inset Map: A small map of Mason County showing the location of Pere Marquette Township (highlighted in red) relative to other townships: Grant, Freetail, Meade, Hamlin, Victory, Sherman, Sheridan, Branch, Riverton, Eden, and Logan.

Hazard Identification Profile Riverton Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Not Participating in NFIP

FIRM Map Date: 08/24/21

Flood Insurance Policies In-Force: 0

Total Flood Insurance Coverage: \$0

Floodplains and Flood-prone Areas: Pere Marquette River, Swan Creek

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- **June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out. Local declaration of emergency for Riverton, Summit, Pere Marquette, and Amber townships.**
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- **May 17, 2001: .88" hail. \$10k property damage, \$10k crop damage, Riverton Township.**
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

- 996 oil and gas test well surface hole locations within Mason County.
- 3 wells with some level of "H2S Concern" in Riverton Township.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

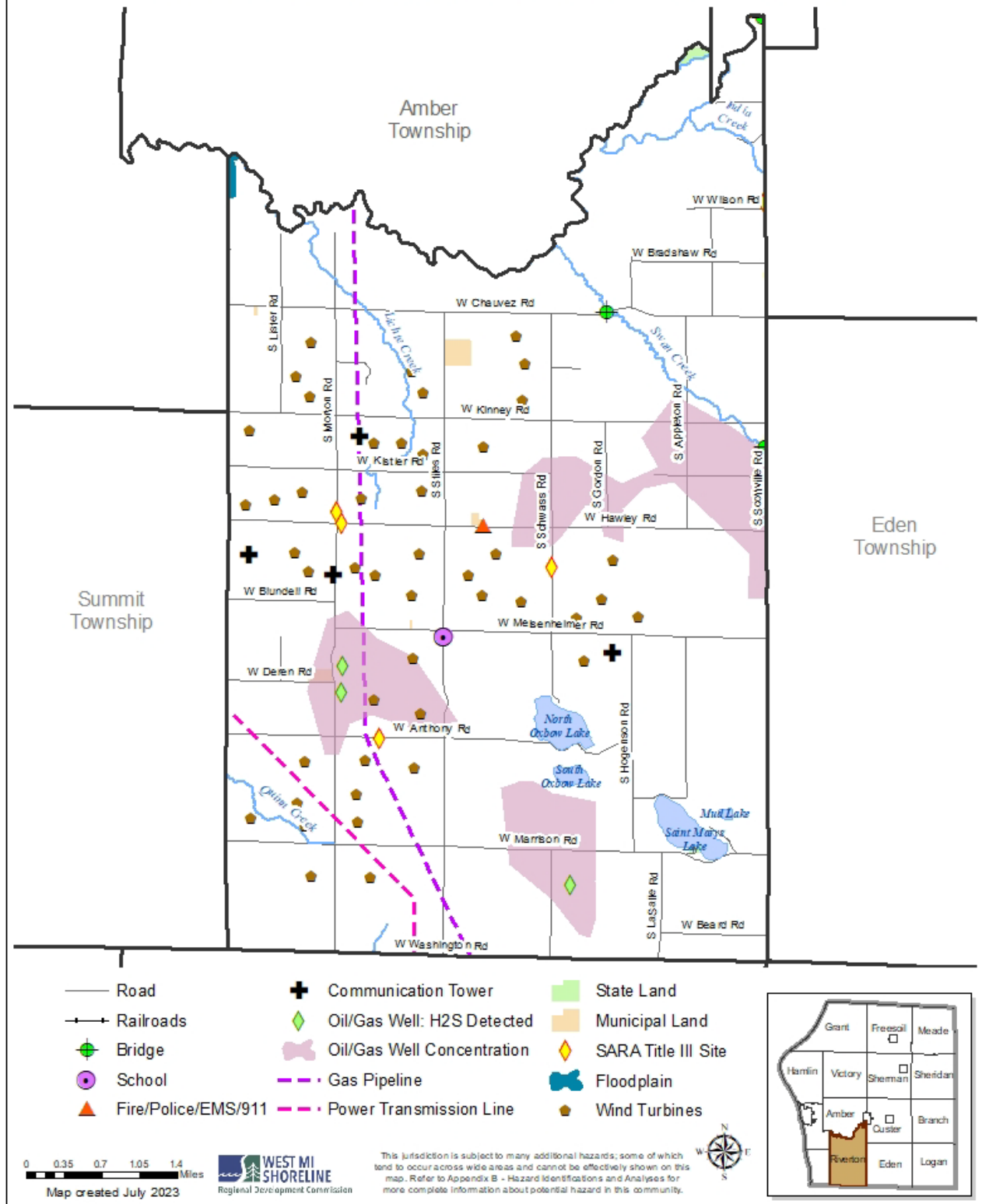
Riverton Township Hazard Rating		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	2	3	13	26
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	1	1	6	18
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	1	1	1	3	8	8
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	1	1	1	1	6	6
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	1	1	1	2	7	7
2.11	Transportation Accidents	1	1	1	1	6	6
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Riverton Township
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Wildfire	3	11	33
4	Extreme Temperatures	3	10	30
5	Fire – Structural	3	9	27
5	Public Health Emergencies	3	9	27
7	Drought	2	13	26
8	Energy Emergencies	3	8	24
8	Infrastructure Failures	3	8	24
8	Invasive Species	3	8	24
8	Lightning	3	8	24
12	Flooding: Riverine/Urban	3	6	18
13	Space Weather	2	8	16
14	Tornadoes	1	15	15
15	Catastrophic Incidents	2	7	14
16	Civil Disturbances	2	6	12
16	Hail	2	6	12
16	Oil/Natural Gas Well Accidents	2	6	12
16	Terrorism & Similar Criminal Acts	2	6	12
20	Celestial Impacts	1	8	8
20	Dam failure	1	8	8
20	Fog	2	4	8
23	Pipeline Accidents	1	7	7
24	Fire – Scrap Tires	1	6	6
24	HAZMAT – Transportation	1	6	6
24	Subsidence	1	6	6
24	Transportation Accidents	1	6	6
	HAZMAT – Fixed Site	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-

Riverton Township, Mason County Critical Facilities and Potential Hazards



Hazard Identification Profile Sheridan Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: No Special Flood Hazard Areas (NSFHA)

Flood Insurance Policies In-Force: N/A

Total Flood Insurance Coverage: N/A

Floodplains and Flood-prone Areas: Big Sable River, North Branch Lincoln River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.
- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63
- **November 22, 2021: Structural fire in Sheridan Township. 1 fatality.**

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCEM events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

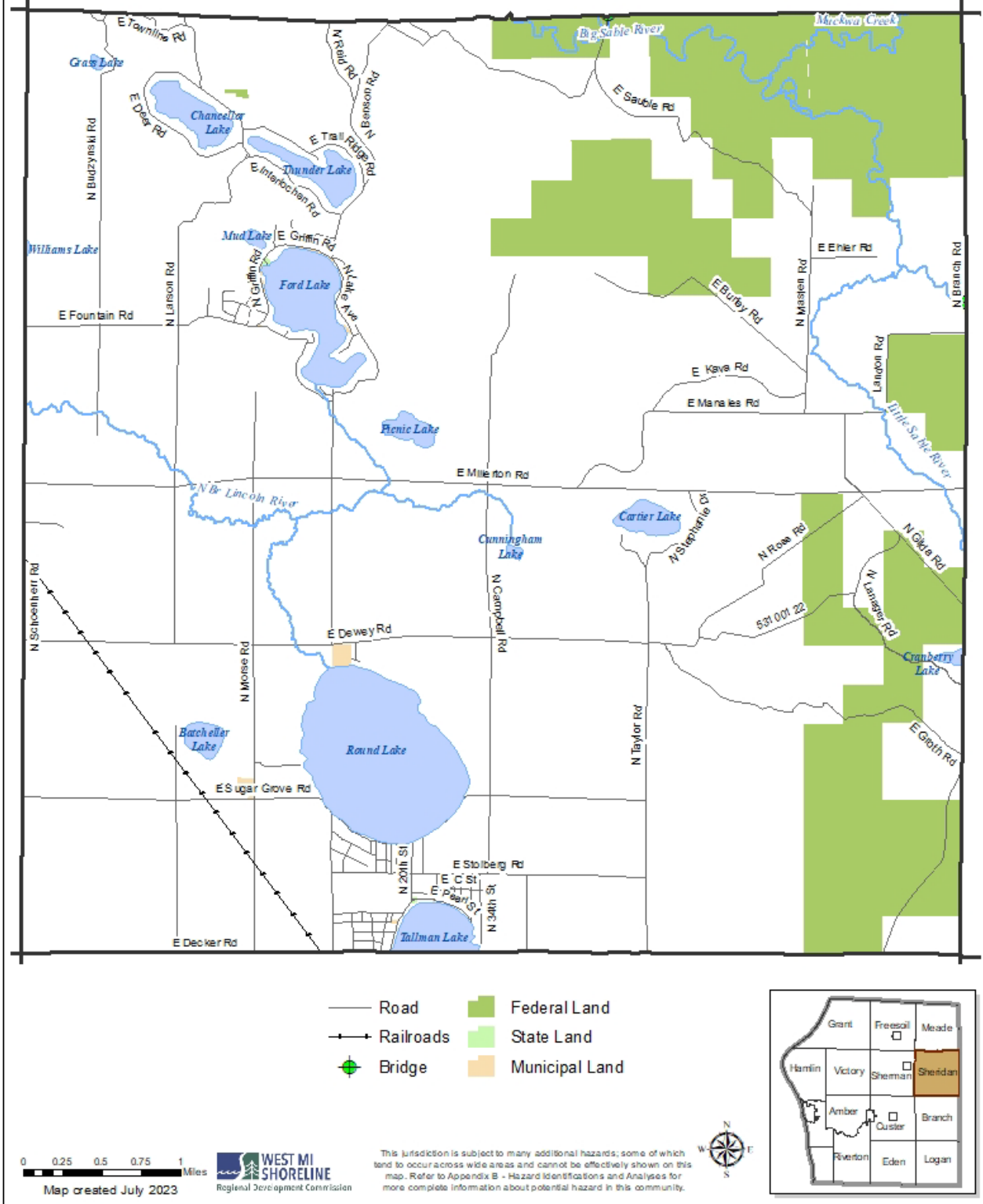
Sheridan Township Hazard Rating		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	1	3	11	22
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	1	1	6	18
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	2	1	1	1	6	12
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	1	1	1	1	6	6
2.10	Pipeline Accidents	0	-	-	-	-	-
2.11	Transportation Accidents	1	1	1	1	6	6
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Sheridan Township
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
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7	Infrastructure Failures	3	8	24
7	Invasive Species	3	8	24
7	Lightning	3	8	24
11	Drought	2	11	22
12	Flooding: Riverine/Urban	3	6	18
13	Space Weather	2	8	16
14	Tornadoes	1	15	15
15	Catastrophic Incidents	2	7	14
16	Civil Disturbances	2	6	12
16	Hail	2	6	12
16	HAZMAT – Transportation	2	6	12
16	Terrorism & Similar Criminal Acts	2	6	12
20	Celestial Impacts	1	8	8
20	Fog	2	4	8
22	Fire – Scrap Tires	1	6	6
22	Oil/Natural Gas Well Accidents	1	6	6
22	Subsidence	1	6	6
	Transportation Accidents	1	6	6
	Dam failure	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	HAZMAT – Fixed Site	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-
	Pipeline Accidents	0	-	-

Sheridan Township, Mason County Critical Facilities and Potential Hazards



Hazard Identification Profile Sherman Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: No Special Flood Hazard Areas (NSFHA)

Flood Insurance Policies In-Force: 1

Total Flood Insurance Coverage: \$228,000

Floodplains and Flood-prone Areas: North Branch Lincoln River

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- **September 16, 1997: Severe thunderstorm winds. \$25k property damage, Ludington; \$10k, Fountain.**
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
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- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
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1.12 Subsidence: - None Identified.

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1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
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- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
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- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
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- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

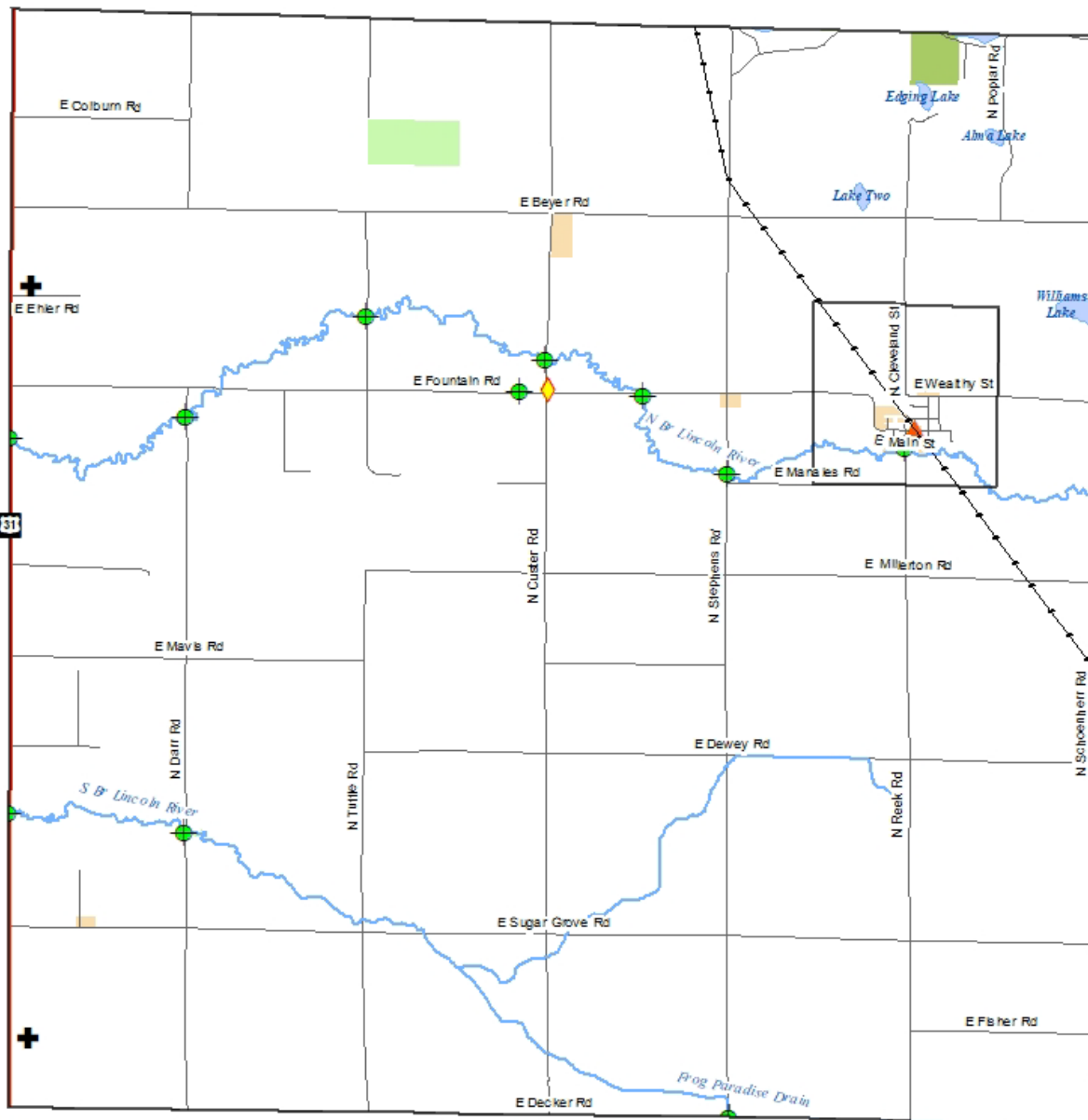
Sherman Township Hazard Rating		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	2	3	13	26
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	2	1	1	1	6	12
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	0	-	-	-	-	-
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	1	1	1	1	6	6
2.06	HAZMAT – Transportation	2	1	1	1	6	12
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	1	1	1	1	6	6
2.10	Pipeline Accidents	0	-	-	-	-	-
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Sherman Township
Hazard Ranking**

$$\begin{matrix} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{matrix} \times \begin{matrix} \text{Impacts} \\ \text{Total} \end{matrix} = \begin{matrix} \text{Hazard} \\ \text{Score} \end{matrix}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Wildfire	3	11	33
4	Extreme Temperatures	3	10	30
5	Fire – Structural	3	9	27
5	Public Health Emergencies	3	9	27
7	Drought	2	13	26
8	Energy Emergencies	3	8	24
8	Infrastructure Failures	3	8	24
8	Invasive Species	3	8	24
8	Lightning	3	8	24
12	Space Weather	2	8	16
13	Tornadoes	1	15	15
14	Catastrophic Incidents	2	7	14
14	HAZMAT – Transportation	2	7	14
16	Civil Disturbances	2	6	12
16	Flooding: Riverine/Urban	2	6	12
16	Hail	2	6	12
16	Terrorism & Similar Criminal Acts	2	6	12
16	Transportation Accidents	2	6	12
21	Celestial Impacts	1	8	8
21	Fog	2	4	8
23	Fire – Scrap Tires	1	6	6
23	HAZMAT – Fixed Site	1	6	6
23	Oil/Natural Gas Well Accidents	1	6	6
23	Subsidence	1	6	6
	Dam failure	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-
	Pipeline Accidents	0	-	-

Sherman Township, Mason County Critical Facilities and Potential Hazards

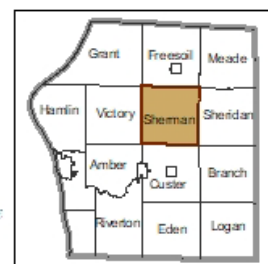


- State Trunkline
- Road
- +— Railroads
- Bridge
- ▲ Fire/Police/EMS/911
- + Communication Tower
- Federal Land
- State Land
- Municipal Land
- ◆ SARA Title III Site

0 0.25 0.5 0.75 1 Miles
Map created July 2023

WEST MI SHORELINE
Regional Development Commission

This jurisdiction is subject to many additional hazards; some of which tend to occur across wide areas and cannot be effectively shown on this map. Refer to Appendix B - Hazard Identifications and Analyses for more complete information about potential hazard in this community.



Hazard Identification Profile

Summit Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: 08/24/21

Flood Insurance Policies In-Force: 2

Total Flood Insurance Coverage: \$630,000

Floodplains and Flood-prone Areas: Lake Michigan shoreline, Bass Lake shoreline, Hopkins Lake shoreline, Kibby Creek, Quinn Creek

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- **June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out. Local declaration of emergency for Riverton, Summit, Pere Marquette, and Amber townships.**
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards:

- Extreme high water levels in the Great Lakes: 1929, 1952, 1973, 1986, and 1997.
- Extreme low water levels in the Great Lakes: 1926, 1934, 1964, 2003, and 2013.
- Rip current incidents on Lake Michigan, 2002-2012: 77 fatalities, 230 rescues.
- June 1986: Record high water level on Lake Michigan.
- July 13, 1938: Seiche/storm surge on Lake Michigan. 3 drowned in Holland, 1 in Muskegon, and 1 near Pentwater.
- 2013: Record low water level on Lake Michigan.
- 2019-21: Lengthy high water event on Lake Michigan. High water record in 2020. Extensive shoreline erosion and property damage along Lake Michigan shoreline. Roughly-estimated \$4.5 million in public and private damages in the City of Ludington.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
- July 19, 2019: Thunderstorm wind. \$300k damage, Mason County.
- June 2, 2020: Thunderstorm wind. \$25k damage, Mason County.

- November 10, 2020: Thunderstorm wind. \$100k damage, Mason County.
- October 10, 2021: Thunderstorm wind. \$50k, Mason County.

1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

- October 1871: Wildfires. 1.2m acres burned, 200 fatalities, Lower Peninsula.
- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
- 1981-2010: Approximately 1 wildfire and 5 acres burned per year on county lands under MDNR jurisdiction (32 total wildfires, 154.6 total acres burned).

1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
- January 27, 1994: Heavy snow and freezing rain. \$5m property damage across region.
- March 9, 1998: Winter storm. \$100k property damage across region.
- April 3, 2003: Ice storm. \$4.9m property damage throughout West Michigan.
- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCEM events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
- May 31, 1998: Power outage (thunderstorms). 681,000 outages in Lower Michigan. Countywide for up to a week.
- November 10, 1998: Power outage (high wind). 167,000 customers without power, statewide.
- April 3, 2003: Hundreds of thousands lose power (ice storm), Lower Michigan.
- October 10, 2004: 100,000 without power (high wind), statewide.
- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

996 oil and gas test well surface hole locations within Mason County.

2.10 Pipeline Accidents: - None Identified.

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

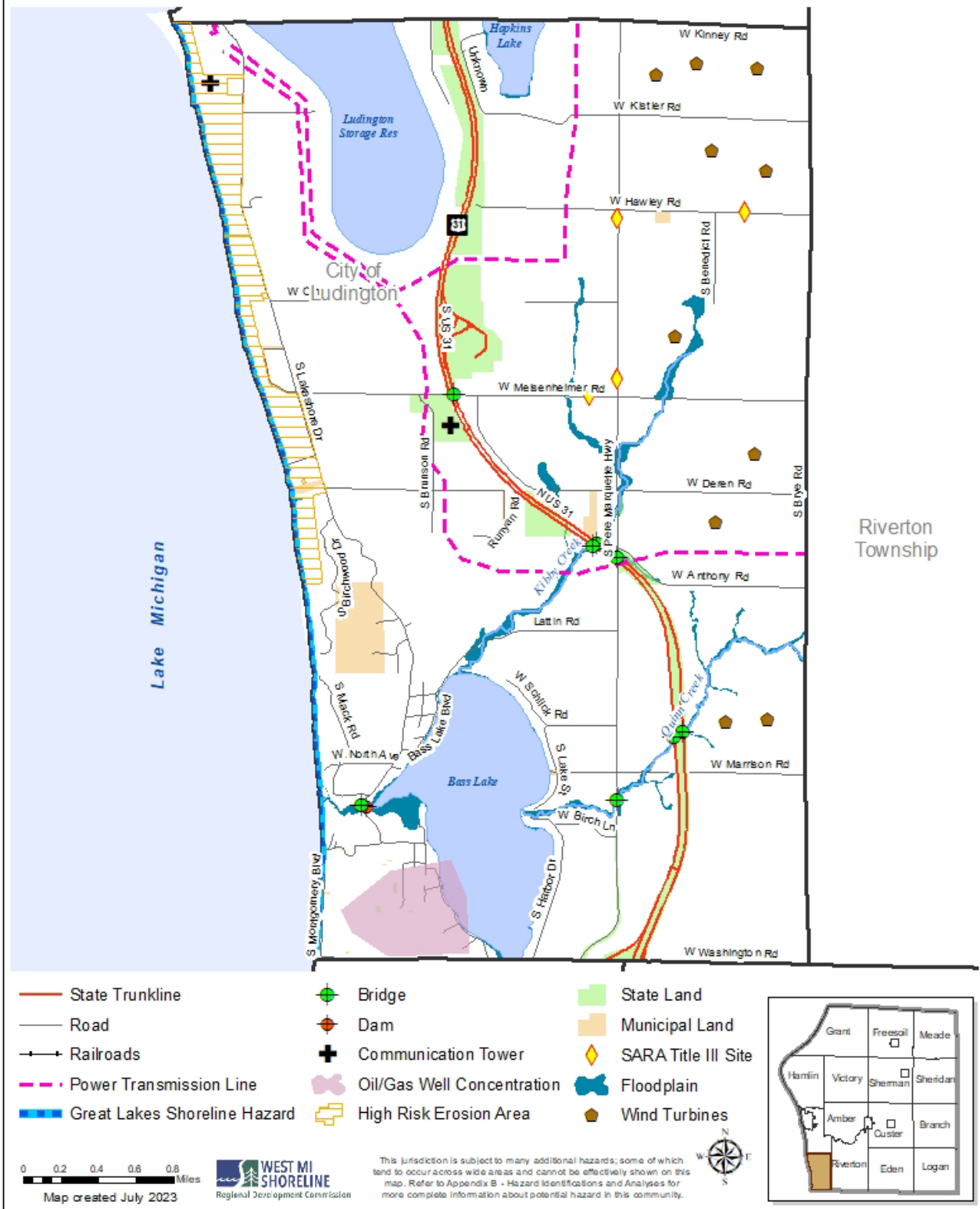
	Summit Township Hazard Rating	Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	2	3	13	26
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	3	1	2	1	8	24
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	3	2	2	1	11	33
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	2	2	2	3	13	26
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	2	1	1	1	6	12
2.06	HAZMAT – Transportation	2	1	1	1	6	12
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	1	1	1	1	6	6
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	0	-	-	-	-	-
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

Summit Township Hazard Ranking

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Great Lakes Shoreline	3	11	33
3	Wildfire	3	11	33
5	Extreme Temperatures	3	10	30
6	Fire – Structural	3	9	27
6	Public Health Emergencies	3	9	27
8	Dam failure	2	13	26
8	Drought	2	13	26
10	Energy Emergencies	3	8	24
10	Flooding: Riverine/Urban	3	8	24
10	Infrastructure Failures	3	8	24
10	Invasive Species	3	8	24
10	Lightning	3	8	24
15	Space Weather	2	8	16
16	Tornadoes	1	15	15
17	Catastrophic Incidents	2	7	14
18	Civil Disturbances	2	6	12
18	Hail	2	6	12
18	HAZMAT – Fixed Site	2	6	12
18	HAZMAT – Transportation	2	6	12
18	Oil/Natural Gas Well Accidents	2	6	12
18	Terrorism & Similar Criminal Acts	2	6	12
18	Transportation Accidents	2	6	12
25	Celestial Impacts	1	8	8
25	Fog	2	4	8
27	Fire – Scrap Tires	1	6	6
27	Nuclear Power Emergencies	1	6	6
27	Subsidence	1	6	6
	Earthquake	0	-	-
	Nuclear Attack	0	-	-
	Pipeline Accidents	0	-	-

Summit Township, Mason County Critical Facilities and Potential Hazards



Hazard Identification Profile

Victory Township

1. NATURAL HAZARDS

1.01 Celestial Impacts: - None Identified.

1.02 Drought:

- Summer 1871: Prolonged drought over much of the Great Lakes region.
- May-September, 1891: Drought devastated Michigan's lumber industry.
- 12 recorded drought events in the area (including Lake, Mason, Muskegon, Newaygo, and Oceana counties) lasting eight months or greater: 1895-1896 (15 months), 1899-1900 (11 months), 1901-1902 (10 months), 1909-1911 (24 months), 1925-1926 (11 months), 1930-1931 (18 months), 1956-1957 (8 months), 1962-1963 (9 months), 1971-1972 (12 months), 1976-1977 (13 months), and 2002-2003 (12 months).

1.03 Earthquake: - None Identified; no significant threat.

1.04 Extreme Temperatures:

- July 1936: Heat wave. 570 deaths statewide, 364 in Detroit.
- Summer 1988: 39 days with temperatures over 90 degrees, statewide.
- January 20, 1994: Record cold. \$50m property damage across Michigan.
- March 2012: Anomalous temperatures. \$209.8m crop damage across Michigan.

1.05 Flooding - Riverine/ Urban:

NFIP Participation: Participating in NFIP

FIRM Map Date: No Special Flood Hazard Areas (NSFHA)

Flood Insurance Policies In-Force: N/A

Total Flood Insurance Coverage: N/A

Floodplains and Flood-prone Areas: Hamlin Lake shoreline, North Branch Lincoln River, Dennis Creek

- September 10-19, 1986: Flooding. Presidential disaster declaration.
- February 9-10, 2001: Flash flood. \$100k property damage, Mason County.
- May 15-16, 2001: Flash flood. \$150k property damage, \$150k crop damage across Mason County.
- Late May-Early June, 2004: Flooding. \$1m property damage, 200k crop damage, Mason County
- June 9, 2004: Flooding. Over 8" rain in 3 hours, \$20k property damage, 31 roads closed, 1 washed out.
- June 13, 2008: Flash flood. Presidential disaster declaration. Up to 11" rain in 6-8 hours, \$3m property damage, \$500k crop damage, Mason County.
- May 3, 2012: Flash flood. \$75k property damage, Mason County.
- July 20, 2019: Flooding. Heavy rain from severe storms, \$500k damage, Mason County.

1.06 Fog:

- January 11-13, 1995: Dense Fog. 4 traffic accident fatalities, school closures, and flight delays across Michigan.

1.07 Great Lakes Shoreline Hazards: - None Identified.

1.08 Hail:

- Severe hail events (1" or greater) recorded in Mason County since 1991: 8
- September 7, 2021: 2.5" hail. \$100k property damage, Mason County.

1.09 Invasive Species:

- Invasive species exist in Mason County, however no significant events have been identified.

1.10 Lightning: - None Identified.

1.11 Severe Winds:

- April 6, 1997: High wind. \$5m property damage across southwest Lower Michigan.
- May 31, 1998: Thunderstorms & high winds. Declaration of major disaster by President.
- June 18, 2001: High wind. \$100k property damage across central Lower Michigan.
- March 9, 2002: High wind. \$485k property damage across southwest Lower Michigan.
- October 30, 2004: High wind. \$1.15m property damage across southwest Lower Michigan.
- October 4, 2006: Severe thunderstorm winds. \$80k property damage, \$20k crop damage, Mason County.
- March 8, 2017: High wind. \$5m property damage, Mason County.
- April 20, 2017: Thunderstorm wind. \$25k damage, Mason County.
- August 28, 2018: Thunderstorm wind. \$150k damage, Mason County.
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1.12 Subsidence: - None Identified.

1.13 Tornadoes: - None Identified.

1.14 Wildfire:

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- May-September, 1891: Uncontrollable wildfires across Michigan during the drought of 1891.
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1.15 Winter Storms:

- January 26, 1978: Blizzard, snowstorm. Declaration of statewide emergency by President, disaster by Governor.
- January 12, 1993: Heavy snow. \$50k property damage, northern Lower Michigan.
- January 12-21, 1994: Heavy lake effect snow. \$500k property damage across western Lower Michigan.
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- April 14, 2018: Winter storm. \$100k damage, Mason County.
- December 1, 2019: Winter storm. \$50k damage, Mason County.

2. TECHNOLOGICAL HAZARDS

2.01 Dam Failure:

- Two documented in Mason County but locations not identified.

2.02 Energy Emergencies: - None Identified.

2.03 Fire - Scrap Tire: - None Identified.

2.04 Fire - Structural:

- County fire rate per 1,000 population in 1998: 4.63

2.05 Hazard Material Incidents - Fixed Site (including industrial accidents):

SARA Title III sites in Mason County in 2022: 13

2.06 Hazard Material Incidents - Transportation: - None Identified.

2.07 Infrastructure Failure:

- Number of NCDC events showing downed power lines or power outages in Mason County, 1997-2014: 27
- January 20, 1994: Frozen sewer/water lines.
- April 6-7, 1997: 180,000-200,000 without power; 70,000 on second day (high wind event), statewide.
- September 16, 1997: Power lines downed in Fountain and across county. 500 customers affected.
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- October 4, 2006: Several trees and power lines downed (thunderstorms), Mason County.
- December 28, 2008: Several trees and power lines downed (high wind), Mason County.
- February 1-2, 2013: Scattered power outages (lake effect snow), Mason County.

2.08 Nuclear Power Plant Emergencies: - None Identified.

2.09 Oil and Natural Gas Well Accidents:

- 996 oil and gas test well surface hole locations within Mason County.
- **36 wells with some level of "H2S Concern" in Victory Township.**
- *May 13, 1994: Blown gasket at a compression station allowed hydrogen sulfide emissions causing a number of self-evacuations and at least 11 emergency hospitalizations, Victory Township.*
- *January 5, 1996: Stuck valve caused 18 emergency calls, Victory Township.*

2.10 Pipeline Accidents:

- *February 1995: Pipeline rupture. 1 evacuation, Victory Township.*
- *April 1995: Pipeline rupture. 30 evacuations, Victory Township.*
- *July 1996: Pipeline rupture. Self-evacuations, Victory Township.*
- *August 1996: Pipeline rupture. Self-evacuations, Victory Township.*
- *September 1996: Accident involving pipeline replacement. 1 injury, Victory Township.*

2.11 Transportation Accidents: - None Identified.

3. HUMAN -RELATED HAZARDS

3.01 Catastrophic Incidents (National Emergencies): - None Identified.

3.02 Civil Disturbances: - None Identified.

3.03 Nuclear Attack: - None Identified.

3.04 Public Health Emergencies:

- 2020 to current: Covid-19 Pandemic. Nearly 7 million confirmed deaths worldwide. 114 confirmed deaths in Mason County as of July 11, 2023.

3.05 Terrorism and Similar Criminal Activities: - None Identified.

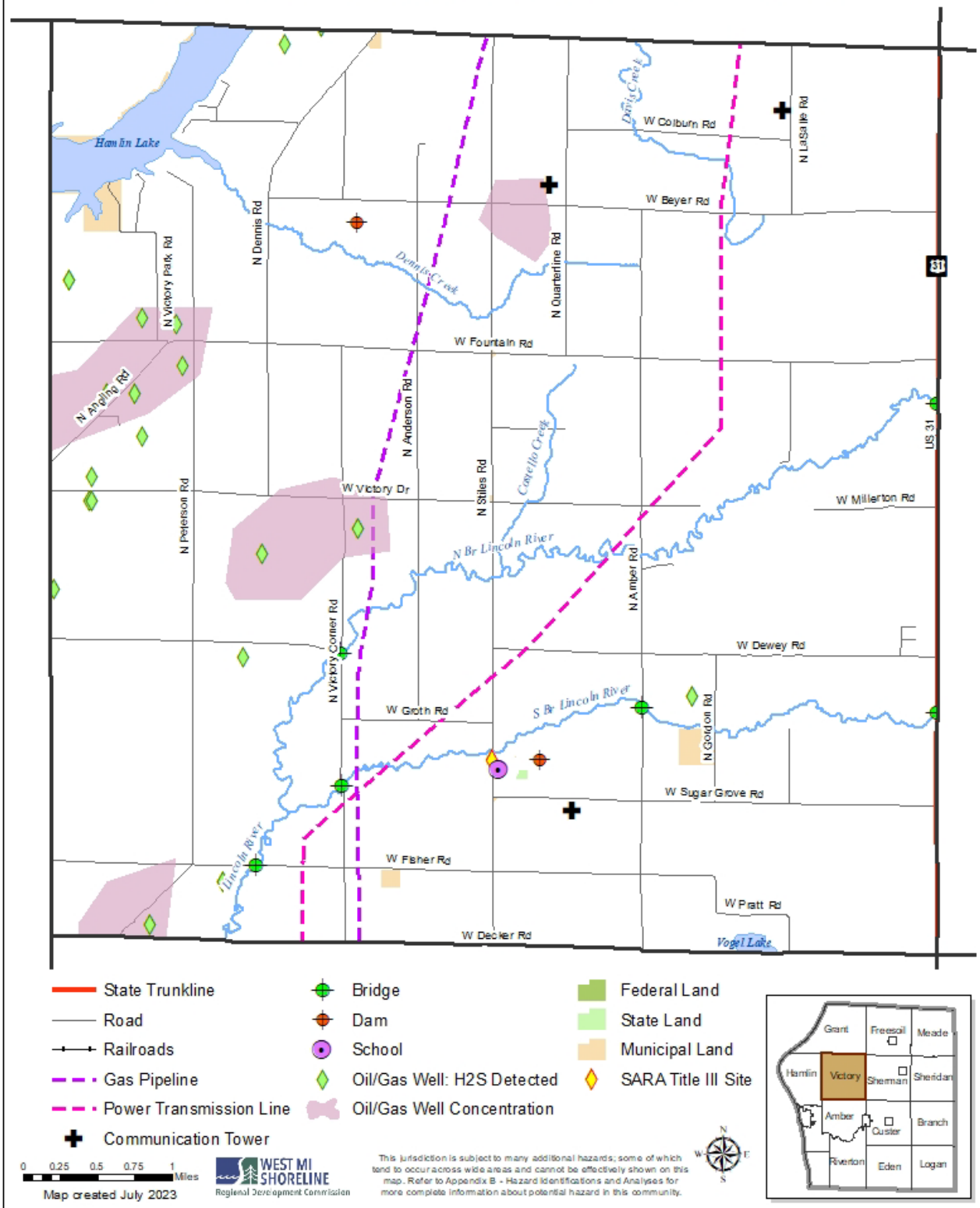
Victory Township Hazard Rating		Probability of Occurrence	Impact on People	Impact on Property	Impact on Economy	Impacts Total	Hazard Score
1.01a	Celestial Impacts	1	2	0	2	8	8
1.01b	Space Weather	2	2	0	2	8	16
1.02	Drought	2	2	2	3	13	26
1.03	Earthquake	0	-	-	-	-	-
1.04	Extreme Temperatures	3	2	1	2	10	30
1.05	Flooding: Riverine/Urban	2	1	1	1	6	12
1.06	Fog	2	1	0	1	4	8
1.07	Great Lakes Shoreline	0	-	-	-	-	-
1.08	Hail	2	1	1	1	6	12
1.09	Invasive Species	3	1	2	1	8	24
1.10	Lightning	3	1	2	1	8	24
1.11	Severe Winds	3	2	2	2	12	36
1.12	Subsidence	1	1	1	1	6	6
1.13	Tornadoes	1	3	2	2	15	15
1.14	Wildfire	3	2	2	1	11	33
1.15	Winter Storms	3	3	2	2	15	45
2.01	Dam failure	2	1	1	1	6	12
2.02	Energy Emergencies	3	2	0	2	8	24
2.03	Fire – Scrap Tires	1	1	1	1	6	6
2.04	Fire – Structural	3	1	2	2	9	27
2.05	HAZMAT – Fixed Site	0	-	-	-	-	-
2.06	HAZMAT – Transportation	2	1	1	1	6	12
2.07	Infrastructure Failures	3	1	1	3	8	24
2.08	Nuclear Power Emergencies	0	-	-	-	-	-
2.09	Oil/Natural Gas Well Accidents	2	1	1	1	6	12
2.10	Pipeline Accidents	1	1	1	2	7	7
2.11	Transportation Accidents	2	1	1	1	6	12
3.01	Catastrophic Incidents	2	1	1	2	7	14
3.02	Civil Disturbances	2	1	1	1	6	12
3.03	Nuclear Attack	0	-	-	-	-	-
3.04	Public Health Emergencies	3	2	0	3	9	27
3.05	Terrorism & Similar Criminal Acts	2	1	1	1	6	12

**Victory Township
Hazard Ranking**

$$\begin{array}{c} \text{Probability} \\ \text{of} \\ \text{Occurrence} \end{array} \times \begin{array}{c} \text{Impacts} \\ \text{Total} \end{array} = \begin{array}{c} \text{Hazard} \\ \text{Score} \end{array}$$

1	Winter Storms	3	15	45
2	Severe Winds	3	12	36
3	Wildfire	3	11	33
4	Extreme Temperatures	3	10	30
5	Fire – Structural	3	9	27
5	Public Health Emergencies	3	9	27
7	Drought	2	13	26
8	Energy Emergencies	3	8	24
8	Infrastructure Failures	3	8	24
8	Invasive Species	3	8	24
8	Lightning	3	8	24
12	Space Weather	2	8	16
13	Tornadoes	1	15	15
14	Catastrophic Incidents	2	7	14
15	Civil Disturbances	2	6	12
15	Dam failure	2	6	12
15	Flooding: Riverine/Urban	2	6	12
15	Hail	2	6	12
15	HAZMAT – Transportation	2	6	12
15	Oil/Natural Gas Well Accidents	2	6	12
15	Terrorism & Similar Criminal Acts	2	6	12
15	Transportation Accidents	2	6	12
23	Celestial Impacts	1	8	8
23	Fog	2	4	8
25	Pipeline Accidents	1	7	7
26	Fire – Scrap Tires	1	6	6
26	Subsidence	1	6	6
	HAZMAT – Fixed Site	0	-	-
	Earthquake	0	-	-
	Great Lakes Shoreline	0	-	-
	Nuclear Attack	0	-	-
	Nuclear Power Emergencies	0	-	-

Victory Township, Mason County Critical Facilities and Potential Hazards



Appendix C:
HAZARD IDENTIFICATION DATA AND MAPS

National Climatic Data Center: Storm Events

(140 events were reported in Mason County, Michigan between 01/01/1950 and 03/31/2005)

COUNTY	DATE	TIME	TYPE	MAGNITUDE	DEATHS	INJURIES	DAMAGE (\$)	
							property	crop
1 MASON	4/24/1960	1631	Hail	0.75 in.	0	0	0	0
2 MASON	8/15/1966	1500	Tornado	F0	0	0	0K	0
3 MASON	4/12/1972	930	Tornado	F1	0	0	0K	0
4 MASON	4/12/1972	930	Tornado	F2	0	8	2.5M	0
5 MASON	4/12/1972	2130	Tornado	F1	0	0	0K	0
6 MASON	7/10/1975	110	Hail	0.75 in.	0	0	0	0
7 MASON	8/31/1976	1900	Tstm Wind	0 kts.	0	0	0	0
8 MASON	9/5/1983	1820	Tstm Wind	0 kts.	0	0	0	0
9 MASON	8/29/1984	2200	Tstm Wind	0 kts.	0	0	0	0
10 MASON	6/8/1985	2225	Tstm Wind	0 kts.	0	0	0	0
11 MASON	6/8/1985	2250	Tstm Wind	0 kts.	0	0	0	0
12 MASON	8/17/1988	1700	Tstm Wind	0 kts.	0	0	0	0
13 MASON	8/4/1989	2200	Tstm Wind	0 kts.	0	0	0	0
14 MASON	7/3/1991	1630	Hail	1.00 in.	0	0	0	0
15 MASON	7/7/1991	1620	Hail	1.00 in.	0	0	0	0
16 MASON	6/17/1992	1417	Tstm Wind	0 kts.	0	0	0	0
17 MASON	6/17/1992	1421	Tstm Wind	0 kts.	0	0	0	0
18 MASON	6/17/1992	1435	Tstm Wind	0 kts.	0	0	0	0
19 MASON	6/17/1992	1440	Tstm Wind	0 kts.	0	0	0	0
20 MASON	9/18/1992	500	Tstm Wind	56 kts.	0	0	0	0
21 S. Lower MI	1/3/1993	2300	Flooding	N/A	0	0	5K	0
22 MIZ004	1/12/1993	2300	Heavy Snow	N/A	0	0	50K	0
23 MIZ001	1/21/1993	0	Ice Storm	N/A	0	0	0	0
24 MIZ004	3/23/1993	300	Freezing Rain	N/A	0	0	0	0
25 MIZ011	4/1/1993	0	Heavy Snow	N/A	0	0	50K	0
26 Upper and W MI	12/20/1993	1000	Heavy Snow	N/A	0	0	0	0
27 MIZ001	12/23/1993	1400	Heavy Snow	N/A	0	0	0	0
28 Upper and W MI	12/25/1993	700	Heavy Snow	N/A	0	0	0	0
29 Upper and W MI	12/29/1993	0	Heavy Snow	N/A	0	0	0	0
30 Upper MI	1/12/1994	0	Heavy Lake Snow	N/A	0	0	500K	0
31 Miz000	1/13/1994	0	Record Cold	N/A	0	0	50.0M	0
32 Lower MI/ part UP	1/27/1994	0	Heavy Snow/freezing Rain	N/A	0	0	5.0M	0
33 W Lower MI	2/2/1994	0	Heavy Snow	N/A	0	0	0	0
34 C Upper, N MI	2/22/1994	1900	Heavy Snow	N/A	0	0	0	0
35 Scottville	7/5/1994	1851	Thunderstorm Winds	N/A	0	0	0	0
36 Statewide	11/18/1994	0	High Winds	up to 62 kts	0	0	1M	0
37 N Lower	12/16/1994	1900	Heavy Snow	N/A	0	0	0	0
38 Lower MI	1/1/1995	0	Heavy Lake Snow	N/A	0	0	0	0
39 Lower Michigan	1/11/1995	1800	Dense Fog	N/A	0	0	0	0
40 MIZ001	2/3/1995	1800	Heavy Lake Snow	N/A	0	0	0	0
41 MIZ001	2/11/1995	0	Heavy Lake Snow	N/A	0	0	0	0
42 Southern Lower	2/27/1995	100	Ice Storm	N/A	0	0	0	0
43 MIZ001	3/6/1995	0	Heavy Snow	N/A	0	0	0	0
44 Ludington	5/13/1995	2102	Thunderstorm Winds	N/A	0	0	0	0
45 Freesoil	5/13/1995	2125	Thunderstorm Winds	N/A	0	0	0	0
46 Ludington	8/13/1995	1800	Lightning	N/A	0	0	30K	0
47 W Cent Lower	11/27/1995	700	Heavy Snow	N/A	0	0	0	0
48 MIZ037	1/29/1996	7:00 AM	Winter Storm	N/A	0	0	0	0
49 Mason Co Arprt	5/19/1996	2:15 AM	Hail	0.75 in.	0	0	0	0
50 MIZ037	11/10/1996	1:00 AM	Heavy Snow	N/A	0	0	0	0
51 MIZ037	12/25/1996	7:00 PM	Heavy Snow	N/A	0	0	0	0
52 MIZ037	2/21/1997	6:00 AM	Flood	N/A	0	0	0	0
53 Scottville	2/21/1997	10:15 AM	Flash Flood	N/A	0	0	0	0
54 Scottville	4/5/1997	9:20 PM	Tstm Wind	52 kts.	0	0	0	0
55 MIZ037	4/6/1997	4:00 PM	High Wind	0 kts.	0	0	5.0M	0
56 Ludington	9/16/1997	11:15 PM	Tstm Wind	50 kts.	0	0	25K	0
57 Fountain	9/16/1997	11:45 PM	Tstm Wind	0 kts.	0	0	10K	0

58 MIZ037	11/11/1997	9:00 PM	Lake Effect Snow	N/A	0	0	0	0
59 MIZ037	12/4/1997	7:00 PM	Lake Effect Snow	N/A	0	0	0	0
60 MIZ037	12/30/1997	7:00 AM	Lake Effect Snow	N/A	0	0	0	0
61 MIZ037	1/4/1998	12:00 AM	Freezing Rain	N/A	0	0	0	0
62 MIZ037	1/7/1998	5:00 PM	Winter Storm	N/A	0	0	0	0
63 MIZ037	1/22/1998	7:00 PM	Winter Storm	N/A	0	0	0	0
64 MIZ037	3/9/1998	7:00 AM	Blizzard	N/A	0	0	0	0
65 MIZ037	3/10/1998	0	Lake Effect Snow	N/A	0	0	0	0
66 MIZ037	3/13/1998	3:00 PM	Heavy Snow	N/A	0	0	0	0
67 Ludington	5/29/1998	12:00 AM	Tstm Wind	0 kts.	0	0	25K	0
68 Ludington Arpt	5/29/1998	12:06 AM	Tstm Wind	50 kts.	0	0	0	0
69 Ludington	5/31/1998	3:45 AM	Tstm Wind	0 kts.	0	5	1.0M	0
70 Ludington	5/31/1998	3:50 AM	Tstm Wind	68 kts.	0	0	0	0
71 Scottville	5/31/1998	3:55 AM	Tstm Wind	57 kts.	0	0	0	0
72 Hamlin Lake	6/25/1998	8:59 PM	Tstm Wind	63 kts.	0	0	0	0
73 Scottville	6/25/1998	8:59 PM	Tstm Wind	61 kts.	0	0	0	0
74 Walhalla	8/6/1998	5:00 PM	Flash Flood	N/A	0	0	10K	0
75 Ludington	9/26/1998	3:15 AM	Hail	1.00 in.	0	0	0	0
76 MIZ037	11/10/1998	10:00 AM	High Wind	87 kts.	1	0	0	0
77 MIZ037	12/21/1998	1:00 PM	Lake Effect Snow	N/A	0	0	0	0
78 MIZ037	12/29/1998	7:00 PM	Lake Effect Snow	N/A	0	0	0	0
79 MIZ037	1/2/1999	7:00 AM	Blizzard	N/A	0	0	0	0
80 MIZ037	1/3/1999	0	Heavy Snow	N/A	0	0	0	0
81 MIZ037	1/4/1999	0	Snow	N/A	0	0	0	0
82 MIZ037	1/5/1999	9:00 PM	Lake Effect Snow	N/A	0	0	0	0
83 MIZ037	1/8/1999	8:00 AM	Lake Effect Snow	N/A	0	0	0	0
84 MIZ037	1/10/1999	4:00 AM	Winter Storm	N/A	0	0	0	0
85 MIZ037	1/11/1999	0	Snow	N/A	0	0	0	0
86 MIZ037	2/5/1999	7:00 PM	Freezing Rain	N/A	0	0	0	0
87 Ludington	2/11/1999	5:37 PM	Tstm Wind	0 kts.	0	0	10K	0
88 MIZ037	1/3/2000	3:00 PM	Winter Storm	N/A	0	0	0	0
89 MIZ037	1/12/2000	12:00 PM	Winter Storm	N/A	0	0	0	0
90 MIZ037	1/19/2000	4:00 PM	Winter Storm	N/A	0	0	0	0
91 MIZ037	1/25/2000	10:00 AM	Winter Storm	N/A	0	0	0	0
92 Scottville	3/8/2000	8:45 PM	Hail	0.75 in.	0	0	10K	0
93 MIZ037	4/7/2000	12:00 PM	Winter Storm	N/A	0	0	0	0
94 Ludington	6/1/2000	8:24 PM	Tstm Wind	53 kts.	0	0	25K	0
95 Scottville	7/13/2000	8:40 PM	Hail	1.00 in.	0	0	20K	10K
96 Scottville	9/11/2000	10:36 PM	Tstm Wind	53 kts.	0	0	25K	0
97 MIZ037	11/19/2000	6:00 PM	Winter Storm	N/A	0	0	0	0
98 MIZ037	12/5/2000	7:00 PM	Heavy Snow	N/A	0	0	0	0
99 MIZ037	12/11/2000	6:00 AM	Winter Storm	N/A	0	0	0	0
100 MIZ037	12/19/2000	0	Heavy Snow	N/A	0	0	0	0
101 MIZ037	12/20/2000	7:00 PM	Heavy Snow	N/A	0	0	0	0
102 MIZ037	12/23/2000	7:00 AM	Heavy Snow	N/A	0	0	0	0
103 MIZ037	2/7/2001	10:00 PM	Winter Storm	N/A	0	0	0	0
104 Countywide	2/9/2001	9:00 AM	Flood	N/A	0	0	100K	0
105 Countywide	5/15/2001	8:00 AM	Flood	N/A	0	0	25K	25K
106 Countywide	5/15/2001	12:00 AM	Flash Flood	N/A	0	0	50K	50K
107 Countywide	5/16/2001	1:00 AM	Flash Flood	N/A	0	0	50K	50K
108 Countywide	5/16/2001	3:00 AM	Flood	N/A	0	0	25K	25K
109 Scottville	5/17/2001	8:18 PM	Hail	0.88 in.	0	0	10K	10K
110 Walhalla	8/9/2001	4:17 PM	Tstm Wind	53 kts.	0	0	10K	0
111 MIZ037	12/23/2001	3:00 PM	Winter Storm	N/A	0	0	0	0
112 MIZ037	1/16/2002	10:00 AM	Winter Storm	N/A	0	0	0	0
113 MIZ037	2/25/2002	7:00 PM	Winter Storm	N/A	0	0	0	0
114 MIZ037	3/2/2002	1:00 AM	Winter Storm	N/A	0	0	0	0
115 MIZ037	3/9/2002	12:54 PM	High Wind	62 kts.	0	0	485K	0
116 Fountain	4/18/2002	6:55 PM	Tstm Wind	53 kts.	0	0	10K	0
117 Ludington	4/18/2002	10:45 PM	Hail	1.00 in.	0	0	5K	5K
118 Scottville	7/30/2002	10:50 PM	Tstm Wind	53 kts.	0	0	10K	0
119 MIZ037	12/1/2002	10:00 AM	Heavy Snow	N/A	0	0	0	0

120 MIZ037	1/18/2003	10:00 AM	Heavy Snow	N/A	0	0	0	0
121 MIZ037	2/10/2003	4:00 AM	Heavy Snow	N/A	0	0	0	0
122 MIZ037	2/11/2003	10:00 AM	Heavy Snow	N/A	0	0	0	0
123 MIZ037	3/4/2003	6:00 PM	Heavy Snow	N/A	0	0	0	0
124 MIZ037	4/3/2003	10:00 AM	Ice Storm	N/A	0	0	4.9M	0
125 Scottville	7/20/2003	10:15 AM	Tstm Wind	53 kts.	0	0	25K	10K
126 MIZ037	1/14/2004	4:00 AM	Heavy Snow	N/A	0	0	0	0
127 MIZ037	1/18/2004	7:00 AM	Heavy Snow	N/A	0	0	0	0
128 MIZ037	1/27/2004	7:00 AM	Winter Storm	N/A	0	0	0	0
129 MIZ037	5/21/2004	11:32 PM	Flood	N/A	0	0	25.0M	4.6M
130 Freesoil	6/9/2004	02:45 AM	Tstm Wind	53 kts.	0	0	5K	0
131 MIZ037	6/9/2004	05:00 AM	Flood	N/A	0	0	20K	0
132 Ludington	8/27/2004	03:09 AM	Tstm Wind	53 kts.	0	0	10K	0
133 MIZ037	10/30/2004	11:00 AM	High Wind	59 kts.	0	0	1.2M	0
134 MIZ037	12/12/2004	07:00 PM	Heavy Snow	N/A	0	0	0	0
135 MIZ037	12/18/2004	12:00 PM	Heavy Snow	N/A	0	0	0	0
136 MIZ037	12/20/2004	07:00 AM	Heavy Snow	N/A	0	0	0	0
137 MIZ037	1/4/2005	07:00 PM	Heavy Snow	N/A	0	0	0	0
138 MIZ037	1/18/2005	11:00 AM	Heavy Snow	N/A	0	0	0	0
139 MIZ037	2/27/2005	07:00 PM	Heavy Snow	N/A	0	0	0	0
140 Ludington	3/30/2005	08:05 PM	Hail	0.75 in.	0	0	10K	0
TOTALS:					1	13	96.195M	4.785M

*The Storm Events Database contains data from the following sources:

- All Weather Events from 1993 - 1995, as entered into Storm Data. (Except 6/93 - 7/93, which is missing) (NO Latitude/Longitude)
- All Weather Events from 1996 - Current, as entered into Storm Data. (Including Latitude/Longitude)
- Additional data from the Storm Prediction Center including: Tornadoes 1950-1992, Thunderstorm Winds 1955-1992, and Hail 1955-1992

National Climatic Data Center: Storm Events

04/01/2005 through 02/28/2014 ♦ 85 events reported for Mason County

Location or Zone (zone indicates multiple counties)	Date	Duration	Type	Magnitude	Death	Injury	Damage (\$)		Notes
							property	crop	
Freesoil	7/24/05	<1 day	Thunderstorm Wind	61 mph	0	0	40k	0	Trees, limbs, and power lines downed. A few trees downed onto houses.
Scottville	7/24/05	<1 day	Thunderstorm Wind	61 mph	0	0	20k	0	Trees, limbs, and power lines downed. A few trees downed onto houses.
Wiley	7/26/05	<1 day	Thunderstorm Wind	61 mph	0	0	25k	0	Trees, limbs, and power lines downed across the area.
Scottville	7/26/05	<1 day	Thunderstorm Wind	61 mph	0	0	20k	0	Trees, limbs, and power lines downed across the area.
Ludington	8/4/05	<1 day	Thunderstorm Wind	61 mph	0	0	5k	0	Trees downed 6 mi SE of Ludington
Scottville	9/13/05	<1 day	Thunderstorm Wind	61 mph	0	0	20k	0	Trees and power lines downed
Mason County (zone)	1/20/06	1 day	Heavy Snow	6-10" snow	0	0	0	0	
Mason County (zone)	2/16/06	1 day	Heavy Snow	6-8" snow	0	0	0	0	
Walhalla	7/9/06	<1 day	Thunderstorm Wind	60 mph	0	0	10k	0	Trees down on wires near intersection of US 10 and Schoenherr Rd
Ludington	7/17/06	<1 day	Thunderstorm Wind	60 mph	0	0	25k	5k	Numerous trees down along Lake MI shoreline
Mason County	8/2/06	<1 day	Thunderstorm Wind	60 mph	0	0	20k	0	Several trees down across southern Mason Co
Hamlin Township	10/3/06	<1 day	Hail	.75"	0	0	15k	15k	Reported at Ludington State Park
Northern Mason Co.	10/4/06	<1 day	Thunderstorm Wind	61 mph	0	0	50k	10k	Widespread wind damage (downed trees) across northern Mason County
Mason County	10/4/06	<1 day	Thunderstorm Wind	60 mph	0	0	30k	10k	Several trees and power lines downed across Mason County
Mason County (zone)	12/1/06	1 day	Heavy Snow	9-12" snow	0	0	0	0	

Mason County (zone)	12/4/06	1 day	Lake Effect Snow	6-8" snow	0	0	0	0	
Mason County (zone)	12/6/06	1 day	Lake Effect Snow	8-12" snow	0	0	0	0	
Mason County (zone)	2/2/07	2 days	Blizzard	up to 6" snow	0	0	0	0	Blizzard conditions caused numerous road closures, power outages, and car accidents
Mason County	6/7/07	<1 day	Thunderstorm Wind	58 mph	0	0	2k	0	Two trees downed in western Mason County
Mason County	6/8/07	<1 day	Thunderstorm Wind	58 mph	0	0	10k	0	Several trees downed across Mason County
Fountain	6/18/07	<1 day	Thunderstorm Wind	58 mph	0	0	10k	0	Several trees downed in Fountain
Mason County (zone)	12/23/07	1 day	Winter Storm	6-8" snow	0	0	0	0	
Mason County (zone)	12/28/07	1 day	Heavy Snow	6-8" snow	0	0	0	0	
Mason County (zone)	1/10/08	1 day	Winter Storm	6-7" snow	0	0	0	0	
Mason County (zone)	1/23/08	1 day	Winter Storm	6-10" snow	0	0	0	0	
Mason County (zone)	1/29/08	1 day	Winter Storm	4-7" snow	0	0	0	0	Blizzard to near blizzard conditions
Mason County (zone)	2/6/08	1 day	Winter Storm	12" snow	0	0	0	0	Near blizzard conditions
Mason County (zone)	2/14/08	1 day	Winter Storm	up to 12" snow	0	0	0	0	
Mason County (zone)	2/18/08	2 days	Lake Effect Snow	10-15" snow	0	0	0	0	
Mason County	4/25/08	<1 day	Thunderstorm Wind	60 mph	0	0	20k	0	Several trees blown down across county, mainly north of US 10. Gust measured at Mason Co Arpt
Grant Township	6/12/08	<1 day	Tornado	EF1	0	0	0	0	Tornado struck the Nordhouse Dunes region of the Manistee National Forest
Freesoil	6/12/08	<1 day	Thunderstorm Wind	70 mph	0	0	0	0	Part of the roof of a convenience store blown off and several trees were uprooted
Mason County	6/12/08	<1 day	Thunderstorm Wind	70 mph	0	0	0	0	Several trees and power lines downed in the Ludington and Hamlin Lake areas
Mason County	6/13/08	1 day	Flash Flood	~11" rain in 8hr	0	0	3m	500k	Presidential Disaster Declaration for flooding; extensive damage to public infrastructure
Hamlin Township	6/14/08	<1 day	Hail	1.00"	0	0	0	0	Measured near Twin Bridges near Hamlin Lake
Custer	6/14/08	<1 day	Hail	1.00"	0	0	0	0	
Hamlin Township	6/28/08	<1 day	Thunderstorm Wind	59 mph	0	0	0	0	Gust measured at Big Sable GLERL observation site
Mason County (zone)	11/20/08	1 day	Lake Effect Snow	8" snow	0	0	0	0	
Mason County (zone)	11/30/08	1 day	Winter Storm	4-9" snow	0	0	0	0	
Mason County (zone)	12/6/08	1 day	Winter Storm	6-10" snow	0	0	0	0	
Mason County (zone)	12/8/08	1 day	Winter Storm	10-16" snow	0	0	0	0	
Mason County (zone)	12/19/08	1 day	Winter Storm	6-9" snow	0	0	0	0	
Mason County (zone)	12/20/08	1 day	Winter Storm	6-10" snow	0	0	0	0	Wind gusts up to 45 mph
Mason County (zone)	12/23/08	2 days	Winter Storm	6-10" snow	0	0	0	0	
Mason County (zone)	12/28/08	1 day	High Wind	60 mph	0	0	0	0	Several trees and power lines blown down
Mason County (zone)	1/17/09	1 day	Winter Storm	up to 15" snow	0	0	0	0	
Mason County	2/21/09	1 day	Winter Storm	8" snow	0	0	0	0	

(zone)									
Mason County (zone)	12/8/09	1 day	Winter Storm	10-12" snow	0	0	0	0	Snow accompanied by 40 mph wind gusts
Mason County (zone)	12/24/09	1 day	Winter Weather	.1-.25" ice	0	0	0	0	
Mason County (zone)	1/1/10	2 days	Lake Effect Snow	12-16" snow	0	0	0	0	
Mason County (zone)	2/23/10	1 day	Lake Effect Snow	12" snow	0	0	0	0	
Riverton Township	9/21/10	<1 day	Hail	1.00"	0	0	0	0	Reported 2 mi NE of Summit Township
Mason County	10/27/10	<1 day	High Wind	71 mph	0	0	0	0	Gust measured at Big Sable GLERL observation site; 60 mph gusts measured inland
Mason County (zone)	12/5/10	3 days	Lake Effect Snow	18-24" snow	0	0	0	0	
Mason County (zone)	1/3/11	1 day	Winter Weather	4.8" snow	0	0	0	0	
Mason County (zone)	1/7/11	1 day	Lake Effect Snow	6-12" snow	0	0	0	0	
Mason County (zone)	1/22/11	1 day	Winter Weather	3-6" snow	0	0	0	0	
Mason County (zone)	2/1/11	1 day	Winter Storm	6-12" snow	0	0	0	0	Snow accompanied by 50 mph wind gusts
Mason County (zone)	2/20/11	1 day	Winter Storm	6-8" snow	0	0	0	0	
Mason County (zone)	3/22/11	1 day	Winter Storm	2-4" snow, 1" sleet	0	0	0	0	
Wiley	9/29/11	<1 day	Hail	.75	0	0	0	0	5 mi S of Scottville
Freesoil	10/25/11	<1 day	Hail	.75	0	0	0	0	5 mi NW of Freesoil
Mason County (zone)	1/1/12	2 days	Lake Effect Snow	6" snow	0	0	0	0	
Mason County (zone)	1/12/12	2 days	Winter Storm	8-12" snow	0	0	0	0	
Mason County (zone)	3/2/12	1 day	Heavy Snow	6.8" snow	0	0	0	0	
Mason County	5/3/12	1 day	Flash Flood	5-7" rain	0	0	75k	0	Barnett Rd washed out in Branch Township
Scottville	5/3/12	<1 day	Hail	1.75"	0	0	25k	0	
Branch Township	5/3/12	<1 day	Hail	1.00"	0	0	0	0	
Ludington	5/3/12	<1 day	Hail	.75"	0	0	0	0	
Ludington	7/25/12	<1 day	Thunderstorm Wind	66 mph	0	0	25k	0	Many trees and power lines blown down
Hamlin Township	8/2/12	<1 day	Thunderstorm Wind	60-70 mph	0	0	100k	0	Downed trees at Ludington State Park caused damage to camper trailers, vehicles, and buildings
Ludington	9/17/12	<1 day	Thunderstorm Wind	60 mph	0	0	0	0	Trees downed in Pere Marquette and Riverton townships
Mason County (zone)	10/30/12	<1 day	High Wind	60 mph	0	0	0	0	Healthy trees blown down
Mason County (zone)	12/20/12	2 days	Winter Storm	6-10" snow, 60 mph	0	0	0	0	Scattered power outages
Mason County (zone)	1/21/13	2 days	Lake Effect Snow	12" snow, 57 mph	0	0	0	0	
Mason County (zone)	2/1/13	2 days	Lake Effect Snow	>12" snow	0	0	0	0	Moderate travel impacts and scattered power outages
Mason County (zone)	2/15/13	2 days	Lake Effect Snow	10-16" snow	0	0	0	0	
Mason County (zone)	2/19/13	2 days	Winter Weather	6-8" snow	0	0	0	0	

Mason County (zone)	4/17/13	6 days	Flood		0	0	3m	0	Significant flooding due to rain from early to mid-April
Hamlin Lake	8/7/13	<1 day	Thunderstorm Wind	61 mph	0	0	50k	0	
Riverton Twp	8/27/13	<1 day	Thunderstorm Wind	64 mph	0	0	25k	0	Multiple large trees down near Wiley
Mason County (zone)	11/17/13	<1 day	High Wind	70 mph	0	0	75k	0	60-70 mph wind gusts caused numerous power outages
Mason County (zone)	1/22/14	1 day	Heavy Snow	6" snow	0	0	0	0	
Mason County (zone)	1/24/14	1 day	Heavy Snow	9" snow	0	0	0	0	
Mason County (zone)	2/17/14	<1 day	Heavy Snow	7" snow	0	0	0	0	

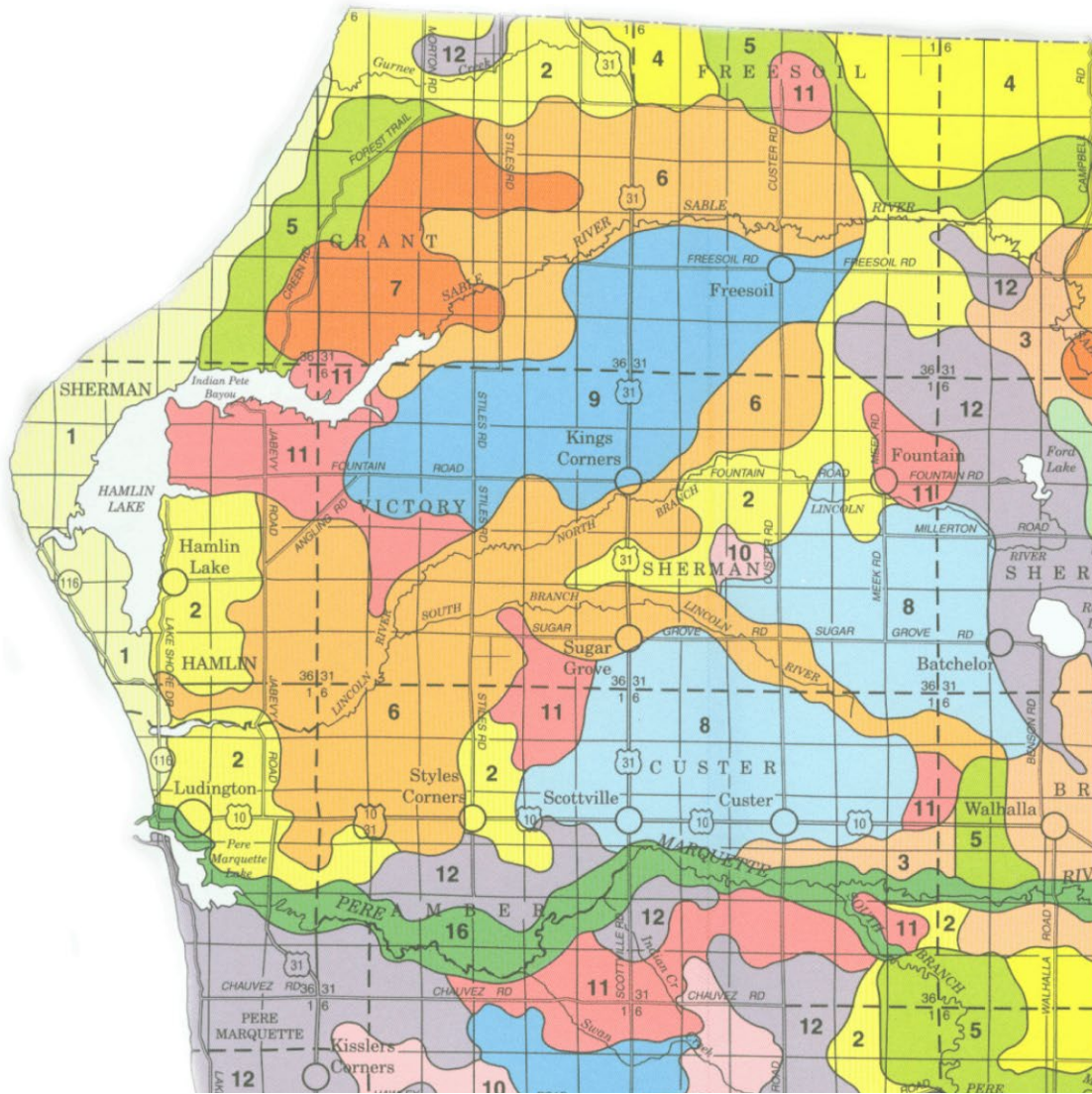
National Climatic Data Center: Storm Events
03/1/14 through 02/28/23 * 39 events reported for Mason County

LOCATION or ZONE (zone implies multiple counties)	DATE	DURATION	TYPE	MAGNITUDE	DEATHS	INJURY	DAMAGE (\$)		NOTES
							property	crop	
BASS LAKE	4/12/14	<1 day	Thunderstorm Wind	80 mph	0	0	500k	0	Downed trees, buildings/homes damaged in Summit and Riverton twps
HAMLIN LAKE	6/17/14	<1 day	Thunderstorm Wind	58 mph	0	0	0	0	A 58 mph wind gust was measured
CUSTER	6/30/14	<1 day	Thunderstorm Wind	60 mph	0	0	15k	0	Several trees blown down across Mason Co
MASON (ZONE)	11/17/14	5 days	Lake-Effect Snow		0	0	0	0	Up to 16-20 inches of snow
MASON (ZONE)	1/8/15	2 days	Heavy Snow		0	0	0	0	10-12 inches of snow
MASON (ZONE)	2/13/15	2 days	Winter Storm		0	0	0	0	10-12 inches of snow, some roads near Lake MI shoreline drifted shut
LUDINGTON	10/15/15	<1 day	Thunderstorm Wind	60 mph	0	0	10k	0	Downed trees and power lines and 7/8" hail
MASON (ZONE)	12/29/15	1 day	Sleet		0	0	0	0	3-4 inches of sleet mixed with snow
MASON (ZONE)	1/9/16	5 days	Lake-Effect Snow		0	0	0	0	12-18 inches of snow
MASON (ZONE)	3/23/16	2 days	Winter Storm		0	0	0	0	5.5 inches of snow measured near Scottville
MASON (ZONE)	12/8/16	3 days	Lake-Effect Snow		0	0	0	0	6-10 inches of lake effect snow
MASON (ZONE)	3/8/17	1 day	High Wind	55 mph	0	0	5m	0	Downed trees and power lines, widespread power outages
FOUNTAIN	4/20/17	<1 day	Thunderstorm Wind	65 mph	0	0	25k	0	Measured 65 mph gust, downed high voltage line cut power to Ludington
MASON (ZONE)	4/14/18	2 days	Winter Storm		0	0	100k	0	Late season storm, 1-2 inches of sleet
LUDINGTON	7/1/18	<1 day	Thunderstorm Wind	60 mph	0	0	10k	0	Downed trees
E of Ludington	8/28/18	<1 day	Thunderstorm Wind	60 mph	0	0	5k	0	Downed trees
Mason County	8/28/18	<1 day	Thunderstorm Wind	80 mph	0	0	150k	0	Wind gusts near 80 mph brought down several trees and power poles
MASON (ZONE)	1/28/19	1 days	Winter Storm		0	0	0	0	12-16 inches of snow
MASON (ZONE)	1/29/19	1 days	Lake-Effect Snow		0	0	0	0	6-12 inches of snow, wind chills 20-40 below zero
MASON (ZONE)	2/24/19	1 days	Blizzard		0	0	0	0	Blizzard conditions with wind gusts near 50 mph
VICTORY TWP	5/31/19	<1 day	Thunderstorm Wind	60 mph	0	0	1k	0	Tree down on Sugar Grove road.
WALHALLA	7/19/19	<1 day	Thunderstorm Wind	70 mph	0	0	250k	0	Downed trees
MILLERTON	7/19/19	<1 day	Thunderstorm Wind	60 mph	0	0	50k	0	downed trees in Sheridan and Branch twps
FREESOIL	7/20/19	1 day	Flood		0	0	500k	0	6-10 inches of rain; road washouts, culvert failures and bridge washouts
MASON (ZONE)	11/11/19	1 days	Lake-Effect Snow		0	0	0	0	Up to 12 inches of snow
MASON (ZONE)	12/1/19	1 day	Winter Storm		0	0	50k	0	Up to 12 inches of snow, .25 inches freezing rain, power outages

SCOTTVILLE	6/2/20	<1 day	Thunderstorm Wind	60 mph	0	0	25k	0	Downed trees and power lines across Mason Co
FOUNTAIN	7/19/20	<1 day	Thunderstorm Wind	60 mph	0	0	10k	0	Downed trees
HAMLIN LAKE LAKE	8/27/20	<1 day	Thunderstorm Wind	69 mph	0	0	0	0	A 69 mph gust measured at Big Sable Point
LUDINGTON ARPT	11/10/20	<1 day	Thunderstorm Wind	60 mph	0	0	100k	0	Downed trees across Mason Co
BASS LAKE	8/10/21	<1 day	Thunderstorm Wind	60 mph	0	0	50k	0	Downed trees and power lines across Mason Co
LUDINGTON	8/24/21	<1 day	Thunderstorm Wind	60 mph	0	0	5k	0	Downed trees
FERN	9/7/21	<1 day	Hail	2.5 in	0	0	100k	0	Large hail across Mason Co
MASON (ZONE)	12/11/21	1 day	High Wind	65 mph	0	0	0	0	A 65 mph peak wind gust occurred at Stony Lake
MASON (ZONE)	12/16/21	1 day	High Wind	59 mph	0	0	0	0	A 59 mph peak wind gust was recorded at Big Sable Point
MASON (ZONE)	1/5/22	2 days	Winter Storm		0	0	0	0	8-12 inches of snow
MASON (ZONE)	11/12/22	2 days	Lake-Effect Snow		0	0	0	0	Up to 10 inches of snow
MASON (ZONE)	11/17/22	4 days	Winter Storm		0	0	0	0	6-8 inches of snow
MASON (ZONE)	12/22/22	3 days	Blizzard		0	0	0	0	Blizzard conditions, 8-12 inches of snow, 45-55 mph gusts

GENERAL SOILS MAP

Mason County



<p>AREAS OF NEARLY LEVEL TO VERY STEEP, EXCESSIVELY DRAINED TO MODERATELY WELL DRAINED, SANDY SOILS AND AREAS OF DUNE LAND</p>		<p>NEARLY LEVEL TO VERY STEEP, EXCESSIVELY DRAINED, WELL DRAINED, AND SOMEWHAT POORLY DRAINED SOILS</p>	
1	Dune land-Northouse-Quartzsammets association	10	Perrinton-Ithaca association
2	Grattan-Epworth association	11	Fern-Marlette association
3	Plainfield-Coloma association	12	Coloma-Spinks-Fern association
4	Typic Udipsammets association	13	Alfic Haploorthods, sandy-Entic Haploorthods, sandy-Haplic Glossudalls, fine-loamy association
5	Entic Haploorthods, sandy association	NEARLY LEVEL, VERY POORLY DRAINED AND POORLY DRAINED SOILS	
NEARLY LEVEL AND UNDULATING, POORLY DRAINED TO EXCESSIVELY DRAINED, SANDY SOILS ON OUTWASH PLAINS AND LAKE PLAINS		14	Medisaprists-Mollic Psammaquents association
6	Covert-Pipestone-Saugatuck association	15	Kingsville-Adrian association
7	Entic Haploorthods, sandy-Aeric Haplaquods, sandy Aquic-Udipsammets association	16	Kerston-Carlisle-Glendorra association
NEARLY LEVEL AND UNDULATING, SOMEWHAT POORLY DRAINED, SANDY AND LOAMY SOILS			
8	Ithaca-Arkona association		
9	Capac-Wixom association		

Source: USDA/Mich.Dept.Agr.(issued September, 1995)

MASON COUNTY DAMS

The National Inventory of Dams (NID) identifies four dams within Mason County. Two of the dams are classified “high” hazard potential and the remaining two are “low” hazard potential. FEMA dam hazard potential classes are defined as the following:

LOW HAZARD POTENTIAL

Dams assigned the low hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner’s property.

SIGNIFICANT HAZARD POTENTIAL

Dams assigned the significant hazard potential classification are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.

HIGH HAZARD POTENTIAL

Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life.

NAME	LOCATION	HAZARD POTENTIAL
Whiskey Creek Dam No. 2	Eden Township	LOW
West Shore Community College	Victory Township	
None	N/A	SIGNIFICANT
Hamlin Lake Dam	Hamlin Township	HIGH
Ludington Pumped Storage Plant	Pere Marquette Township	

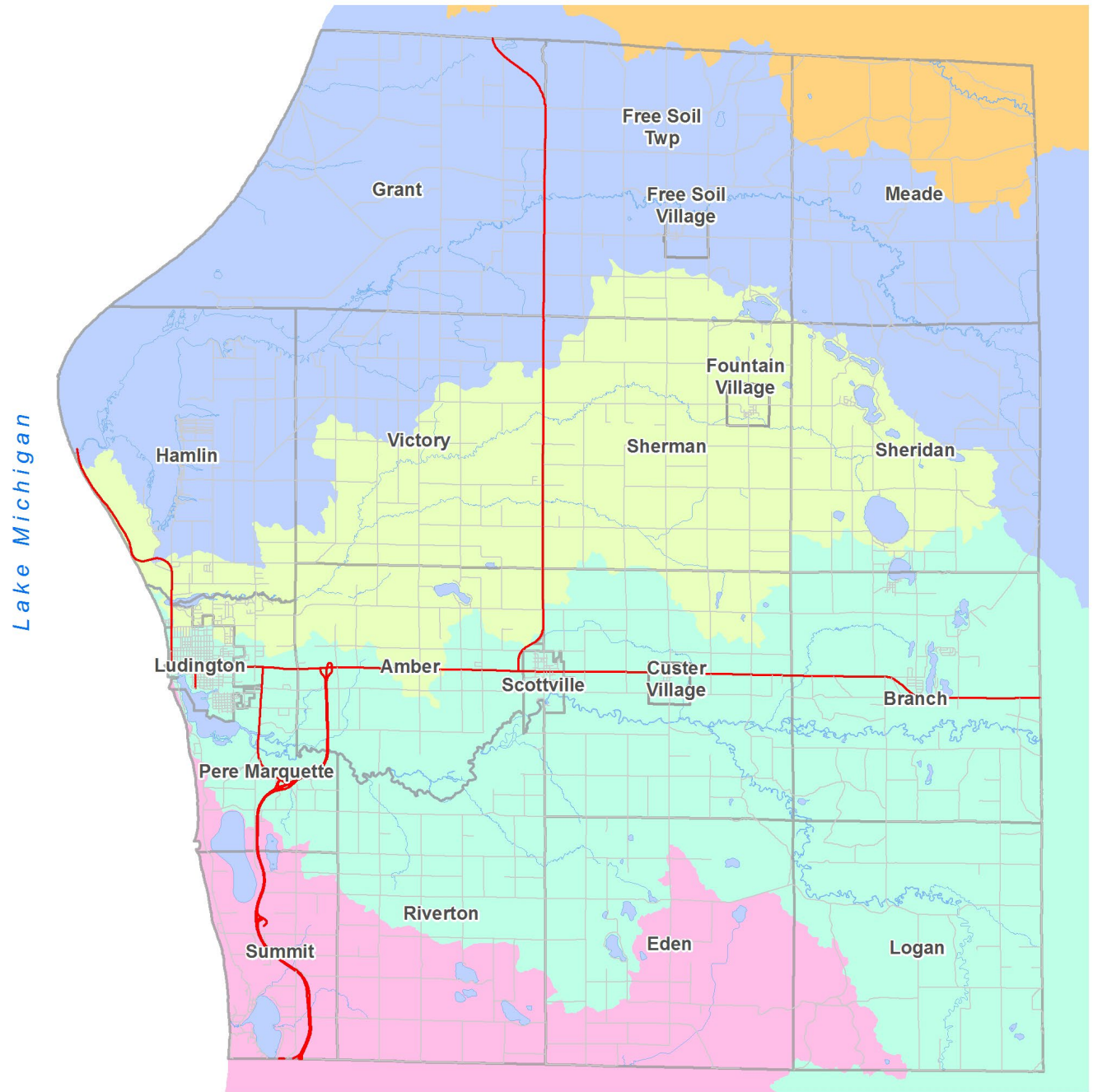
Source: National Inventory of Dams, US Army Corps of Engineers, 2023.

In addition to the dams listed above, the county has many dams that are not in the NID yet are worthy of mention.

Dam Name	Location
Brookside Cemetery Dam	Amber Township
Gun Lake Outlet Control Structure	Sherman Township
Hall Dam	Branch Township
West Riverton Cemetery Dam	Riverton Township
Bass Lake Dam	Summit Township
Nickelson Pond Dam	Amber Township
Weinert Dam #1	Victory Township
Romeo and Juliet Lakes	Branch Township
Gallie Dam	Victory Township
Evans Dam	Victory Township

Source: Michigan Dam Inventory 2023

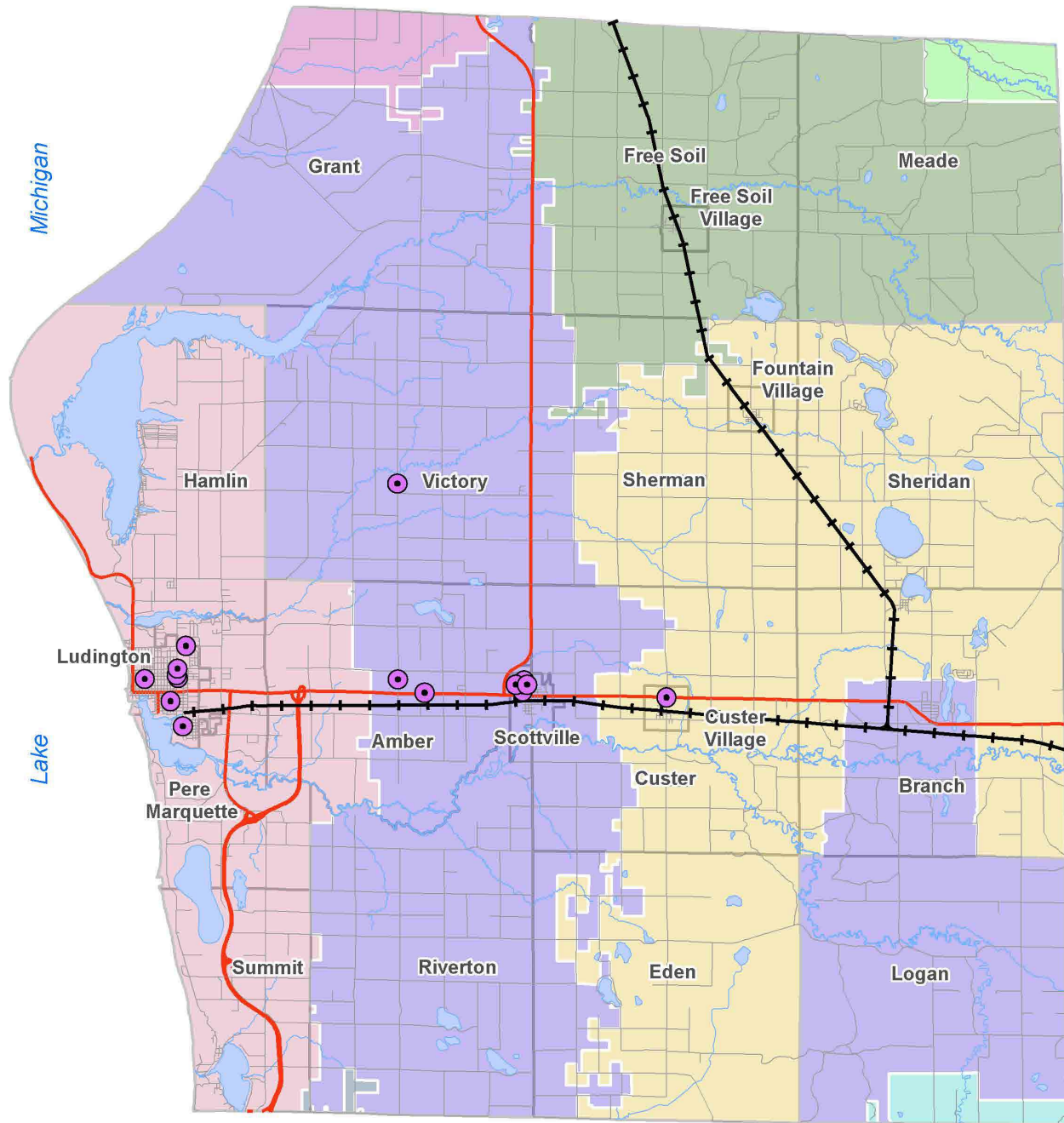
MASON COUNTY Watersheds



WMSRDC
WEST MICHIGAN SHORELINE
REGIONAL DEVELOPMENT COMMISSION

Source: Michigan Geographic Data Library
United States Geological Survey, Mason
Co. Hazard Mitigation Update 2015

MASON COUNTY School Districts



● School

Free Soil Community Schools

Kaleva Norman Dickson S/D

Ludington Area School District

Manistee Area Schools

Mason County Central Schools

Mason County Eastern Schools

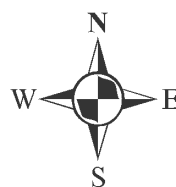
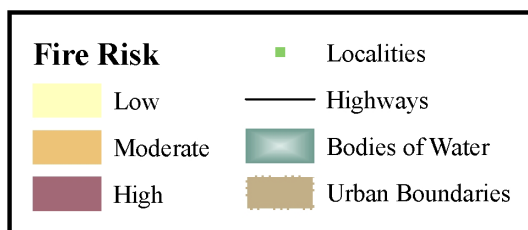
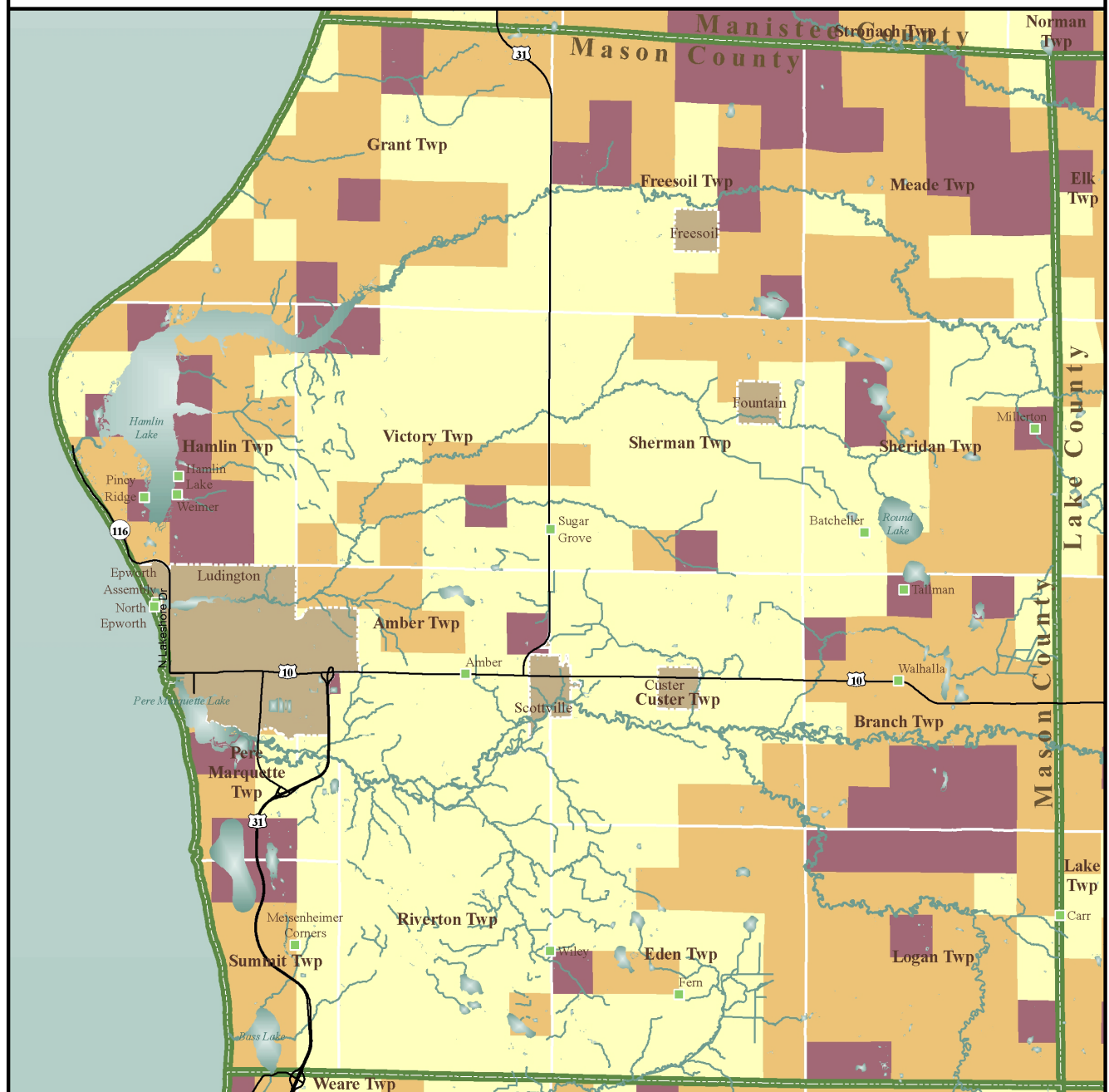
Pentwater Public School District

Walkerville Rural Community S/D

WASRDC
WEST MICHIGAN ARCHITECTURAL
REGIONAL DEVELOPMENT COMMISSION

Source: Michigan Geographic Data Library
United States Geological Survey, Mason Co
Hazard Mitigation Plan Update 2014

Fire Management - Communities at Risk



0 1.6
Miles



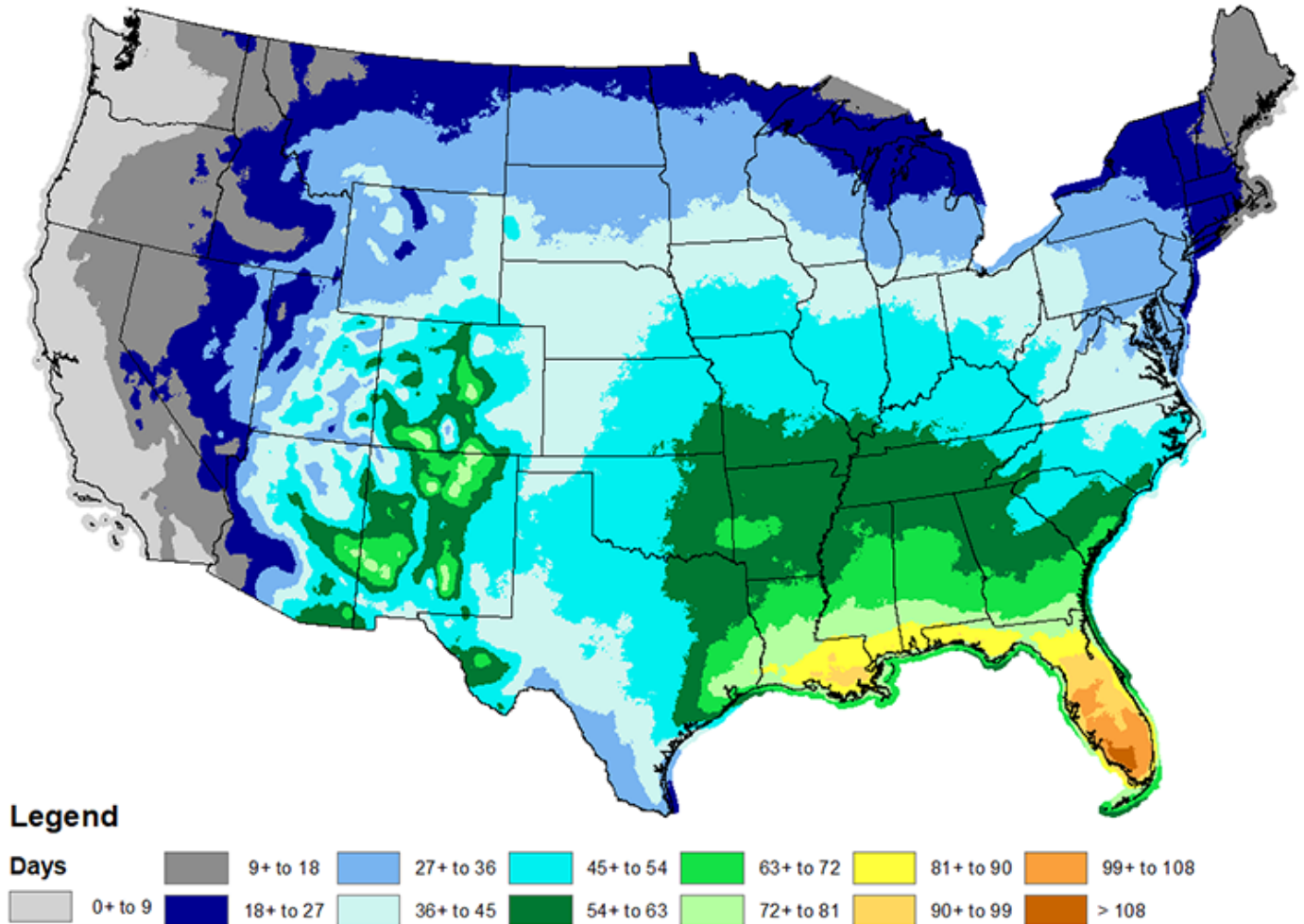
Mason County

Map and Analysis by Remote Sensing & GIS Research and Outreach Services
<http://www.rsgis.msu.edu>

Number of Wildfires and Acres Burned, by County: 1981-2018 (MDNR jurisdiction only) Source: MDNR/FRD

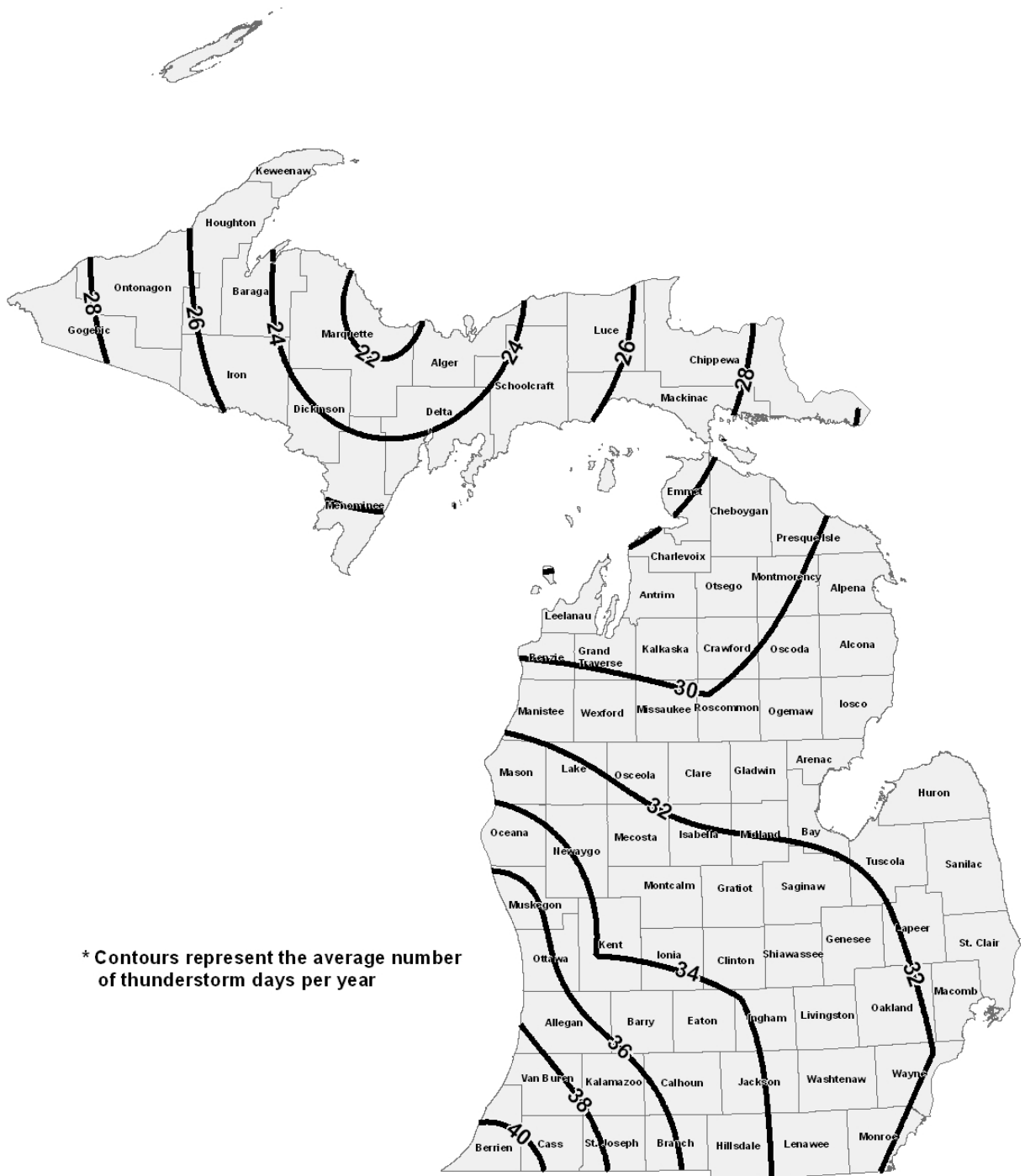
<i>County</i>	<i>Number of Fires</i>	<i>Number of Wildfires/Year</i>	<i>Number of Acres Burned</i>	<i>Acres Burned/Year</i>
Alcona	257	6.8	1,567.6	41.3
Alger	64	1.7	201.2	5.3
Allegan	125	3.3	594.6	15.6
Alpena	281	7.4	441.6	11.6
Antrim	256	6.7	285.3	7.5
Arenac	183	4.8	703.7	18.5
Baraga	74	1.9	1,936.6	51.0
Barry	125	3.3	613.1	16.1
Bay	24	0.6	180.7	4.8
Benzie	184	4.8	396.8	10.4
Berrien	12	0.3	25.9	0.7
Branch	9	0.2	173.9	4.6
Calhoun	11	0.3	45.3	1.2
Cass	3	0.1	27.0	0.7
Charlevoix	173	4.6	522.2	13.7
Cheboygan	828	21.8	1,571.4	41.4
Chippewa	474	12.5	5,916.4	155.7
Clare	1,019	26.8	2,647.8	69.7
Clinton	29	0.8	142.7	3.8
Crawford	1,291	34.0	32,506.0	855.4
Delta	620	16.3	3,393.7	89.3
Dickinson	560	14.7	2,547.6	67.0
Eaton	3	0.1	0.3	0.0
Emmet	377	9.9	649.6	17.1
Genesee	1	0.0	0.1	0.0
Gladwin	587	15.4	2,161.3	56.9
Gogebic	120	3.2	254.9	6.7
Grand Traverse	435	11.4	1,484.2	39.1
Gratiot	3	0.1	42.7	1.1
Hillsdale	2	0.1	23.0	0.6
Houghton	192	5.1	1,211.9	31.9
Huron	30	0.8	982.5	25.9
Ingham	18	0.5	479.0	12.6
Ionia	35	0.9	765.8	20.2
Iosco	144	3.8	1,782.8	46.9
Iron	324	8.5	2,041.2	53.7
Isabella	144	3.8	1,782.8	46.9
Jackson	38	1.0	562.0	14.8
Kalamazoo	19	0.5	125.3	3.3
Kalkaska	627	16.5	3,200.4	84.2
Kent	28	0.7	213.5	5.6
Keweenaw	63	1.7	381.9	10.1
Lake	355	9.3	1,541.8	40.6
Lapeer	67	1.8	629.4	16.6
Leelanau	60	1.6	267.6	7.0
Lenawee	30	0.8	224.2	5.9
Livingston	93	2.4	812.1	21.4
Luce	254	6.7	39,821.3	1,047.9
Mackinac	226	5.9	1,695.9	44.6
Macomb	7	0.2	15.4	0.4
Manistee	54	1.4	1,070.7	28.2
Marquette	1,018	26.8	16,607.2	437.0
Mason	38	1.0	206.2	5.4
Mecosta	227	6.0	1,039.7	27.4
Menominee	745	19.6	2,615.8	68.8
Midland	560	14.7	1,596.3	42.0
Missaukee	406	10.7	1,884.9	49.6
Monroe	7	0.2	658.4	17.3
Montcalm	40	1.1	640.2	16.8
Montmorency	645	17.0	1,371.7	36.1
Muskegon	299	7.9	2,944.9	77.5
Newaygo	74	1.9	548.9	14.4
Oakland	57	1.5	399.9	10.5
Oceana	427	11.2	1,983.6	52.2
Ogemaw	646	17.0	9,480.1	249.5
Ontonagon	100	2.6	1,509.0	39.7
Osceola	466	12.3	1,192.4	31.4
Oscoda	309	8.1	8,872.9	233.5
Otsego	1,110	29.2	2,123.2	55.9
Ottawa	152	4.0	494.3	13.0
Presque Isle	378	9.9	968.6	25.5
Roscommon	691	18.2	4,667.4	122.8
Saginaw	21	0.6	478.6	12.6
Sanilac	49	1.3	453.7	11.9
Schoolcraft	390	10.3	6,770.9	178.2
Shiawassee	82	2.2	618.5	16.3
St. Clair	114	3.0	1,758.1	46.3
St. Joseph	4	0.1	20.3	0.5
Tuscola	126	3.3	1,355.0	35.7
Van Buren	42	1.1	259.4	6.8
Washtenaw	20	0.5	249.1	6.6
Wayne	2	0.1	42.2	1.1
Wexford	467	12.3	1,199.1	31.6

Annual Mean Thunderstorm Days (1993-2018)



Source: National Oceanic and Atmospheric Administration

Thunderstorm Hazards



* Contours represent the average number of thunderstorm days per year

Produced by:
Michigan State Police
Emergency Management and Homeland Security Division
January 2011



WIND ZONES IN THE UNITED STATES*

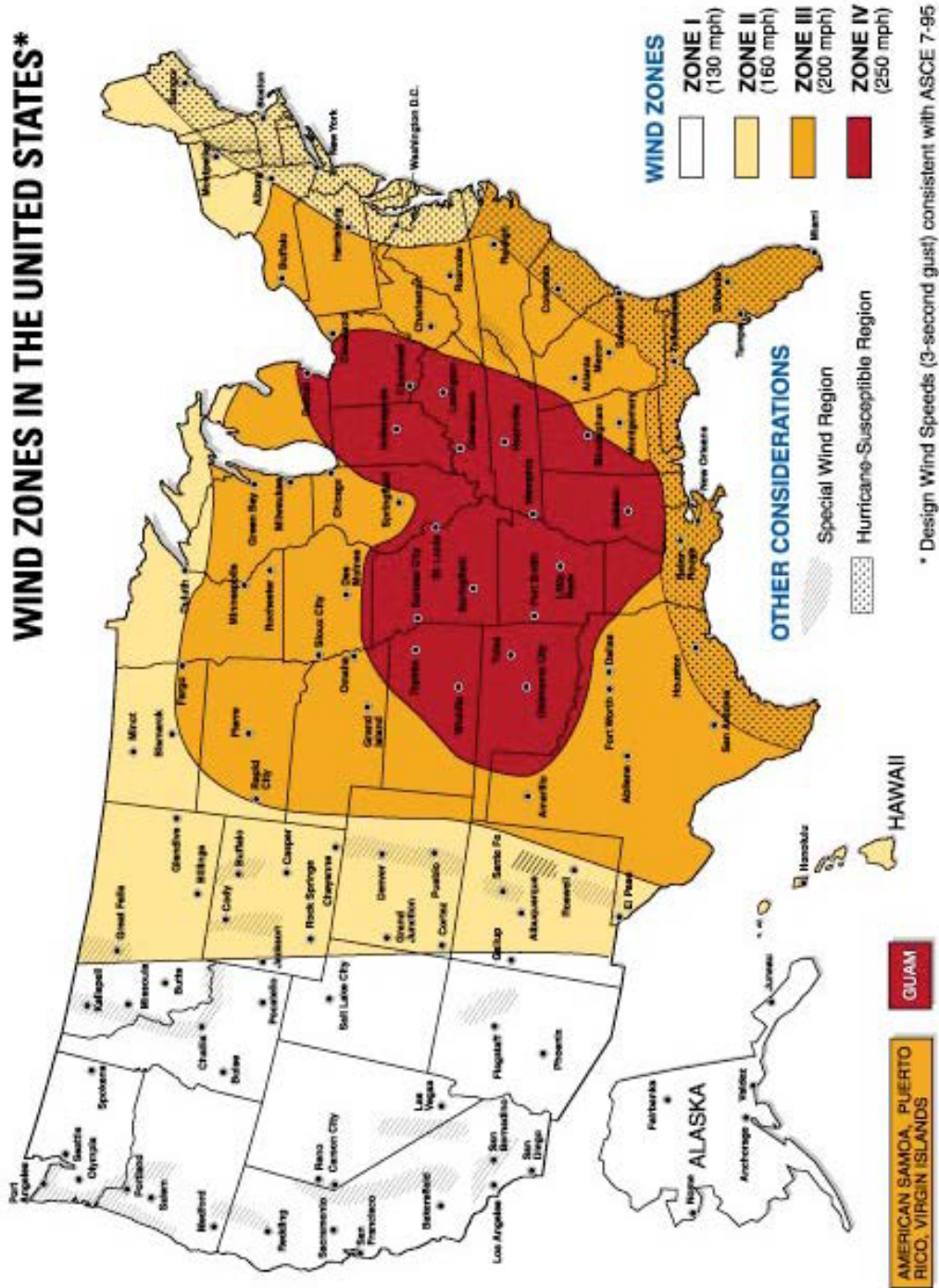


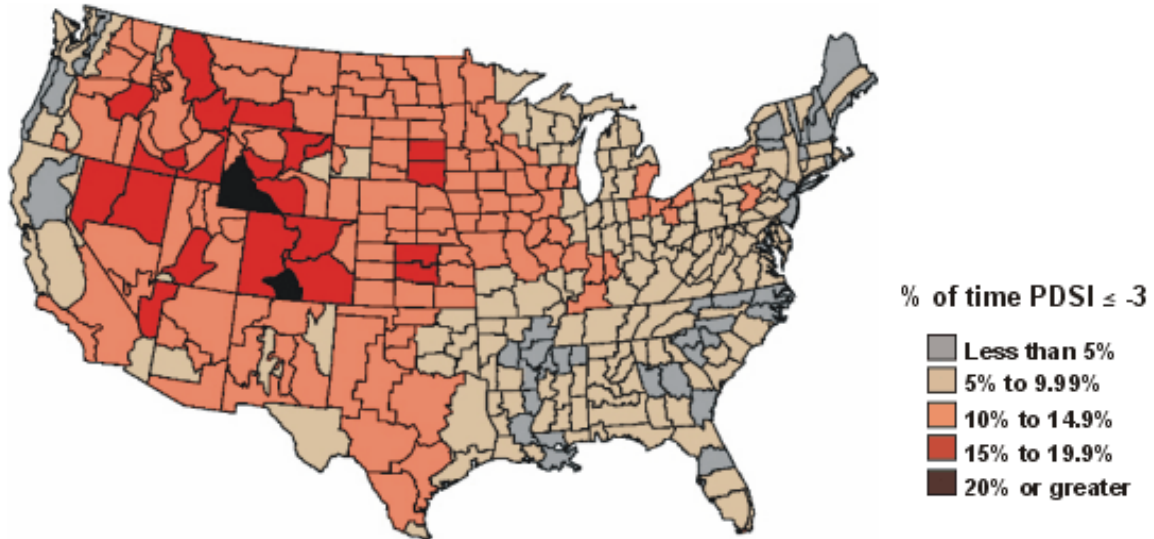
Figure L2 Wind zones in the United States

Source: Federal Emergency Management Agency

Palmer Drought Severity Index

1895–1995

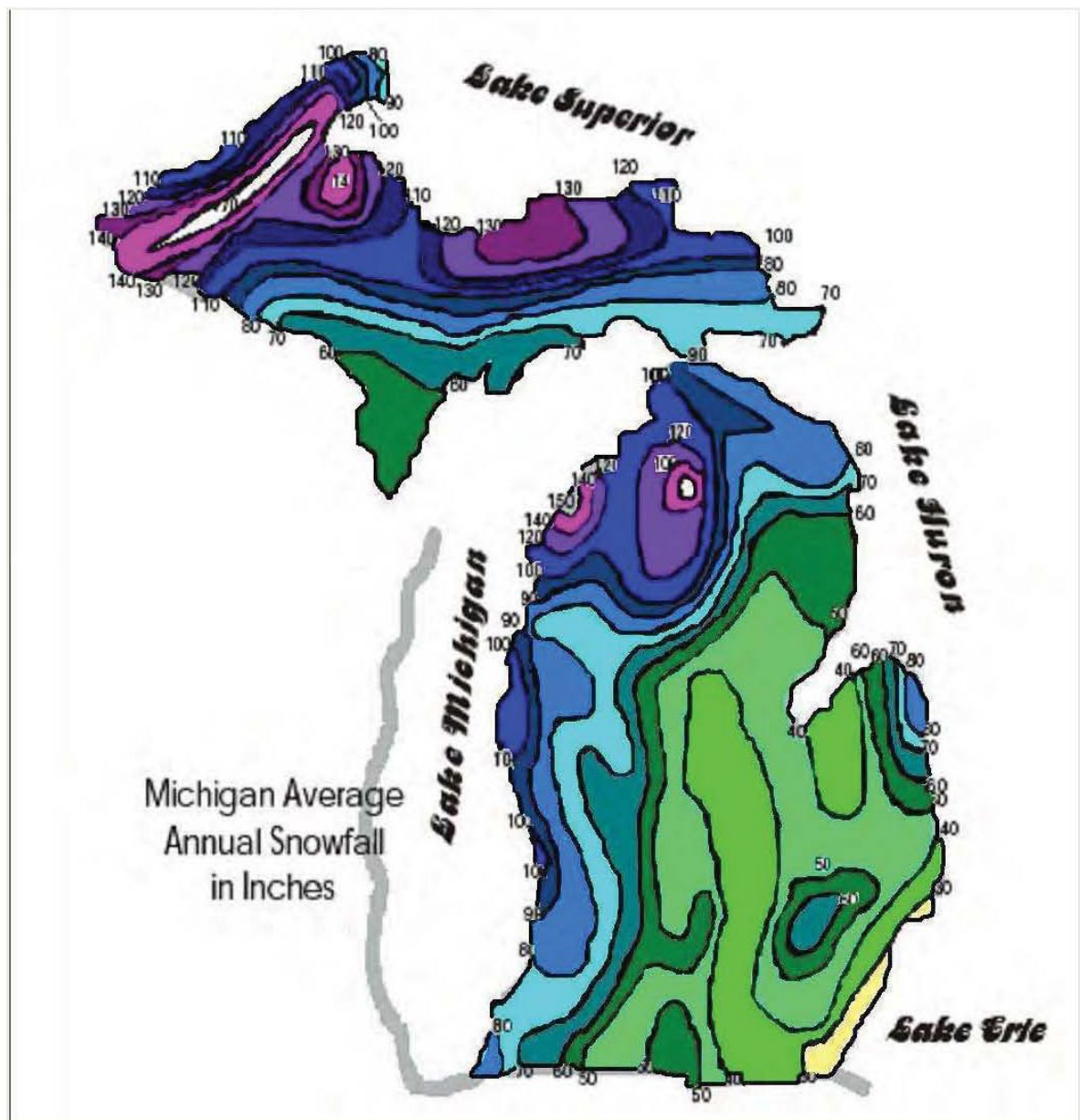
Percent of time in severe and extreme drought



SOURCE: McKee et al. (1993); NOAA (1990); High Plains Regional Climate Center (1996)
Albers Equal Area Projection; Map prepared at the National Drought Mitigation Center

Michigan Average Annual Snowfall

Source: Michigan Committee for Severe Weather Awareness



MICHIGAN FATAL FIRE STATISTICS

State of Michigan FY2022

111 TOTAL DEATHS

 **95** TOTAL FIRES

GENDER



66%
MALE



33%
FEMALE

1% not reported

AGES



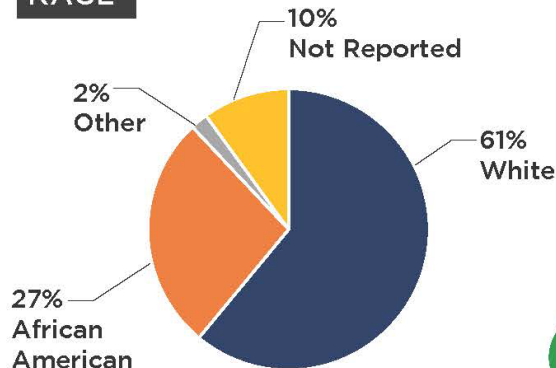
68% OF VICTIMS were between the ages of 50 and 89

17% OF VICTIMS were between the ages of 0 and 19

THE TOP AGE GROUPS OF VICTIMS WERE

60-69 | 70-79

RACE



25% of victims were reported as disabled



10% of victims were on oxygen

TIME



6pm - 6am **62%**



6am - 6pm **38%**

DAYS

Most fatal fires occurred on

Monday
24%

Tuesday
17%

Wednesday
15%

TOP FATAL FIRE CAUSES



SMOKING
46%



ELECTRICAL
13%



COOKING
11%

TOP AREAS OF ORIGIN



LIVING ROOM
40%



BEDROOM
19%



ALARM STATUS IN HOME

YES **23%**

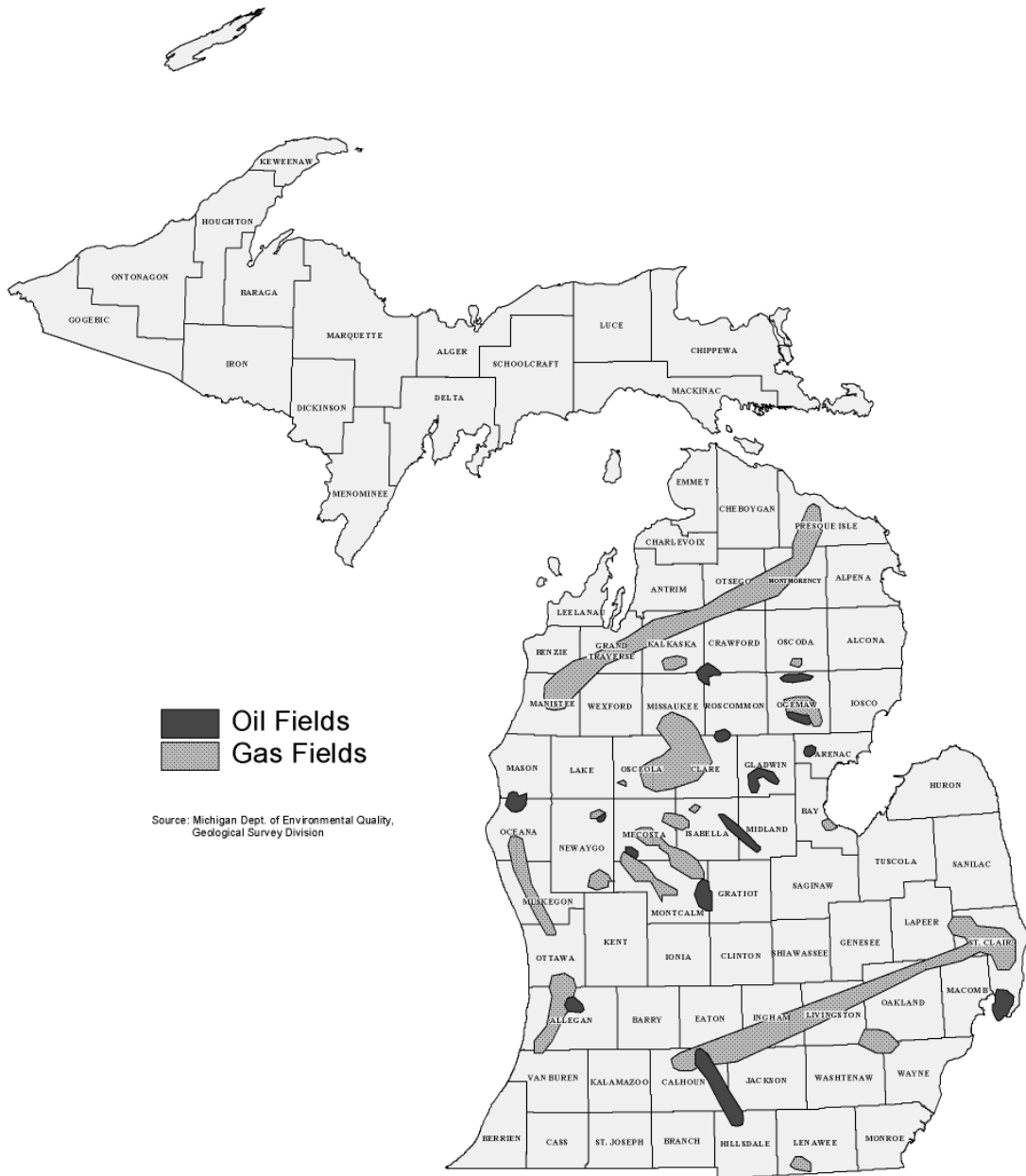
NO **39%**

UNKNOWN **38%**



MFISfoundation.org

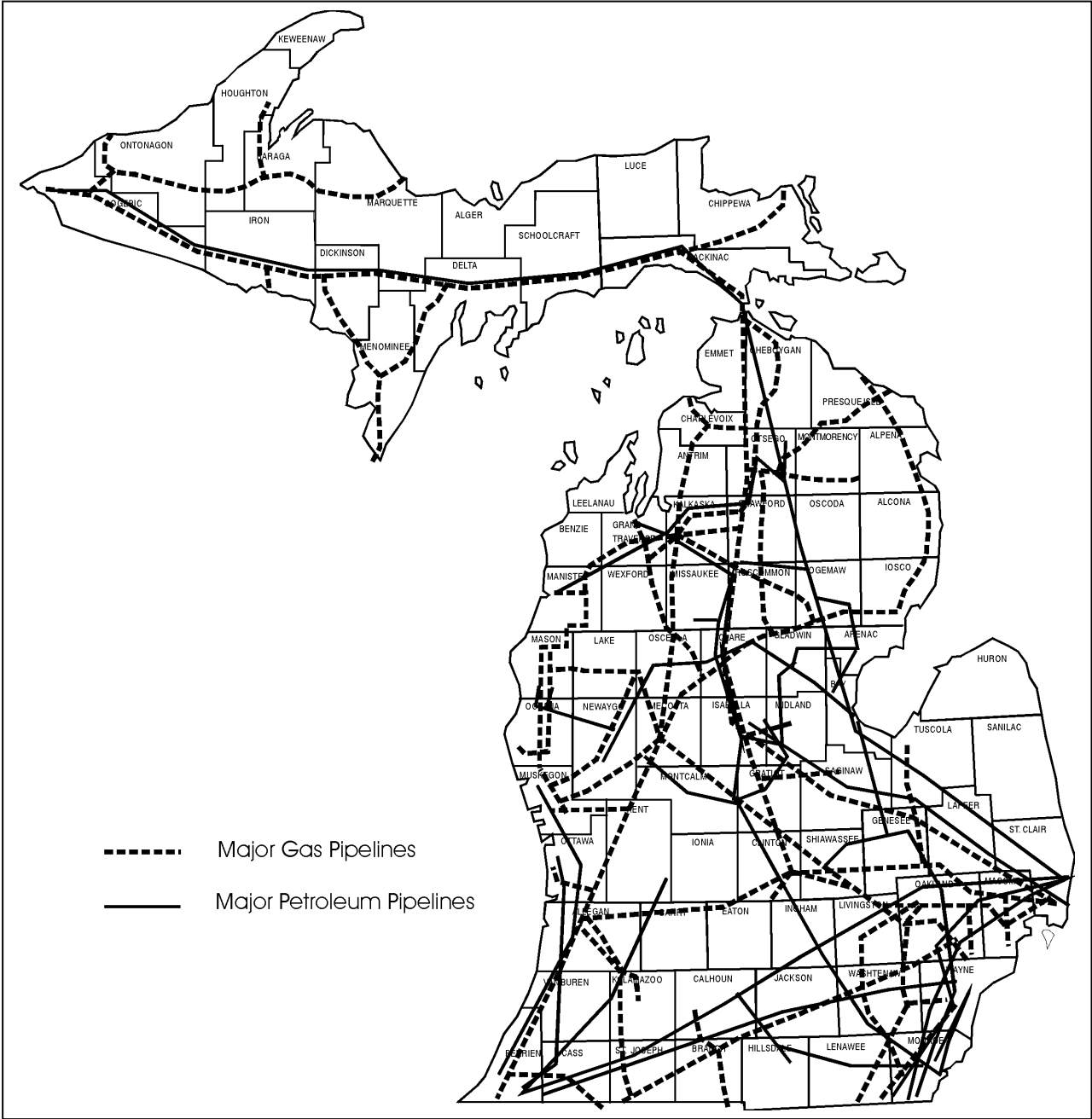
Michigan's Oil and Gas Fields



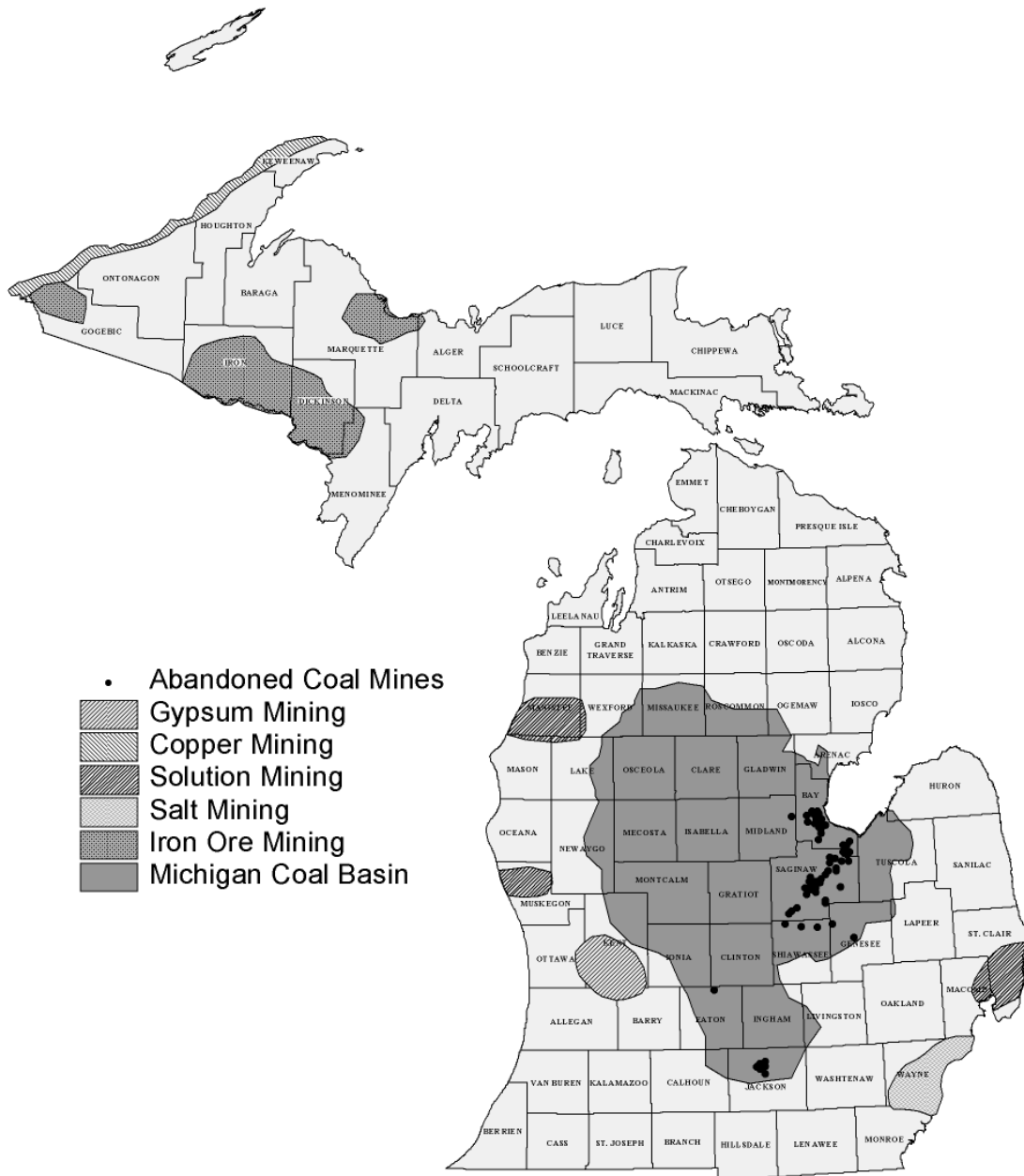
Produced by:
Michigan State Police
Emergency Management Division
13 November 2000

Major Petroleum and Natural Gas Pipelines in Michigan

Source: Michigan Public Service Commission; pipeline company maps



Potential Subsidence Hazards



Produced by:
Michigan State Police
Emergency Management Division
20 November 2000

DISADVANTAGED AREAS

In January of 2021, President Biden issued Executive Order 14008. The order directed the Council on Environmental Quality (CEQ) to develop a new tool. This tool is called the Climate and Economic Justice Screening Tool. The tool has an interactive map and uses datasets that are indicators of burdens in eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. The tool uses this information to identify communities that are experiencing these burdens. These are the communities that are disadvantaged because they are overburdened and underserved.

Federal agencies will use the tool to help identify disadvantaged communities that will benefit from programs included in the Justice40 Initiative. The Justice40 Initiative seeks to deliver 40% of the overall benefits of investments in climate, clean energy, and related areas to disadvantaged communities. Go to <https://screeningtool.geoplatform.gov/en/> to access the Climate and Economic Justice Screening Tool.

Mason County Summary

According to the screening tool, roughly the eastern half of Mason County, as well as the City of Ludington, are considered “disadvantaged.” These determinations are based on census blocks and do not always align with municipal boundaries. These tracts are considered disadvantaged because they meet more than 1 burden threshold **AND** the associated socioeconomic threshold (low income).

Disadvantaged Areas		
<i>General Location</i>	<i>Jurisdictions (all or part)</i>	<i>Burdens</i>
Northeast quarter of Mason County	Townships of Free Soil, Meade, Sheridan, Sherman Villages of Fountain and Free Soil	Low Income Energy (energy cost) Health (heart disease) Transportation (transportation barriers)
Southeast quarter of Mason County	Townships of Branch, Custer, Eden, Logan, Sheridan	Low Income Energy (energy cost) Health (heart disease) Transportation (transportation barriers)
Central Mason County	Little River Tribal Land (Custer Twp)	Low Income Federally Recognized Tribal Land
City of Ludington	City of Ludington	Low Income Legacy Pollution (proximity to Risk Management Plan facilities) Water and Wastewater (underground storage tanks and releases) Heart Disease

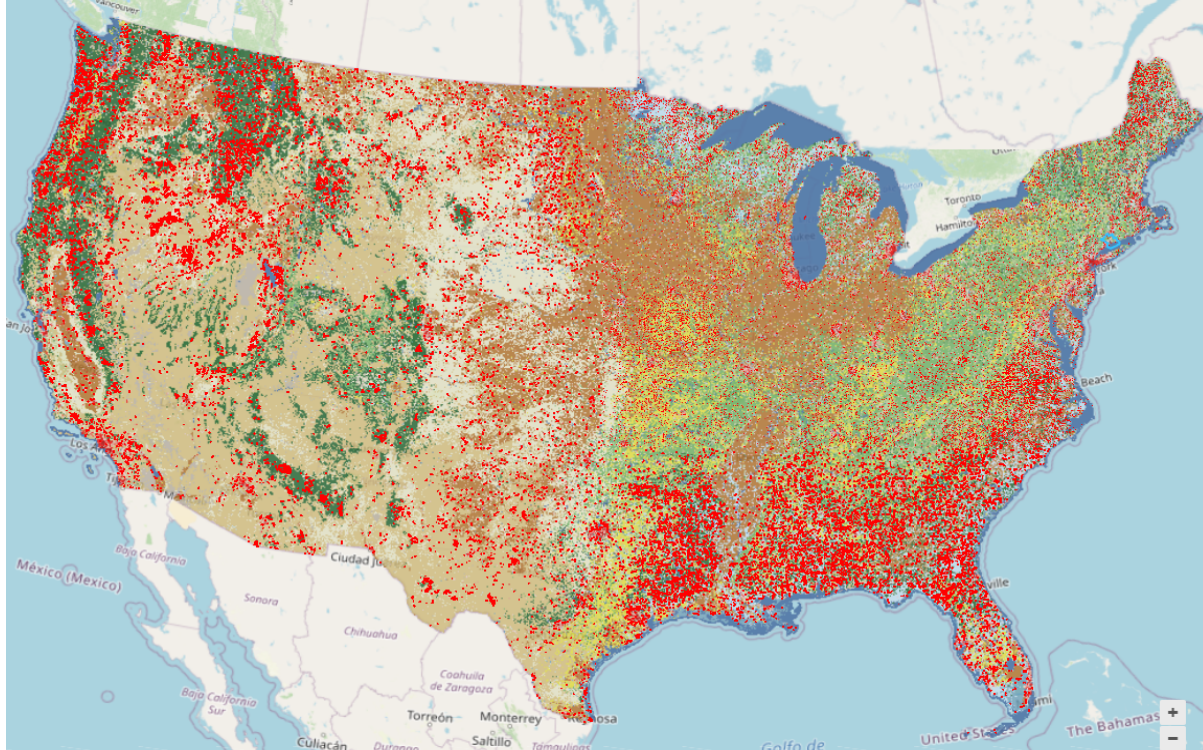
Mason County, Michigan

2019 Land Cover

Having an accurate picture of an area's landscape and understanding how that landscape is changing is important information for any planning effort. Land cover data can help provide that big-picture view.

The data seen in the map below was derived through the Multi Resolution Land characteristics Consortium (MRLC). The MRLC produces the National Landcover Database (NLCD), a nationally standardized land cover and land change information product for the United States. Multiple dates of satellite imagery are used to document changes in various types of land cover. The 2019 land cover for Mason County can be seen below.

These summary sheets provide an easy way to understand some of the important information derived from these data for Mason County.



Land Cover Overview

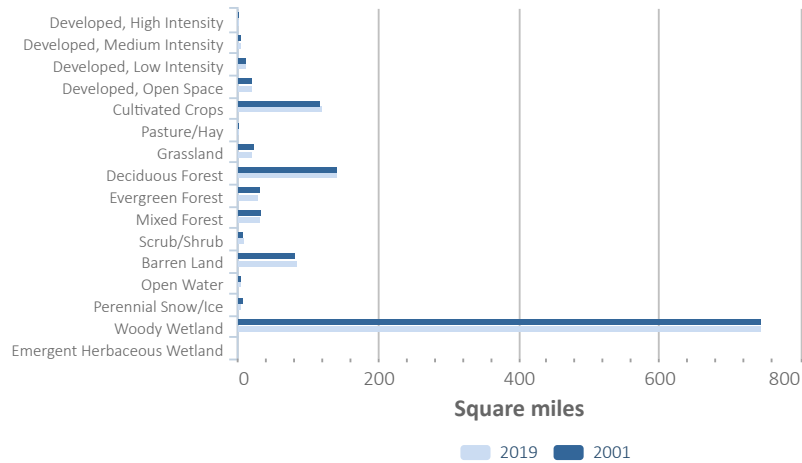
Mason County, Michigan

Land Cover Data: 2001 to 2019

Land Cover Basics

1.9 percent or 23.60 square miles of this County changed.

Communities comparing data from one year to the next can evaluate how their land use management efforts are working, and can also use information on trends to aid future planning initiatives. In this bar chart, showing each land cover class, the difference between the two bars represents the net difference in the area for that category. This data represents a beginning to end year comparison, and does not quantify cumulative change between years. For instance, an evergreen forest that was harvested after the beginning year and re-grew to Evergreen forest before the end year would not be represented in the statistics. Additional GIS analysis is needed for this type of cumulative change. Other data sources available through the MRLC consortium include developed impervious surface, percent forest canopy cover, and nine discrete rangeland components for the Western United States. All of these additional components provide increased and complementary detail for analysis across the United States.



Additional GIS analysis is needed for this type of cumulative change. Other data sources available through the MRLC consortium include developed impervious surface, percent forest canopy cover, and nine discrete rangeland components for the Western United States. All of these additional components provide increased and complementary detail for analysis across the United States.

Land Cover Categories	Area 2001	Area Lost	Area Gained	Area 2019	Net Change	Percent Change
Developed, High Intensity	1.67	0.00	0.36	2.04	0.36	21.78%
Developed, Medium Intensity	4.50	-0.02	0.97	5.45	0.94	20.98%
Developed, Low Intensity	13.39	-0.33	0.49	13.55	0.16	1.19%
Developed, Open Space	20.59	-0.83	0.35	20.10	-0.49	-2.36%
Cultivated Crops	118.02	-1.10	2.28	119.20	1.18	1.00%
Pasture/Hay	1.66	-0.06	0.07	1.67	0.01	0.69%
Grassland	23.14	-3.73	2.68	22.09	-1.05	-4.55%
Deciduous Forest	140.89	-2.98	4.64	142.55	1.66	1.18%
Evergreen Forest	31.47	-2.37	0.85	29.95	-1.52	-4.82%
Mixed Forest	34.30	-2.45	0.44	32.29	-2.01	-5.87%
Scrub/Shrub	7.52	-3.25	5.71	9.98	2.46	32.66%
Woody Wetland	83.68	-1.27	2.15	84.56	0.88	1.05%
Emergent Herbaceous Wetland	5.86	-2.25	1.83	5.45	-0.42	-7.15%
Barren Land	7.91	-2.02	0.08	5.98	-1.93	-24.43%
Open Water	747.36	-0.89	0.66	747.12	-0.23	-0.03%
Perennial Snow/Ice	0.00	0.00	0.00	0.00	0.00	0.00%

*All numbers expressed in square miles

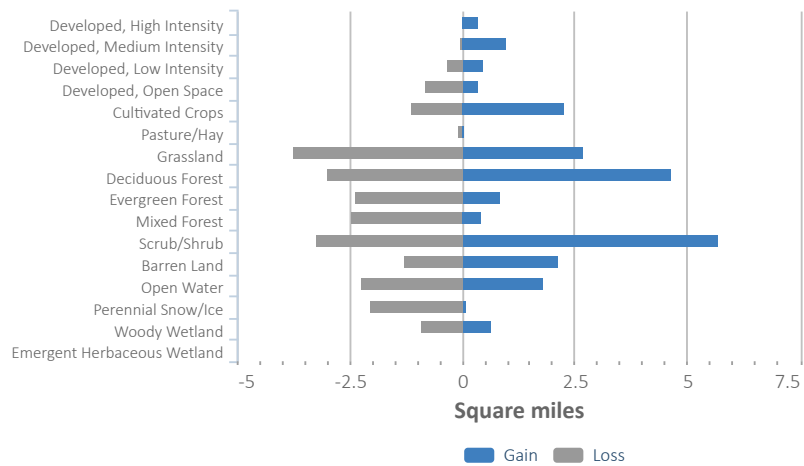
Land Cover Overview

Mason County, Michigan

Land Cover Data: 2001 to 2019

Area Gained - Area Lost = Net change

Net change numbers can be deceiving; forests may be lost on one side of the County, while another area may experience an increase. The net change might be minimal, yet the total area of change could be substantial, and the quality of new growth areas may be different than those lost. It is important to look at these offsetting losses and gains, in addition to the overall net difference.



Development

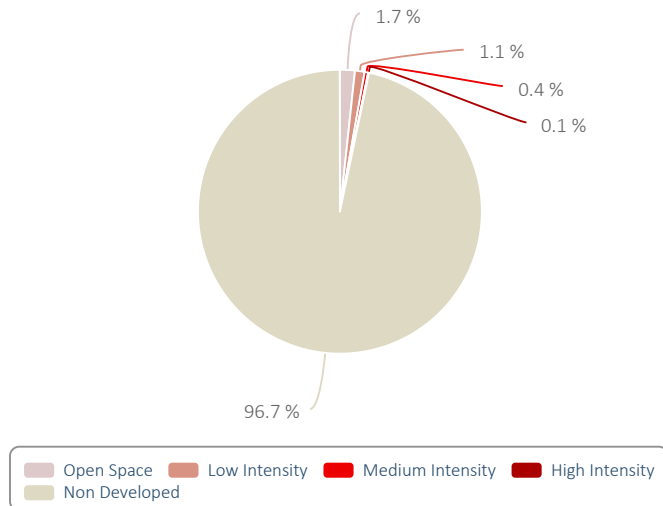
Mason County, Michigan

Land Cover Data: 2001 to 2019

Development and Impervious Surfaces (2019)

3.31% of Mason County is developed and 0.86% is impervious.

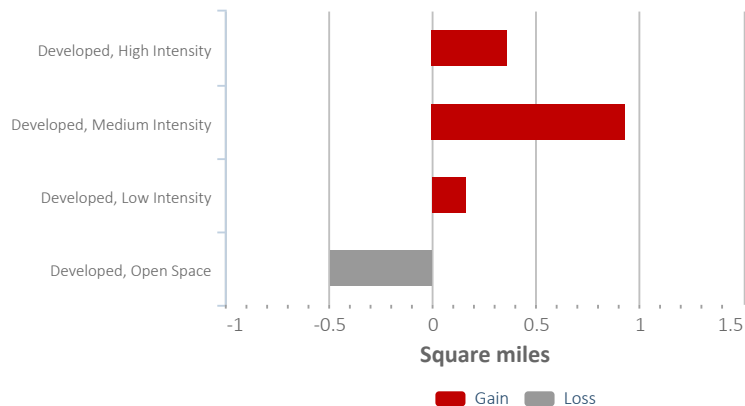
More development means more impervious surfaces, which translates into a greater risk for increased flooding and decreased water quality. Areas with impervious surface rates approaching or exceeding 12 percent to 15 percent will likely experience negative impacts to water quality. Severe degradation can be expected when rates reach 25 percent. This chart highlights the percentage of the County developed in 2019.



Development Change

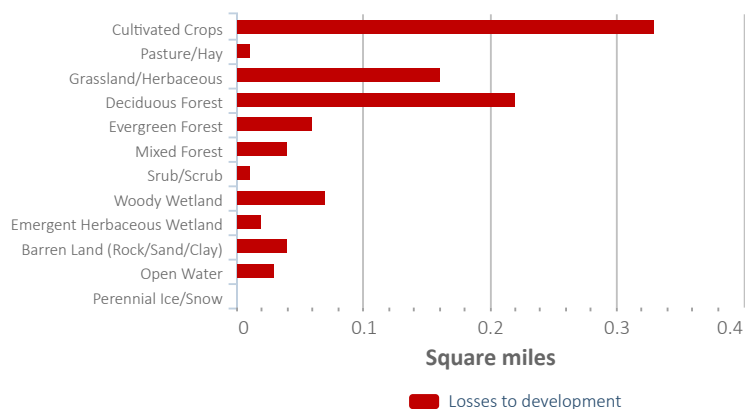
0.98 square miles of development and 0.86 square miles of impervious surfaces were gained between 2001 and 2019.

Low density and open space development can impact water quality negatively, though usually to a lesser degree than with higher density development. This graph shows how each type of development changed between 2001 and 2019.



What's Being Lost

Unlike natural land cover changes, land lost to development tends to be permanent. This graph shows the types of lands that changed to developed between 2001 and 2019. It does not show any potential losses of previously developed areas, as this is a rare occurrence.



Forests

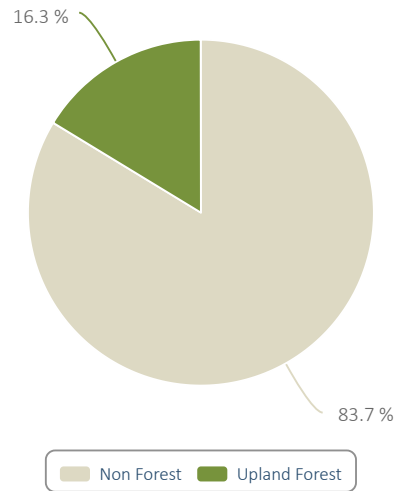
Mason County, Michigan

Land Cover Data: 2001 to 2019

Current State of Forests (2019)

16.49% of Mason County is forest.

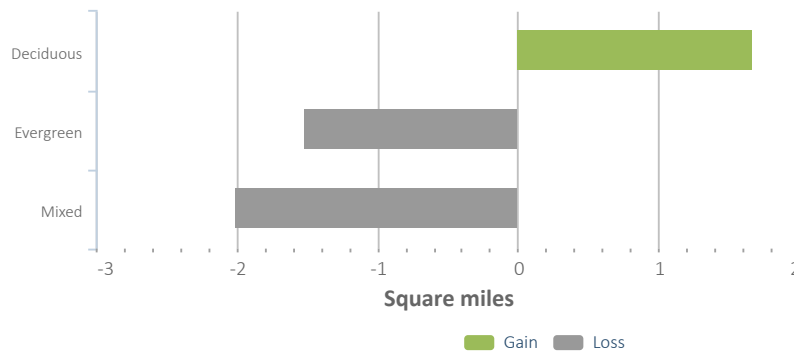
Healthy forests are a vital part of a healthy ecosystem, but it is important to understand the types of forest that are present. This chart shows the percentage of the County that is forested as well as the percentage in uplands and wetlands.



Forest Change

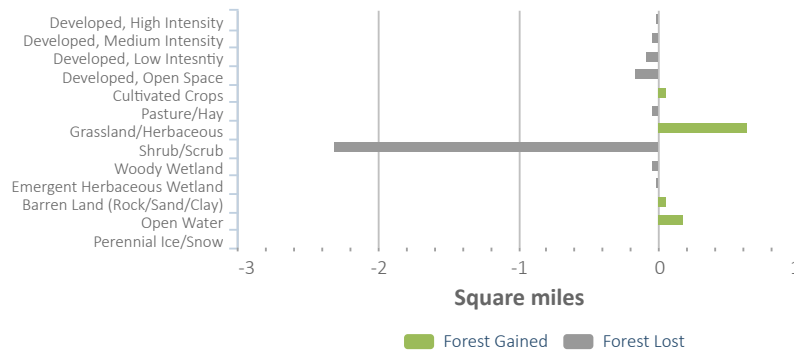
1.87 square miles of the forest was lost between 2001 and 2019.

Knowing which types of forests are being lost or gained can be as important as knowing about changes in the total forest area. Different forest types can differ in ecosystem value. This graph highlights changes in each forest type over a specific time frame.



What is Changing

A forest can go through a transitional period after a fire, other natural disaster, or logging operation, but typically can be expected to recover. Some losses, such as forests converted to development, tend to be permanent. This graph highlights the transformation of forestlands into different land cover types. It also highlights the origin of any forest gains.



Wetlands

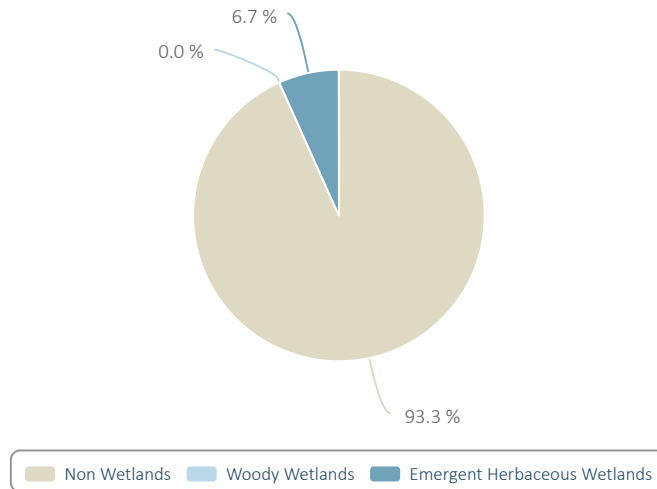
Mason County, Michigan

Land Cover Data: 2001 to 2019

Current State of Wetlands (2019)

7.25% of Mason County is wetland.

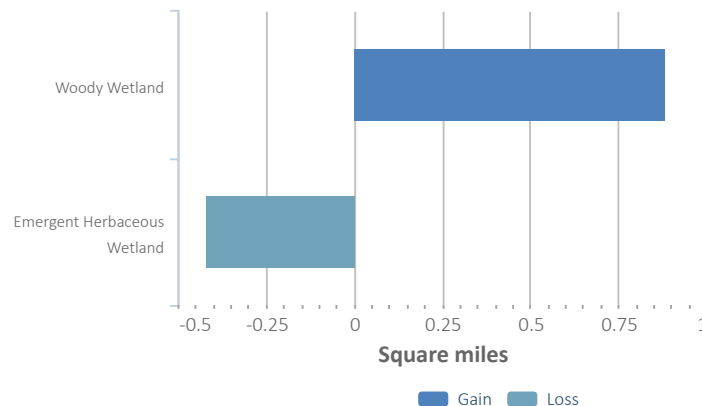
Wetlands are among the most productive environments on Earth. Wetlands provide habitat and food, buffer the impacts of storm surge and flooding, and help control erosion. Wetlands also absorb, store, and filter urban and agricultural runoff to maintain water quality. This chart highlights how much of the County is covered by wetlands.



Wetland Change

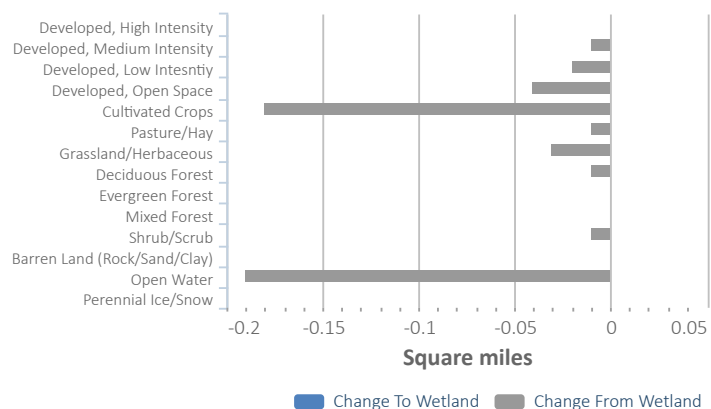
0.46 square miles of wetlands were gained between 2001 and 2019.

When a wetland area or type undergoes change, the benefits of the wetland will change as well. Understanding which type of wetland is changing, and how, can help in determining the eventual impacts of the change. This graph highlights the change or changes in each type of wetland.



What Is Changing

Understanding wetland changes can help communities identify potential management actions to reverse or mitigate the trend. This graph highlights the transformation of lost wetlands into different land cover types. It also highlights the origin of any wetland gains.



Agriculture

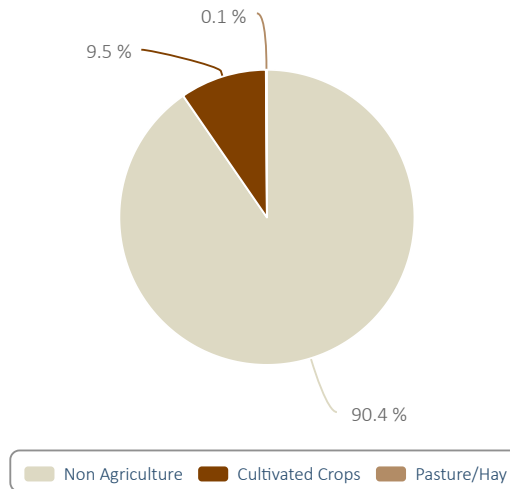
Mason County, Michigan

Land Cover Data: 2001 to 2019

Current State of Agriculture (2019)

9.73% of Mason County is agriculture.

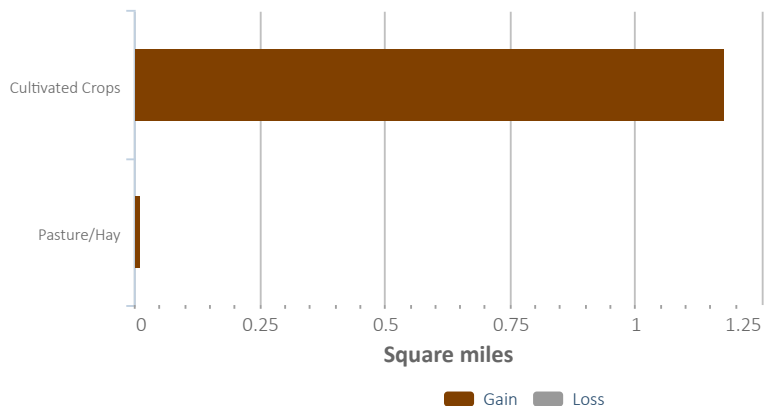
NLCD Agriculture classes include land used for production of annual crops as well as areas intensively managed for livestock production. Agricultural areas are managed in a variety of ways including tillage, fertilization, and other man-made interventions that make the area more productive than it would be naturally.



Agriculture Change

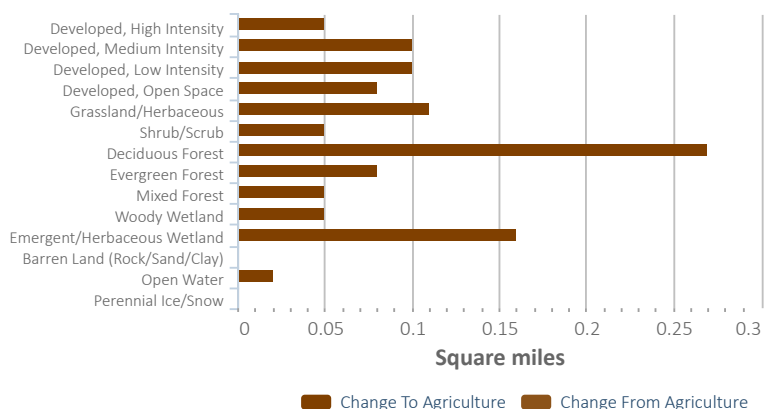
1.19 square miles of agriculture were between 2001 and 2019.

Agricultural lands can have a high impact on surrounding areas. This can be for a variety of reasons including runoff, pesticide application, fertilizer application, etc. This can also show conversion of natural areas to more highly managed areas which relate to overall increases for local impacts. This can also include areas of hay pasture, which generally have lower impacts on the landscape, to higher production cultivated crops. Decreasing agricultural land can show habitat restoration, increased urbanization, decreasing water availability, and a host of other factors important for resource managers and local communities.



What Is Changing

As agricultural lands increase or decrease, a variety of impacts can happen. Increasing agricultural lands can sometimes identify increased water usage as well as loss of natural habitat. Decreasing agricultural lands can highlight droughts, long-term water shortages, habitat restoration, etc. etc. Understanding how these changes are occurring and to what extent help to identify usage and potential risks for producers and the community.





Digging Deeper

Understanding how your County's land cover has changed over the years is an excellent way to document trends, understand the effects of past land use decisions, and consider future land use planning needs. This report, which covers 2001 and 2019, provides a solid foundation.

Communities adding additional data and analysis are able to generate findings designed to meet their specific needs. There are additional tools developed by NOAA's Digital Coast. This provides data and information useful for this purpose in coastal areas. Visit the website at coast.noaa.gov/digitalcoast. Some examples are listed below.

Land Cover Resources

Interested in more information related to land cover, or in taking this analysis one step further? Start with the following tools that use land cover to analyze specific issues.

- **Nonpoint - Source Pollution and Erosion Comparison Tool** - Investigates potential water quality impacts from development, and other change. coast.noaa.gov/nspect
- **Coastal County Snapshots**- Provides local officials with easy-to-understand graphics and analysis that cover a county's demographics, infrastructure, and environment. <https://coast.noaa.gov/snapshots>
- **Sea Level Rise Impacts Viewer**- Displays maps of potential impacts of sea level rise along the coast and provides related information and data for community officials. <https://coast.noaa.gov/slr>
- **Coastal Flood Exposure Mapper**- Supports communities that are assessing their coastal hazard risks and vulnerabilities. The tool creates a collection of user-defined maps that show the people, places, and natural resources exposed to coastal flooding. <https://coast.noaa.gov/floodexposure>

About the Source Data

The data seen in the map below was derived through the MRLC(Multi Resolution Land characteristics Consortium). The MRLC produces the National Landcover Database (NLCD), a nationally standardized land cover and land change information product for the United States. Multiple dates of satellite imagery are used to document changes in various types of land cover.

- **Notes and Limitations** While efforts have been made to ensure that data are accurate and reliable within the limits of current technology, NLCD data sets were made for analysis at a regional and national scale. These data are intended for use in identifying regional landscape patterns and major functional habitats. NLCD is a national and regional data set that should be used only as a screening tool for very local or site-specific management decisions. Small features and changes should be verified with a higher resolution data source. Additional resources on accuracy and methodology can be found on the MRLC publications page [Publications | Multi-Resolution Land Characteristics \(MRLC\) Consortium \(https://www.mrlc.gov/publications\)](https://www.mrlc.gov/publications)



Appendix D:
HAZARD MITIGATION PLAN UPDATE SURVEY

Survey Distribution Letter:

This letter was mailed in Spring of 2022 to local units of government, elected officials, county departments, and other stakeholders in Mason County.



Community Hazards Survey Available

The West Michigan Shoreline Regional Development Commission (WMSRDC), in partnership with local emergency management leaders, is working to update Hazard Mitigation plans for the West Michigan counties of Lake, Mason, and Oceana.

Hazard mitigation is any sustainable action that reduces or eliminates long-term risk to people and property from future disasters. Mitigation planning breaks the cycle of disaster damage, reconstruction, and repeated damage. Hazard mitigation includes long-term solutions that reduce the impact of disasters in the future. Once Hazard Mitigation plans are approved by FEMA and adopted locally, communities become eligible to apply for pre-disaster and post-disaster mitigation funding.

Public input is essential to identifying and planning for local hazards. An online survey has been created to collect comments from community members, leaders, and stakeholders and is available at:
<https://app.surveymethods.com/EndUser.aspx?E1C5A9B6E3A0B2BAE4>.

The survey may also be accessed through the WMSRDC website:
<https://wmsrdc.org/project/hazard-mitigation-plan-updates/>

The survey will be open through the summer, though participants are encouraged to complete the survey as soon as possible. In addition, public hearings will be held in Lake, Mason, and Oceana counties to provide additional opportunities for public input later in 2022. Once dates are identified, public notices will be published in local newspapers and noted on social media and the WMSRDC website.

For additional information please visit wmsrdc.org or contact Stephen Carlson at scarlson@wmsrdc.org.

316 Morris Avenue, Suite 340, Muskegon, MI 49440
Telephone: (231) 722-7878 / www.wmsrdc.org

Press Release:

Mason County Emergency Management distributed this press release to local media and it was posted on the WMSRDC Facebook page.

FOR IMMEDIATE RELEASE



Community Hazards Survey Available

June 8, 2022

The West Michigan Shoreline Regional Development Commission (WMSRDC), in partnership with local emergency management leaders, is working to update Hazard Mitigation plans for the West Michigan counties of Lake, Mason, and Oceana.

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Public input is essential to identifying and planning for local hazards. An online survey has been created to collect comments from community members, leaders, and stakeholders and is available at <https://app.surveymethods.com/EndUser.aspx?E1C5A9B6E3A0B2BAE4>. The survey will be open through July 2022, though participants are encouraged to complete the survey as soon as possible.

In addition, public hearings will be held in Lake, Mason, and Oceana counties to provide additional opportunities for public input later in 2022. Once dates are identified, public notices will be published in local newspapers and noted on social media and the WMSRDC website.

For additional information please go to <https://wmsrdc.org/project/hazard-mitigation-plan-updates/>.

###

Online Survey Form:

Community Hazards Survey

1. **Select a county for the purpose of this survey.**

- ☐ Lake County
- ☐ Mason County
- ☐ Oceana County
- ☐ All three counties (regional perspective)
- ☐ If other, please specify

2. **In what city, village, or township of this area do you primarily live, own land, or serve?**

3. **Select all that apply to you.**

- ☐ Local official (elected or appointed)
- ☐ Public employee
- ☐ Local resident
- ☐ Land owner
- ☐ If other, please specify

Page 2 - Land Use

4. **Land use planning is often cited as a primary tool for reducing or preventing property damage and loss of life. Does your community have a master plan?**

- ☐ Yes
- ☐ No
- ☐ I don't know

5. **If possible, please share the date the master plan was adopted.**

6. **Does your community have a zoning ordinance?**

- ☐ Yes
- ☐ No
- ☐ I don't know

7. **Describe any significant land use changes you have observed over the past 10 years in your area.**

8. **Describe any significant land use changes you anticipate to happen over the next 10 years in your area.**

9. **Rate your level of concern for changes in weather patterns to impact your community.**

- ☐ Very concerned
- ☐ Somewhat concerned
- ☐ Neutral
- ☐ Not concerned

Additional Comments

10. **Rate your level of concern regarding the condition of infrastructure in your community. (roads, bridges, culverts, water/sewer, utilities, etc)**

- ☐ Very concerned
☐ Somewhat concerned
☐ Neutral
☐ Not concerned

Additional Comments

Page 3 - Hazards

11. **What hazards do you feel pose the greatest threat to people in your area. (select up to 5)**

- ☐ Civil Disturbance
☐ Dam Failure
☐ Drought
☐ Erosion
☐ Extreme Temperatures
☐ Great Lakes Shoreline Hazards
☐ Hazardous Materials Accident
☐ Infrastructure Failure
☐ Invasive Species
☐ Oil & Gas Well Accident
☐ Petroleum and Natural Gas Pipeline Accident
☐ Public Health Emergency
☐ Riverine/Runoff Flooding
☐ Severe Winter Weather (snow, ice, & sleet)
☐ Structural Fire
☐ Sustained Wind Events
☐ Terrorism and Criminal Activity
☐ Thunderstorm Hazards (Hail, Lightning, Severe Wind, & Tornadoes)
☐ Wildfire
☐ If other, please specify

12. **What hazards do you feel pose the greatest threat to property in your area. (select up to 5)**

- ☐ Civil Disturbance
☐ Dam Failure
☐ Drought
☐ Erosion
☐ Extreme Temperatures
☐ Great Lakes Shoreline Hazards
☐ Hazardous Materials Accident
☐ Infrastructure Failure
☐ Invasive Species
☐ Oil & Gas Well Accident
☐ Petroleum and Natural Gas Pipeline Accident
☐ Public Health Emergency
☐ Riverine/Runoff Flooding
☐ Severe Winter Weather (snow, ice, & sleet)
☐ Structural Fire
☐ Sustained Wind Events
☐ Terrorism and Criminal Activity
☐ Thunderstorm Hazards (Hail, Lightning, Severe Wind, & Tornadoes)
☐ Wildfire
☐ If other, please specify

13. What hazards do you feel pose the greatest threat to the economy in your area.

- ☐ Civil Disturbance
- ☐ Dam Failure
- ☐ Drought
- ☐ Erosion
- ☐ Extreme Temperatures
- ☐ Great Lakes Shoreline Hazards
- ☐ Hazardous Materials Accident
- ☐ Infrastructure Failure
- ☐ Invasive Species
- ☐ Oil & Gas Well Accident
- ☐ Petroleum and Natural Gas Pipeline Accident
- ☐ Public Health Emergency
- ☐ Riverine/Runoff Flooding
- ☐ Severe Winter Weather (snow, ice, & sleet)
- ☐ Structural Fire
- ☐ Sustained Wind Events
- ☐ Terrorism and Criminal Activity
- ☐ Thunderstorm Hazards (Hail, Lightning, Severe Wind, & Tornadoes)
- ☐ Wildfire
- ☐ If other, please specify

14. Are there any areas in your community that are frequently affected by hazards? Please describe the location(s) and hazard(s). This information will be helpful for identifying potential mitigation projects.

15. Note your concerns for hazards or complicating factors that may compromise the safety of people and property in your community.

Page 4 - Optional Information

16. Enter your email address to receive notification of future opportunities to provide input and to be notified when the draft hazard mitigation plan is available for public review and comment. (This step is optional)

Summary of Survey Results:

Community Hazards Survey Results Mason County

Survey Period: May 5, 2022 through January 9, 2023

Total number of surveys completed: 112

SURVEYS COMPLETED BY MASON COUNTY Jurisdiction					
City/village/township where you primarily live, own land or serve	Local official (elected or appointed)	Public employee	Local resident	Land owner	Other Please specify
Pere Marquette Twp.	2	1	12	11	
Branch Township		1	4	4	
City of Ludington	2	10	13	9	1 – Clergy / 1 - Retired
Summit Township	4	1	5	4	
City of Scottville	2	5	3	4	
Hamlin	4	4	9	7	
Amber Township	2	3	9	7	
Grant Township	2	2	2	2	
Sherman Township	3		5	5	
Sheridan Township	2		2	1	
Victory Township		1	2	3	Municipality
Eden Township	1	1	3	3	
Riverton Township		4	5	5	
Custer Township	1		1	2	

DOES YOUR COMMUNITY HAVE A MASTER PLAN?				
City/village/township where you primarily live, own land or serve	Yes	No	I Don't Know	Blank
Pere Marquette Twp.	8		3	3
Branch Township				
City of Ludington	9		12	3
Summit Township	2	3	1	1
City of Scottville	4		2	2
Hamlin	3		4	4
Amber Township	5	2	2	2
Grant Township	2			
Sherman Township	3	1	1	
Sheridan Township			2	1
Victory Township	1		3	1
Eden Township	2			
Riverton Township	3		3	
Custer Township			2	

DOES YOUR COMMUNITY HAVE A ZONING ORDINANCE?				
City/village/township where you primarily live, own land or serve	Yes	No	I don't know	Blank
Pere Marquette Twp.	8		2	2
Branch Township			5	
City of Ludington	21			4
Summit Township	3	3		1
City of Scottville	6			1
Hamlin	5			6
Amber Township	6		1	2
Grant Township	2			
Sherman Township	3	1	1	
Sheridan Township	2			1
Victory Township	3		1	1
Eden Township	3			
Riverton Township	5	1		
Custer Township	3			

Community Hazards Survey Results Mason County

OBSERVED Significant land use changes in the PAST 10 years:

- Residential development
- Allowing for increased density in housing
- Installation of wind turbines
- More residential, less industry
- Ask Mitch Foster
- Wind turbines and solar systems
- For home building
- Single family dwellings in downtown
- Building in remote areas
- Sand mining increase
- Area becoming more residential
- Continued growth along the US-10 corridor
- Residential homes, clearing of vacant land, retail businesses
- Property lines set back lines
- Every available lot on lakes in being stripped off and houses are being built. Ag land is being used up for other business and hobby farming is becoming a thing of the past.
- There is more junk and trash in people's yards
- Changes in lifestyles of our time
- Sand mining on our street. Not sure what impact this has.
- Decrease in size required for dwellings – accessory buildings on vacant parcels
- Condos for high income people. Lack of industry. More temporary jobs in factories.
- Expansion of land development; increased traffic leading to additional traffic control devices
- Ag becoming commercial
- Increased impervious surface in the US-10 area/commercial areas
- More residential housing
- School property re-zoned as residential
- Increase in residential land use. Increase in recreational land use
- Large increase in privately owned resident homes
- The inclusion of commercial wind mills
- Elementary schools have been sold or torn down, numerous housing units have been built (not enough low income homes), some downtown business have gone out of business with (in some cases) new businesses coming in, some business properties being sold and renovated.
- My commercial property with one of our businesses was rezoned to C3 without notice.
- Ag converting to housing
- Too much vacation rental properties
- Not being able to put a garage/pole building up on vacant land unless you have at least 10 acres. Should be able to have them with less land.
- Land fragmentation due to larger parcels being sub-divided. Building pressures on inland waterways (lakes, rivers, streams). Consolidated commercial agricultural operations/loss of the small farmer. Increase in motorized recreational use. Loss of forested land and open green space within primary travel corridors.
- Brownfield development
- Farmland now have houses built
- Fragmentation, farm consolidation and increase in industrial farm practices, loss of open space, increased motor vehicle use, increased non-native invasive species, increase in wind energy, increased fire hazards on public lands, increased waterfront development.
- Industrial wind turbines, more businesses in residential areas
- We have increased our rental properties and also increased housing opportunities by the addition of low income rentals as well as mid to high income rentals. We also had Dow properties that will be developed for community recreation.
- Sand mining in Hamlin Township
- Increase of commercial establishments and residences; decrease of agricultural/recreational land use.
- Increasing single-family homes and subdivisions in once wooded acreage. Continued development along lakeshore. Increased commercial development leading to conflict as use changes.

ANTICIPATED significant land use changed in the NEXT 10 years:

- Residential development
- More seasonal people buying housing. More planning and awareness of fluctuating lake levels.
- Installation of commercial solar farms
- Significant downtown development and increase in residential structures
- Continued increase in residential. More condos and apartment complexes.
- Ask Mitch Foster
- Continued growth and housing development on land around Ludington to include medium income apartments
- Further commercial and private development
- More mining, less forest, more agricultural use, more multi-family housing units.
- Increase in residential.
- Further density of commercial operations along corridor
- Hopefully more handicapped parking in the City of Ludington especially on the main street in downtown. There are NO handicap parking on Ludington Avenue
- I see US-10 continuing to be developed in both Pere Marquette and Amber townships. New restaurants and stores will be building along US-10 along with housing developments.
- I can only see it getting worse.
- Staying flexible to make best use of space without taking out more forests, fields, etc.
- More apartments, less green space
- Continued housing and traffic development

Community Hazards Survey Results Mason County

- Increased precipitation events accompanied by poor on-site stormwater management especially in commercial areas.
- Increase in recreational land use, outside the “tried and true” uses. We may see equestrian trails, dirt bike trails/tracks, requests for recreational use of the water/beaches etc.
- Increase in resident homes and commercial sites being built
- Farms
- Hopefully more housing for those who can’t afford the price of a “typical” home. Using vacant land for the development of a community/senior center. I anticipate continued change in downtown businesses over time.
- More vacation rental properties.
- In addition to increase of the items listed in #7, I would anticipate an increase in flooding, drought, and invasive species causing increased risk for those along waterways to be flooded, increased risk of wildfire risk, and loss of agricultural options dues to invasive species (i.e. spotted lanternfly).
- More houses built for the growing population
- In addition to the cumulative effects of #7, due to demographic transition: increased run-off of pesticide and fertilizer into waterways, loss of stream/lakeside natural habitat, further reduction of native flora and fauna, reduced natural green space, need for improved transportation infrastructure.
- Industrial Solar Development, more rooftop solar, multiple dwellings on single properties
- Hopefully an increase in land use for more housing options.
- Solar fields
- Increase of commercial establishments and residences; decrease of agricultural/recreational land use
- More fracturing of once wooded and open acreage areas. Continued pressure on inland lake and river shores as well as the Lake Michigan shoreline. Continued clear-cutting for potential development and increased commercial development. The change is stressing the capacity of secondary roads and is changing the character of some parts of the county and local community leading to conflicts that will grow.

RATE YOUR LEVEL OF CONCERN FOR CHANGES IN WEATHER PATTERNS TO IMPACT YOUR COMMUNITY:	Very Concerned	Somewhat Concerned	Not Concerned	Neutral	No Answer
	15	32	15	18	22

Comments about the level of concern for changes in weather patterns that will impact your community:

- As the recent tornado in Gaylord demonstrated
- The weather is very erratic and unusual
- Power outages have been a consistent issue with consumers energy south of Pere Marquette Lake.
- Flooding seems to happen more frequently
- High water causes many issues within the community
- Crazy green energy
- The Midwest will attract more residents due to the mildness of the changes (comparatively).
- Winds
- The winds are getting tedious. Luckily, so far, the lake has kept our region cooler than others.
- Changes in weather may indicate a changing climate. Climate change will impact the area in many ways, including changes to Lake Michigan, drought, floods, climate refugees to Great Lakes region, housing shortages. This is not only a local issue.
- Much hotter than it used to be. We use to have much more snow in the wintertime.
- We have no control over the weather, just be prepared
- Getting hotter
- Concerned about beach erosion and impact on coastal residences
- More construction occurring in fragile areas: stream, river, inland shorelines, and Lake Michigan shoreline
- Every raindrop, gust of wind and snowflake is not an emergency nor a sign of manmade catastrophic influence

RATE YOUR LEVEL OF CONCERN REGARDING THE CONDITION OF INFRASTRUCTURE AND PUBLIC FACILITIES IN YOUR COMMUNITY (roads, bridges, culverts, dams, water/sewer, utilities, etc.):	Very Concerned	Somewhat Concerned	Not Concerned	Neutral	No Answer
	21	43	5	11	22

Comments about the level of concern regarding the condition of infrastructure and public facilities in your community:

- Concerned that adequate maintenance may not be getting done; concerned that there seems to be more concern about giving tax breaks rather than fixing infrastructure
- Our roads and water/sewer service lines are very dated and in poor condition
- Power outages specifically as noted above
- Culverts and bridges are in poor condition and undersized
- Lakeshore erosion at the water plant is my top concern
- Victory township
- The dirt roads need to go. We are in 2022. Cut all the wasteful social spending and pave the roads
- Water quality is being impacted by farm runoff (surface) and mining (ground)
- Water and sewer lines are behind the times. With the amount of development I see happening, I’m concerned that our utilities will not be able to keep up. Our roads in Ludington, Scottville and US-10 are horrible in spots, I am very concerned with the lack of road work in the City of Scottville. Also, US-10 is becoming extremely bumpy, almost to the point of being dangerous. I would like to give a kudos to Amber Township for taking care of their roads with seal coating and repaving multiple roads each year.
- There are many roads in Mason County still unpaved and difficult to maintain due to that fact
- The Mason County Road Commission has done an excellent job of replacing aging infrastructure.
- Infrastructure is not being improved commensurate with the surge in population.

Community Hazards Survey Results Mason County

- As population increases, the existing infrastructure will not be sufficient, and the area will be in need to maintain existing and build/improve.
- I am concerned that in a country with so much perceived wealth that we do not put a higher emphasis on infrastructure. Overall, our infrastructure is “adequate” and we aren’t having injuries because of bridges collapsing, but our bridges are old, our roads are significantly overdue for updates.
- Heavily used secondary roads are overused and often lacking sufficient shoulders and turn lanes. Also a great need to accommodate the growing number of bicyclists using roadways for local commutes, recreation and cross-county travel. Another bridge across the Lincoln and the Pere Marquette rivers respectively between Scottville and Ludington is going to be needed. Hamlin Lake is going to need a sewer system.

Your opinion on hazards and the threats they pose. Of the hazards listed, which do you feel pose the great threat in your area to:	PEOPLE
Infrastructure Failure	33
Thunderstorm Hazards (Hail, Lightning, Severe Wind, & Tornadoes)	32
Invasive Species	27
Public Health Emergency	26
Severe Winter Weather (snow, ice & sleet)	26
Civil Disturbance	23
Great Lakes Shoreline Hazards	22
Sustained Wind Events	20
Terrorism and Criminal Activity	15
Extreme Temperatures	13
Hazardous Materials Accident	13
Dam Failure	4
Erosion	11
Wildfire	10
Riverine / runoff Flooding	9
Structural Fire	9
Drought	7
Petroleum and Natural Gas Pipeline Accident	4
Oil & Gas Well Accident	2
Specify – System, traffic	1
Specify – Pump Storage Project failure	1

Your opinion on hazards and the threats they pose. Of the hazards listed, which do you feel pose the great threat in your area to:	PROPERTY
Sustained Wind Events	34
Thunderstorm Hazards (Hail, Lightning, Severe Wind, & Tornadoes)	33
Invasive Species	27
Great Lakes Shoreline Hazards	22
Infrastructure Failure	22
Severe Winter Weather (snow, ice & sleet)	22
Riverine / runoff Flooding	21
Erosion	19
Structural Fire	19
Wildfire	16
Extreme Temperatures	11
Drought	9
Hazardous Materials Accident	9
Civil Disturbance	7
Dam Failure	6
Petroleum and Natural Gas Pipeline Accident	3
Public Health Emergency	3
Terrorism and Criminal Activity	2
Oil & Gas Well Accident	1
Specify – Pump Storage Project failure	1
Specify – Industrial Noise	1
Specify – Mining disturbance of ground and pond water	1
Specify – Folks moving to area without properly checking ordinances or guidelines and creating issues with neighbors	1
Specify – General “wear and tear” / damage to property at greater than average rate, caused by increased tourist traffic with no preplanned prevention	1

Community Hazards Survey Results Mason County

Your opinion on hazards and the threats they pose. Of the hazards listed, which do you feel pose the great threat in your area to:	ECONOMY
Public Health Emergency	33
Infrastructure Failure	32
Great Lakes Shoreline Hazards	19
Invasive Species	16
Severe Winter Weather (snow, ice & sleet)	16
Sustained Wind Events	15
Thunderstorm Hazards (Hail, Lightning, Severe Wind, & Tornados)	15
Civil Disturbance	14
Hazardous Materials Accident	13
Extreme Temperatures	12
Terrorism and Criminal Activity	11
Riverine / runoff Flooding	10
Drought	9
Wildfire	7
Dam Failure	6
Petroleum and Natural Gas Pipeline Accident	4
Erosion	4
Oil & Gas Well Accident	2
Structural Fire	2
Specify – Government overreach / Stupidity	2
Specify – Lack of affordable housing	1
Specify – Bad governmental policy decisions	1
Specify – overtaxing, permits	1
Specify – Lack of people not going back to work and businesses needing to close due to no workforce	2
Specify – Too large/fast influx of people moving here without enough available housing	1

Areas in your community that are frequently affected by hazards?

- No, we do not have any frequent hazards but many of them could be lurking in the shadows. We cannot ignore our problems.
- Power outages
- Hazards – residences on Iris and South Lakeshore Drive seem to loose power frequently as compared to folks in the Ludington city proper. I will classify as local disturbance – the Oxychem plant emits industrial noises that are a nuisance to residents on South Lakeshore and that visit the new PM Township conservation park. A reduction of noise and/or ordinance to enforce a reduced limit would be appreciated. The noise can be heard through the walls of home and also impact campers at Buttersville.
- Low land, roads, and home are prone to flooding
- The river that comes in from Lake Michigan to Pier Marquette Lake can rise to levels that cause hazards
- River and Great Lakes Flooding
- Farms, lakes, schools
- Culverts and bridges
- Area along Hamlin Lake subject to high winds which down trees
- Sour gas well leaks, traffic on Jebavy Drive, fireworks on Hamlin Lake
- Shoreline on Lake Michigan
- Lake Michigan shoreline – erosion; easter and southern Mason County – wind events/power outages due to storms
- Shoreline areas affected by rising lake level
- People are effected by low paying jobs and poor diet – creating chronic health issues
- House of flavors ammonia leak
- The Lake Michigan shoreline has great potential for the effects of hazards. While the Pumped Storage Project has many safety measures in place, it is still an area that would devastate our region if it was impacted by a hazard. Straight-line winds have caused problems numerous times in our area with little advance notice.
- Invasive species are rampant; people are killed every year in the Great Lakes due to currents; roadways not cleared in the winter is always a hazard – US-31 is often not cleared; the windmills and hydroelectric plant are potential hazards; there are some dangerous intersections in Mason County including Pere Marquette Highway near 31, and US-10/Jebavy intersection; there are gas wells that could be hazardous; there is a contaminated water plume under part of the city; there is an increase in violence and rage
- Lake Michigan Shoreline
- Lake Michigan Shoreline
- Residential areas from weather damage
- Would look towards investing in monitoring stations/projects related to the long term contamination effect from Dow/Oxy at the mouth of the Pere Marquette and Lake Michigan, impacts from Indian Summer solid waste disposal and spray drift-surface and groundwater contamination from orchards and row crop operations.
- Consumers Energy and shoreline erosion
- Lake Michigan shoreline erosion, flooding along certain local roads that can cause closures or culvert failure, secondary roads lacking sufficient shoulders and lack of bike paths/trails creating an unsafe mix of vehicles and bicycles on high-speed, narrow roads

Community Hazards Survey Results Mason County

Note your concerns for hazards or complicating factors that might compromise the safety of people and property in your community.

- Drought and wildfire are probably my top concerns especially as the weather is generally drier and hotter than it used to be
- High waters on Lake Michigan. The lake levels have risen and fallen so quickly in the last 10 years; storms seem to be getting more severe
- Thunderstorms and other severe weather
- Trees falling in the roadways
- The Consumer pumped project dam is likely the largest risk to the townships people and property. Not to say it is not managed effectively to mitigate the risk, but a failure of the wall could be extremely detrimental. Lake access at Buttersville is wonderful and adding life jackets and emergency life rings are a good step to supply potentially life saving equipment in an emergency. The noise from Oxychem reduces the quality of life, such as resting in the yard or trying to sleep.
- Dune communities egress access with larger trucks
- Culverts and drain systems are not adequate to handle rain events that are happening more frequently
- School shootings are a threat everywhere. With the lies and hate stirred up by Trump and followers there could be widespread violence in the future.
- There is limited affordable housing, especially for young people and young families, which poses threats to family and community stability.
- Road speed limits too high especially in rural residential areas. Few roads have shoulders. Nowhere to safely walk or bike
- No plans for sewer system, roads heading west in case of emergency
- Hamlin Dam breaking
- The Junk Authority allowing homes to unmanaged and neglected
- The noise that is now existing in the Hamlin area (Stix). People living close to that area are "stressed". Maybe one of these neighbors will take matters in their own hands. Almost everyone has guns. I don't know what you are going to do about it. The political climate is angry and short-tempered. Mental health treatment is bad. Our Spectrum Hospital closed our Psych Bed (opened under the Hill-Burton Act in the late 70's).
- Increasing traffic and the need for controls for cars and safe routes for bicycles.
- Mature/diseased trees (beech/fir) are a hazard to property and people – people don't have the money to cut them down.
- I am particularly concerned about the hazardous materials traveling our railroad tracks in the county. I don't think most people think about the devastation that could occur if an accident happened. In some cases, the railroad tracks are particularly close to our school buildings.
- Fewer law enforcement personnel; increased resident violence and rage; increased illegal drugs availability; decreased number of road commission employees and less equipment to take care of the county and insurance; less residents applying for jobs; more businesses being forced to work short-handed or close their doors due to lack of staff.
- Lack of access to problem site on private property
- Traffic not stopping for pedestrians in crosswalks, especially on Ludington Avenue / Highway 10. Steps in the downtown area that are not painted yellow on the edge so people can distinguish one step from another. We recently had a tourist fall on steps that were not painted.
- Some invasive species are out of control and will costs millions to eradicate/control
- Prolonged power outages
- Power, local influence, and dep pockets outweigh community safety as it relates to the long-term human health and safety issues identified in #14. What makes our area special (and draws in tourism dollars) is the natural resources. These should weigh heavily into the land-use planning structure for long-term preservation.
- Possibly the number of supporting organizations or groups to help provide assistance when large numbers of people or areas are impacted.
- Rip currents in Lake Michigan. Dam failures
- Traffic speeds in some rural residential communities such as Hamlin are too fast leading to unsafe roads. Too narrow or non-existent secondary road shoulders. Insufficient crossings on the Lincoln and Pere Marquette rivers that could lead to gridlock if an existing bridge fails or is closed. Lack of sewer system around populated areas of Hamlin Lake likely is harming water quality and could lead to unsafe water at times.

Email addresses to received notification of future opportunities to provide input and to be notified when the draft hazard mitigation plan is available for public review and comment:

34 email addresses collected (withheld here to protect identity and privacy)

Appendix E:
ACKNOWLEDGMENTS & DOCUMENTATION

Mason County LEPC MEMBERSHIP ROSTER

2022 Appointees

Name	Agency	Representing Discipline	E-mail
Jeff Nawrot	American Red Cross	Community Group	jeffrey.nawrot@redcross.org
O'Nealya Gronstal	Lakeshore Food Club	Community Group	ogronstal@lakeshorefoodclub.org
Dan Meysar	Ludington Area Schools	Community Group	dmesyar@lasd.net
Jeff Mount	Mason County Central Schools	Community Group	jmount@mccschools.org
Jon Miller	Salvation Army	Community Group	jon_miller@usc.salvationarmy.org
Tammy Miller	Salvation Army	Community Group	tammy_miller@usc.salvationarmy.org
Lynne Russell	United Way - 211	Community Group	lynner@uwmasoncounty.org
Liz Reimink	Mason Co EMC	Emergency Management	emergencymanagement@masoncounty.net
Jeff Stockhill	Life EMS	EMS	jstockhill@lifeems.com
Jim Herrema	Life EMS	EMS	jherrema@lifeems.com
Justin Brown	Soil Conservation District	Environmental	justin.brown@macd.org
Kathy Winczewski	AFFEWS	Environmental/Local Official	kwinc@hotmail.com
Joe Cooper	Mason Co. Rural Fire Authority	Fire Fighting	chiefj2601@hotmail.com
Ron Melchert	Mason Co. Rural Fire Authority	Fire Fighting	rjmelchert78@gmail.com
Carlene Zielinski	Mason County Rural Fire Authority	Fire Fighting	mcrfzielinski@gmail.com
Larry Gaylord	Pere Marquette Fire Department	Fire Fighting	pmfd@pmtwp.org
Janet Vyse-Staszak	Dept of Human Services	Healthcare	Vyse-StaszakJ@michigan.gov
Ben White-Elder	Spectrum Health Ludington Hospital	Healthcare	
Zach Vanderwall	West Michigan Community Mental Health	Healthcare	zacharyv@wmcmmhs.org
	Ludington Police Department	Law Enforcement	
Derrek Wilson	Sheriff Dept	Law Enforcement	dwilson@masoncounty.net
Kim Cole	Sheriff Dept	Law Enforcement	kcole@masoncounty.net
Andrew Velky	US Coast Guard	Law Enforcement	Andrew.J.Velky@uscg.mil
Fabian Knizacky	Administration	Local Officials	fknizacky@masoncounty.net
Steven Hull	Board of Commissioners	Local Officials	stevenhull1957@gmail.com
Mitch Foster	City of Ludington	Local Officials	mfoster@ci.ludington.mi.us
Dan Rohde	Mason County Drain Commissioner	Local Officials	drohde@masoncounty.net
Cayla Sanders	Mason County Zoning	Local Officials	csanders@masoncounty.net
Ray Hasil	Mason Oceana 911 Central Dispatch	Local Officials	rhasil@mason-oceana911.org
Todd Myers	Mason Oceana 911 Central Dispatch	Local Officials	tmyers@mason-oceana911.org
Steve Ruba	Synergy Broadcasting	Media - Broadcast	steve@westminews98.com
Rob Alway	Mason County Press	Media - Print	masoncountypress@gmail.com
Bret Haner	DHD #10	Public Health	bhaner@dhd10.org
Jen Hansen	DHD#10	Public Health	jhanzen@dhd10.org
Kathy Kenyon	House of Flavors	Subject Facilities	hfkathyk@houseofflavors.com
Barbara Wood	Quick Way Inc	Subject Facilities	bwood@qkwa.net
Mary Samuels	Mason Co. Road Commission	Transportation	marysamuels@masoncountyroads.com
Joe Stickney	Ludington DPW	Transportation	jstickney@ci.ludington.mi.us
John O'Connor	Mason County Airport	Transportation	joconnor@masoncounty.net

PARTICIPATING LOCAL OFFICIALS

Jurisdiction	Name/Title	Method of Participation/Date(s)
Amber Twp	Mr. Gallie, Supervisor Ms. Rohde, Clerk N/A (elected or appointed official)	Action agenda update, April 2017 Action agenda update, April 2023 Survey responses 8/9/22, 8/11/22
Branch Twp	Mr. Shoup, Supervisor	Phone interview 11/30/23
Custer Village	Ms. Griswold, Clerk	Action agenda update, April 2017
Custer Twp	Mr. Bacon, Supervisor N/A (elected or appointed official)	Action agenda update, April 2017, April 2018 Survey response 8/10/22
Eden Twp	Mr. Nash, Supervisor	Action agenda update, April 2017, April 2018 Survey response 8/9/22
Fountain Village		
Free Soil Village	Mr. Morley	Phone interview 11/14/23
Free Soil Twp	Mr. Surma, Supervisor	Action agenda update, April 2017, April 2018, April 2023
Grant Twp	N/A (elected or appointed official)	Survey response 7/15/23
Hamlin Twp	Nancy Vandervest N/A (elected or appointed official)	Action agenda update, April 2017, April 2018 Survey responses 8/8/22, 8/11/22, 8/24/22
Logan Twp	Mr. Kampfschulte, Clerk N/A (elected or appointed official)	Action agenda update, April 2017, April 2018 Survey response 8/9/22
Ludington City	Mr. Foster, City Manager N/A (elected or appointed official)	Interview 6/13/23 Survey responses 6/16/22, 8/9/22, 8/10/22
Meade Twp	Ms. Krepps, Supervisor	Action agenda update, April 2017, April 2018
Pere Marquette Twp	Mr. Keson, Supervisor N/A (elected or appointed official)	Action agenda update, April 2017, April 2018 Survey responses 6/17/22, 6/120/22
Riverton Twp	Mr. Dittmer, Supervisor	Action agenda update, April 2017, April 2018 Survey response 8/10/22
Scottville City	Ms. Williams, City Manager	Action agenda update, April 2018 Survey response 7/13/22
Sheridan Twp	Mr. Cormany, Trustee N/A (elected or appointed official)	Action agenda update, April 2017, April 2018, April 2023 Survey response 8/9/22
Sherman Twp	Mr. Mickevich, Supervisor Kurt Lubben, Clerk	Phone interview 9/14/23 Survey response 7/26/22 Action agenda update, April 2017 April 2018
Summit Twp	N/A (elected or appointed official)	Survey responses 6/20/22, 8/10/22
Victory Twp	Mr. Mazur, Supervisor	Action agenda update, April 2017, April 2018

MEETINGS

Meetings attended for the purpose of updating the Lake County Hazard Mitigation Plan; including lists of attendees and synopses of relevant comments and discussion.

August 17, 2021: Mason County LEPC Meeting

Synopsis:

Introduction of hazard mitigation and presentation of the process for updating the county's plan.

LOCAL EMERGENCY PLANNING COMMITTEE MASON COUNTY, MICHIGAN MEETING MINUTES August 17, 2021

Emergency Management Coordinator Liz Reimink called the LEPC meeting to order at 4:00 p.m. in the lower-level Conference Room of the Mason County Sheriff Department. Committee members in attendance were: Liz Reimink, Kate Carrigan, Mary Samuels, Kathleen Kenyon, Jim Herrema, Larry Gaylord, Jen Hansen, Andrew Velky, Courtney Miller, Tim Kozal, Derrek Wilson, Fabian Knizacky, Melissa Alvarado, Joe Stickney, and Shannon Stickney. Stephen Carlson, Chris Fannesbeck, and Constance Andersen were also in attendance.

Motion to approve the agenda for the August 17th, 2021 meeting and the minutes from the May 18th 2021 meeting by D. Wilson supported by M. Alvarado. Motion carried.

Notifications/Correspondence Received: L. Reimink read a letter from the Bureau of Alcohol, Tobacco, Firearms, and Explosives informing the LEPC of licensee within our community.

HMEP Grant Updates: Emergency Management Assistant, K. Carrigan, is updating the HEMP plans and has been modeling the sites. All updates should be completed by September 2021.

Hazard Mitigation Updates:

- a. Mason County received their Hazard Mitigation Grant. The Plan is available on the Mason County website under the Emergency Management page.
- b. Stephen Carlson gave an update on the Hazard Mitigation Process and what the committee members can expect as we work to update the plan over the next 3 years.
- c. L. Reimink and Stephen Carlson mentioned the availability of the new FEMA hazard mitigation grants now known as BRIC (Building Resilient Infrastructure & Communities). Member of the public expressed concern over the recent severe storm response and mitigation plans moving forward.

Three Year Exercise & Training Plan:

L. Reimink presented the requirement to have submit a 3-year training and exercise plan and asked if other groups had exercises or trainings planned that could be included in the plan.

CodeRED Update:

L. Reimink shared that the enrollment numbers for CodeRED keep increasing. All agencies are asked to continue promoting the system.

Hazard Risk & Vulnerability Assessment:

L. Reimink lead the group through the additional hazard assessments.

Upcoming Events & Dates: Prepare Fair September 11, 2021 from 1pm to 4pm at Walmart. L. Reimink described the plans for the State sponsored fair.

Agency Updates/ Roundtable: Agencies present shared the following updates:

Mason County Road Commission: Crews have been busy cleaning up trees from the prior week's storms. Plans are in place to do chip sealing and road improvement projects. MDOT will be adding in right turn lanes in front of Meijers.

House of Flavors: Facility will be conducting a table-top exercise with community agencies on August 25th.

Quick-Way: Has received a National Safety Award.

USCG: Station Ludington will be closing for the season on September 11th.

January 20, 2022: Mason County Township Officers Association

Synopsis:

Mason County Emergency Management attended to discuss hazard mitigation planning process with local units of government.

Mason County Township Officers Association

Regular meeting minutes of January 20, 2022; 6:00 p.m.

Sheridan Township Hall, 6407 E. Dewey Rd., Fountain, MI 49410

Minutes of the Mason County Township Officers Association are as follows.

Meeting called to order by Lois Krepps, MCTOA Secretary/Treasurer, due to the absence of Jerry Bleau, MCTOA Chairman, at 6:06 p.m. Pledge of Allegiance was recited by all.

Roll Call:

Amber – 0	Meade – 1	County Officers – 4
Branch – 0	Pere Marquette – 2	Rural Fire Authority – 1
Custer – 1	Riverton – 1	Road Commission – 0
Eden – 2	Sheridan – 3	Conservation District – 1
Free Soil – 0	Sherman – 1	Visitors & Guests – 3
Grant – 0	Summit – 1	911 – 1
Hamlin – 1	Victory – 0	<i>Totaling: 27</i>
Logan – 0	Commissioners – 4	

Excerpt from Minutes:

K. Other County Officers Report:

Liz Reimink (Mason County Emergency Management) informed the Association a few years ago the County Hazard Mitigation Plan was updated. MC Emergency Management will be starting that process again with hiring West Michigan Shoreline Regional Development Commission. Around 5 years ago, all Townships adopted the County Hazard Mitigation Plan. With adopting the plan, allows Townships to apply for FEMA funding Hazard Mitigation Projects. Townships will be getting information to participate in the update process. Once the final draft is completed, all Townships will be receiving it again to be adopted.

May 10, 2022: Mason County LEPC

Synopsis:

Reviewed and discussed Community Hazards Survey, community participation, and public engagement. LEPC also reviewed draft hazard rating and ranking tables and seasonal population estimates drafted by WMSRDC.

LOCAL EMERGENCY PLANNING COMMITTEE MASON COUNTY, MICHIGAN MEETING MINUTES May 10 2022

Vice Chair T. Kozal called the LEPC meeting to order at 3:00 PM. Committee members and guests in attendance were: Liz Reimink, MCEM remotely; Kate Carrigan, MCEM; Tim Kozal, LPD; Joe Stickney, Ludington DPW; Zach VanderWall, West MI CMH; Carlene, MCRFA; Stephen Carlson, WMSRDC; Ray Hasil, Mason/Oceana 911; John O'Connor, Mason County Airport; Fabian Knizacky, Mason County Administrator; Kathy Winczewski, AFFEW & City of Ludington; Mary Samuels, MCRC; Holi Werner, Spectrum Health Ludington remotely; Andrew Velky, USCG remotely.

Motion by K. Winczewski and second by R. Hasil to approve agenda.

Motion by R. Hasil and second by J. Stickney minutes from the 4-12-2022 meeting. Motion passed

Public Comment: None

Notifications/Correspondence Received: Received resignations from Courtney Miller and Melissa Alvarado.

HMEP Grant Updates: K. Carrigan updated. Hackert Farms has less chemicals than expected. L. Reimink does not recommend getting TIER II software because of the cost and limited value added to the committee.

Hazard Mitigation Updates: T. Kozal and S. Carlson Updated.

Plan draft would be available in June 2023. There will be an online survey. LEPC reviewed the survey questions and made observations.

CodeRED Update: K. Carrigan gave an update on the results of the annual all-call feedback survey.

By-Law Updates: The committee reviewed the draft and offered suggestions.

Agency Updates/ Roundtable: Agencies present shared the following updates:

K. Carrigan, Emergency Management, reported on the welcome packet for LEPC new members.

M. Samuels, Mason County Road Commission, reported projects and brining soon will begin.

J. Stickney, DPW for City of Ludington, Washington Avenue street project will be starting soon. There will be a lot of patching done.

J. O'Connor, Mason County Airport, the airport is getting ready for all the summer traffic.

Z. VanderWall, CMH, is busy working on training for security plans.

K. Winczewski, AFFEW is having a stakeholders meeting Ludington wants dogs on the beach, more people are having chickens in their yards. Lots of sidewalk construction going on around town. Trailers. NOAA light at Stearns Beach to determine whether people should go into the water.

R. Hasil, Updated the LEPC about High Fire Risk Days, May 24th will be organizing a forum for dunes organizations in Pentwater

Barbara from Quick Way is just checking out the committee and will be Melissa's replacement.

T. Kozal, Chief of LPD, is looking forward to Gus Macker and Water Safety Day on June 4th.

A. Velky, USCG opening Station Ludington on May 16th

Any Other Business: No other business was reported.

Adjournment: J. Stickney Moved Steve second to adjourn

Next Meeting: August 9th, 2022

August 9, 2022: Mason County LEPC Meeting & Public Input Opportunity

Synopsis:

Public input opportunity hosted by the Mason County LEPC. Meeting was noticed in the Ludington Daily News and posted on the Mason County Emergency Management website.

LOCAL EMERGENCY PLANNING COMMITTEE MASON COUNTY, MICHIGAN MEETING MINUTES August 09, 2022

Emergency Management Coordinator Liz Reimink called the LEPC meeting to order at 3:00 p.m. in the lower level conference room in the Sheriff's Office. Committee members in attendance were: Liz Reimink, Cayla Sanders, Kathy Winczewski, Fabian Knizacky, Tim Kozal, Carlene Zielinski, Zack Vanderwall, Bret Haner, Seth Hopkins, John O'Connor, Mary Samuels, Barbara Wood, Jannice Lamm, Jon Miller, Kathy Kenyon.

Public hearing on Hazard Mitigation Plan: Draft plan will be done August 2023

WMSRDC Staff, Stefan Carlson gave opening remarks about hazard mitigation and moved on to invite comments regarding community hazards in terms of location and vulnerable populations.

Comments received:

- Mason Lake Conservation District representative noted a road-stream crossing inventory that can be shared for the hazard mitigation plan and may present an opportunity for collaboration.
- During recent Lake Michigan high water episode, City of Ludington municipal water intake was severely impacted, as well as other manmade structures along the shoreline. Water deaths were above average around Lake Michigan.
- Old or aging public infrastructure presents a significant risk... and also opportunity for improving resistance to natural forces
- Mason County is experiencing residential growth, which is expected to continue in the near future.
- Excessive rainfall events have impacted Mason County with increasing frequency, causing erosion and flooding. Waterfront properties are regularly impacted by flooding.
- Increasing heat is an increasing concern in Ludington, whereas it historically has not. (Cooling centers maybe needed).
- Within federal forest lands (Huron-Manistee National Forest) homeless and transient population is a concern due to difficulties for contacting/warning those populations. Approximately 50 family units are believed to be living in the forest.
- Chemical spills along roads and railroads, and near industrial operations
- Ludington Pumped Storage Facility

Public Hearing Concluded with discussion about next steps in the hazard mitigation planning process and gratitude for comment and participation in the meeting.

Motion by Kozal and seconded by Samuels to approve the agenda for the August 09, 2022 meeting and the minutes from the May 21, 2019, meeting. Motion carried.

Public Comments: None

Notifications/Correspondence Received: Metalworks had a tank over fill & made a report to LEPC

HMEP Grant Updates: Kate is wrapping up plans. Charter will be a new site

Hazard Mitigation Updates:

CodeRED Updates: Has been a boom in enrollments

Updated By-Law Adoption: Kathy moves Jannice 2nd to approve the update to the LEPC By-Laws. Motion Carried.

February 14, 2023: Mason County LEPC Meeting

Synopsis:

Reviewed Community Hazards survey results and offered an opportunity for LEPC to comment on revised hazard rating and ranking tables. (*minutes are not available due to an error by the Emergency Manager, who subsequently accepted another job and left Mason County*)

Mason County Local Emergency Planning Committee
February 14, 2023

Name	Agency Represented
Emergency Management	
Liz Reimink	MCEM

Elected State Officials

Local Officials	
Kathy Wine, Zaski	City of Ludington

Law Enforcement	
Derek Wilson	Mason County Sheriff's Office

Firefighting	
CARLENE ZIELINSKI	MCEFA

Public Health

Local Environmental

First Aid/EMS	
Jim Herremq	Life Ems

Transportation	
JOE STICKNEY	City of Ludington

Healthcare	
Benjamin White -Elder	Corewell Health

Broadcast & Print Media

Community Groups

Owners & Operators of Subject Facilities
--

Other Members	
Orville Theaker	MSP GMSD
Fabian Knizack	Mason County Administration

June 13, 2023: Mason County LEPC Meeting

Synopsis:

WMSRDC staff gave an update on planning progress and discussed steps for completion and adoption.

LOCAL EMERGENCY PLANNING COMMITTEE MASON COUNTY, MICHIGAN MEETING MINUTES June 13, 2023

Mason County Administrator Fabian Knizacky called the LEPC meeting to order at 3:00 p.m. in the lower level conference room in the Sheriff's Office. Committee members in attendance were: Orville Theaker MSP EMHSD, Bret Haner DHD #10, Kathy Winczewski AFFEW, John O'Connor Mason County Airport, Jim Herrema Life EMS, Zack Vanderwall West MI CMH, Ben White-Elder Corewell Health Ludington, Kathy Kenyon House of Flavors, Steve Wietrzykowski LPD, Joe Stickney Ludington DPW, Stephen Carlson West MI Shoreline RDC, Barbra Wood Quick-Way INC. Virtual: Derrek Wilson MCSO by Teams.

Motion by K. Winczewski and seconded by D. Wilson to approve the agenda for the June 13, 2023 meeting and minutes from the February 14, 2023 meeting. Motion carried.

Public Comments: None

Notifications/Correspondence Received:

Hazard Mitigation Updates: Stephen Carlson reported Grant will end December 2023 and draft plan will be available in September 2023. Is seeking co-adoption after FEMA.
H. Scarbrough EM will be distributing information before the August 2023 meeting.
Hazard mitigation plan for pre and post disaster, prevent, rebuild. Mitigation Projects – Do not have to be listed in plan for Grant.

CodeRED Updates:

Chemical Emergency Brochure: House of Flavors has updated and has submitted to LEPC. House of Flavors is looking for more sponsors. Needs to be reviewed so it can be issued possibly September or November. Draft will be forwarded to EM.
EM will need to put together mailing list and LPD will post to their Facebook Group. Everyone will receive an email with the brochure and please have your thoughts or changes back to EM by June 30th to be brought to the August 8th Meeting.

MSP Training Opportunities: H. Scarbrough will be forwarding any MSP training opportunities via email to LEPC Committee.

Agency Updates:

Emergency Management: Heath Scarbrough new EM

City of Ludington: City of Ludington has been busy with the invasive species removal at the park by AFFEW. The 150th Birthday party of Ludington was last weekend. There was a mini Friday night live. This year is the last year of Gus Macker in Ludington.

September 12, 2023: Mason County Board of Commissioners & Public Comment Opportunity

Synopsis:

Meeting was noticed in the Ludington Daily News and all local units of government were notified via email. These communications invited review of the Community and Hazard profiles, Goals & Objectives, and Hazard Vulnerability Analysis sections, which were posted on the WMSRDC website prior to the public meeting. Opportunities for comment on the draft sections could be made during the public meeting or by submitting written comments to WMSRDC staff prior to the meeting. One commissioner commented that he wished for the wind turbines in Riverton and Summit townships to be shown on county and local maps. Another commissioner subsequently provided edits and additions to information presented in Appendix A.

September 12, 2023

The regular meeting of the Mason County Board of Commissioners was held at 9:00 a.m. at the Mason County Airport terminal conference room 5300 W. US 10 Ludington, Michigan.

The meeting was called to order by Chair J. Andersen.

Roll call was taken. Present: N. Krieger, G. Castonia, J. Hartley, L. Squires,
S. Hull, J. Andersen, R. Bacon.
Absent: None.

Invocation was given by L. Squires followed by the Pledge of Allegiance to the flag of the United States of America.

Motion by R. Bacon and seconded by S. Hull to approve the agenda. Motion carried.

Motion by N. Krieger and seconded by S. Hull to approve the minutes of the August 15, 2023 regular meeting. Motion carried.

No correspondence was read.

Public Comment:

James Kelly, MSU-E, wished to update the Board on new hires within the past few months with Michigan State University Extension. They have hired Julie Erickson as administrative support staff. Introduced was Lori Cargill, the new 4-H Coordinator.

Karla McLouth, Branch Township, Tallman Lake Senior Center, Vice President, thanked the Finance, Personnel, & Rules Committee for their several weeks of work with the senior allocations and with the appointment of the coordinator. She encouraged the Board to also support the proposed appropriations.

In her personal capacity, she thanked the Board for the Prepare Fair presentation that occurred this past weekend in the Walmart plaza. It provided insight for her that she did not previously have in her role as court reporter.

Tom Rotta, City of Ludington, noted that at the City of Ludington meeting held last night, two resolutions were passed regarding commercial rehab districts. He was in favor of one, but noted that the second parcel, the old Foster School District, in his opinion, did not meet the requirements for commercial rehabilitation. He cited the approval of this would be in violation of Act 210. This parcel is considered government and not allowable under the laws of the State. He informed the Board, that they have the oversight and ability to veto this project within 28 days if the site does not meet the requirements. He is requesting a meeting with the County Administrator to review. A copy of his transcript will be included with the official notes.

Cayla Sanders reviewed the Mason County Zoning & Building 2022 report in detail. Questions from Commissioners were answered. It was noted that Air B & B's do not have a separate ordinance to regulate.

Motion by L. Squires and seconded by S. Hull to leave regular session and move into a Public Hearing.

Motion carried.

Stephan Carlson, program manager for Economic Development and Local Government Services West Michigan Shoreline Regional Development Commission provided an overview of why the County needed a hazardous mitigation plan and the impact of FEMA pre and post disaster mitigation projects need to be done. Commissioner Hartley noted that the information needed to be updated for the individual communities as it was outdated and that the infrastructure also needed addressing with regards to the wind mills, as these were not listed on the map.

Motion by L. Squires and seconded by S. Hull to leave public session and return to regular session. Motion carried.

Commissioner Krieger noted that he was able to attend the Mason-Lake Farm tour on August 31, 2023 and noted this annual event was well put-together and encouraged all Board members to make sure to attend any future events.

Motion by N. Krieger and seconded by G. Castonia to approve the following resolution:

HONORABLE COMMISSIONERS

WHEREAS, the Federal Aviation Administration (FAA) requires Airports receiving federal funding to periodically undergo an airport consultant procurement process; and

WHEREAS, the Michigan Office of Aeronautics has advised the County of the need to perform this process.

THEREFORE BE IT RESOLVED, that the Board of Commissioners of the County of Mason approves the establishment of the Airport Consultant Selection Committee and names Commissioner Steve Hull, Commissioner Janet Andersen, Commissioner Nick Krieger, Airport Manager John O'Connor and Administrator Fabian Knizacky to said committee.

RESOURCES

Many resources, documents, and websites were researched and referenced during the development and updates of this plan. The following were most helpful during this process:

Michigan Hazard Mitigation Plan (2019)
Michigan Hazard Analysis (2019) and Supplemental (2020)
Michigan Historical Markers <https://www.michigan.gov/mhc/historical-markers>
Michigan Department of Environment Great Lakes and Energy (EGLE) (water/wastewater, GIS data)
Michigan Department of Natural Resources <https://www.michigan.gov/invasives>
Michigan GIS Open Data <https://gis-michigan.opendata.arcgis.com/>
Michigan Transportation Asset Management Council
<https://www.mcgi.state.mi.us/mitrp/tamcDashboards/reports/pavement>
National Register of historic places <https://www.nps.gov/subjects/nationalregister/index.htm>
US Census: American Community Survey & Decennial Census
US Drought Monitor <https://droughtmonitor.unl.edu/>
NOAA National Centers for Environmental Information (NCEI a.k.a. NCDC) Storm Events Database
National Weather Service – Beach Hazards https://www.weather.gov/greatlakes/beachhazards_stats
NFIP Community Status Book <https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book>
NFIP Policy Information <https://nfipservices.floodsmart.gov/reports-flood-insurance-data>
FEMA Comprehensive Economic Development Strategy and Hazard Mitigation Plan Alignment Guide
US Department of Agriculture Census of Agriculture County Profile (2017)
NFIP Flood Insurance Rate Maps
USGS topographic maps
USDA Mason County Soil Survey (September 1995)
Climate and Economic Justice Screening Tool <https://screeningtool.geoplatform.gov/en/>
American Red Cross (shelters)
National Inventory of Dams <https://nid.sec.usace.army.mil/#/>
Multi-Resolution Land Characteristics Consortium Land Cover Data Sheet www.mrlc.gov/data
Michigan Fire Inspectors Society Foundation
United Way of Michigan (ALICE statistics)
Michigan Sea Grant <https://www.michiganseagrant.org/>
Mason County Master Plan Update (2020)
Mason County Zoning Ordinance (2019)
Mason County Recreation Plan (2022)
Mason County Equalization Report (2022)
Mason County Wildfire Protection Plan (2016)
Mason County Stormwater Runoff, Soil Erosion and Sedimentation Control Guidelines and Ordinance (1999)
Ludington Area Shoreline Land Use and Resiliency Plan (2020)
MLive (news) <https://www.mlive.com/>
Shoreline Media (news) www.shorelinemedia.net

ARTICLES & PUBLIC NOTICES

Articles and public notices published during the Mason County Hazard Mitigation Plan Update planning process.

June / July 2021 – WMSRDC print newsletter

LOCAL GOVERNMENT AND SPECIAL PROJECTS

Hazard Mitigation Grant Awarded

According to the Federal Emergency Management Agency (FEMA), hazard mitigation is any sustainable action that reduces or eliminates long-term risk to people and property from future disasters. Mitigation planning breaks the cycle of disaster damage, reconstruction, and repeated damage.

WMSRDC has experience working with local communities on hazard mitigation dating back to the early 2000's. This planning tradition is set to continue, thanks to a grant from FEMA accepted by WMSRDC in June. Over the next two years, WMSRDC will work within the counties of Lake, Mason, and Oceana to update existing county-wide hazard mitigation plans. Each county will be armed with an advisory team to help guide the process by helping to identify and assess hazards and prioritize potential mitigation measures.

This effort will help communities within Lake, Mason and Oceana mitigate hazards (including natural, man-made, and other hazards) by identifying potential hazards and mitigation strategies, as well as help communities be eligible to access various sources of federal assistance, such as the Building Resilient Infrastructure and Communities (BRIC) program.

**The WMSRDC office is open.
Staff is currently working a hybrid
of in-person and remotely.**

Coastal Zone Reforestation Grant Closes Successfully

Thanks to a Great Lakes Restoration Initiative (GLRI) grant through the United States Forest Service (USFS), WMSRDC has facilitated the planting of over 290 trees and 4,300 tree seedlings. This will allow for the interception of up to 286,622 gallons of runoff annually. That is more than twice the obligation of the grant requirement.

Stormwater reduction is an important ecological service that trees provide but one that is seldom considered. The water those trees absorb does not end up creating flash flows that cause erosion, flooding, or damage to infrastructure, and the presence of trees provide many benefits. The benefits include shade, screening of viewsheds, aesthetic quality, cooling of urban landscapes, pollution mitigation, habitat for wildlife along with the targeted runoff reduction of this grant.

WMSRDC worked with private, state, and municipal partners to meet the region's goal. WMSRDC partnered with five state parks (Ludington, Charles Mears, Silver Lake, Muskegon, and Hoffmaster) as well as, the Muskegon Conservation District and the City of Muskegon to achieve the results. WMSRDC is grateful to the USFS and the GLRI grant program for the opportunity to successfully provide these services.



LOCAL GOV'T SERVICES & SPECIAL PROJECTS

Hazard Mitigation Planning Update

Efforts to update the hazard mitigation plans for Lake, Mason, and Oceana counties continue. In March, WMSRDC staff coordinated with each county's emergency manager to send letters to all local units of government. The letters served to notify local units of the plan updates over the next 12 to 16 months and to seek their participation in the process.

The plans will enable counties, and local municipalities that participate in the planning process, to apply for funding to lessen or prevent the effects of natural hazards. The Federal Emergency Management Agency (FEMA) requires these plans to be updated every five years.

Feedback from each community within the county is critical to the quality of this effort. Opportunities for input will be made available through the WMSRDC website. Communities that choose to participate will be notified when opportunities arise. There is no cost or obligation associated with participation. However, failure to participate may jeopardize a community's eligibility for hazard mitigation funding or projects in the future.

If your community wishes to participate, and has not yet responded to the aforementioned letter, please appoint a point of contact for your community by sending a name and email address to scarlson@wmsrdc.org. Questions and concerns regarding the hazard mitigation plan updates may also be sent to that address, or directed to your county's emergency manager.

Local Planning Clearinghouse

As a regional planning and development organization, WMSRDC serves a wide variety of roles. One perhaps lesser-known role is to provide a clearinghouse for local planning efforts. In Michigan, local governments that are creating or updating master planning and recreation planning must notify the local regional planning agency when they are engaging in the activity, and they must provide a copy of the plan to the regional planning agency when it is complete. This may be in the form of a paper copy, a digital copy sent via email, or a link to the plan online.


In the coming months, WMSRDC will step up its "clearinghouse game." A project page will appear on the WMSRDC website to provide information about






the status of community master and recreation plans within the region, links to those plans (if available), and instructions on how to submit plans to WMSRDC. This public-facing clearinghouse will facilitate awareness for planning and be a resource for communities and interested individuals.


*"...a lesser-known role of
WMSRDC is to provide
a clearinghouse for
local planning efforts."*



June 2022 – WMSRDC Facebook posting








**West Michigan Shoreline Regional Development Commission (WMSRDC)**...


Intro


Our mission is to promote and foster regional development in West Michigan through cooperation among

 **Page** · Government organization




 316 Morris Ave #340


 (231) 722-7878

 wmsrdc.org

 **Open now** ▾

Photos [See all photos](#)



**West Michigan Shoreline Regional Development Commission (WMSRDC)**...

June 9, 2022 · 🌐

Take the Community Hazards Survey

This survey is designed to gather input from community members and stakeholders for the purpose of updating the hazard mitigation plans for the counties of Lake, Mason, and Oceana.

Hazard mitigation plans assess a wide variety of hazards from both the county and local community perspectives and make participating jurisdictions eligible to apply for funding for projects that will mitigate (reduce or prevent impacts of) hazards.

Go to <https://wmsrdc.org/program/hazard-mitigation/> for additional information and resources. There you will find the latest on the effort to update the hazard mitigation plans for Lake, Mason, and Oceana counties, as well as helpful hazard resources.

Click here to complete the survey:
<https://app.surveymethods.com/EndUser.aspx...>

LOCAL GOV'T SERVICES & SPECIAL PROJECTS

Community Hazards Surveys Available

WMSRDC, in partnership with local emergency management leaders, is working to update hazard mitigation plans for the West Michigan counties of Lake, Mason, and Oceana.

Hazard mitigation is any sustainable action that reduces or eliminates long-term risk to people and property from future disasters. Mitigation planning breaks the cycle of disaster damage, reconstruction, and repeated damage. Hazard mitigation includes long-term solutions that reduce the impact of disasters in the future. Once hazard mitigation plans are approved by the Federal Emergency Management Administration and adopted locally, communities become eligible to apply for pre-disaster and post-disaster mitigation funding.

Public input is essential to identifying and planning for local hazards. An online survey has been created to collect comments from community members, leaders, and stakeholders. The survey may be accessed through the WMSRDC website: <https://wmsrdc.org/project/hazard-mitigation-plan-updates/>

The survey will be open through the summer, though participants are encouraged to complete the survey as soon as possible. In addition, public hearings will be held in Lake, Mason, and Oceana counties to provide additional opportunities for public input later in 2022. Once dates are identified, public notices will be published in local newspapers and noted on social media and the WMSRDC website.



Erosion at a residence on the Lake Michigan Shoreline in the City of Norton Shores, Muskegon County.

Muskegon River Watershed Tree Plantings

WMSRDC is wrapping up the most recent tree planting grant within the Muskegon River Watershed. A total of 265 trees have been planted in the cities of Muskegon and Roosevelt Park, and the townships of Cedar Creek and Dalton in Muskegon County, as well as the City of Fremont in Newaygo County. The grant is provided by the U.S. Forest Service in partnership with the Muskegon River Watershed Assembly.

Earlier this summer final monitoring of the tree plantings was completed and of the 265 trees planted only 17 did not survive. The trees that did not survive will be replaced later this fall with funds provided by this grant. Native Michigan type trees such as maple, oak, tulip tree, eastern redbud, serviceberry, dogwood, sycamore, arborvitae, linden, river birch and poplars were planted within parks in Muskegon County including Beegle Field, Campbell Field, Marsh Field, Margaret Elliot Drake Park, Padley Park, and Sheldon Field. Trees were also planted at Cedar Creek Township Hall and

See Trees continued on page 7



Public Meeting Notice #1 – August 2022

Affidavit of Publication

STATE OF MICHIGAN

§§


County of Mason

Banks Dishmon, being first duly sworn, says that he is the VP/CRO of the Ludington Daily News, a daily newspaper printed and circulated in said county of Mason, and that annexed hereto is a copy of a certain notice taken from said newspaper, in which the notice was published on the following dates, to wit:

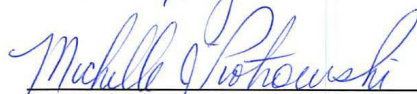
**NOTICE OF PUBLIC MEETING REGARDING
HAZARD MITIGATION**

The West Michigan Shoreline Regional Development Commission (WMSRDC), in cooperation with Mason County Emergency Management, has begun the process of updating the Mason County Hazard Mitigation Plan. Public input is requested regarding community hazards that pose a threat to people and property in Mason County. A public meeting to discuss Hazard Mitigation and receive input from community members will take place at 3:00 PM on August 9, 2022 at the Mason County Sheriff's Office located at 302 N. Delia Street, Ludington, MI 49431. In addition, an online "Community Hazards Survey" and information about the Hazard Mitigation plan update are available at www.wmsrdc.org. Questions? Please contact Stephen Carlson at scarlson@wmsrdc.org.

August 2, 2022


(Banks Dishmon, VP/CRO)

Subscribed and sworn to before me this
3rd day of August A.D. 2022


Michelle J. Piotrowski

Notary Public for Mason County, acting in
Mason County

Commission Expires: 12-18-2026

Economic Development: EDA Projects in the Region

A core component of the WMSRDC economic development program is to provide technical assistance to local communities within the counties of Lake, Mason, Muskegon, Newaygo, and Oceana. This includes helping communities navigate the U.S. Department of Commerce,

Economic Development Administration (EDA) grant application process; from vetting ideas, to crafting applications, to accepting and managing grants. Over the past year, WMSRDC assisted numerous communities in applying for and receiving EDA funding assistance. These are the current

EDA-funded projects within the WMSRDC region:

- **City of Muskegon Heights**
 - Industrial Parks Master Plan
- **Oceana County**
 - Workforce & Economic Diversification Study
- **City of Hart**
 - Wastewater System Improvements
- **Lake County**
 - Economic Diversification Initiative

EDA offers many funding opportunities, which may be researched at <https://www.eda.gov/funding/funding-opportunities>. Please contact WMSRDC early and often to discuss your community's economic development ideas, find the right funding program, and make your application to EDA a success!



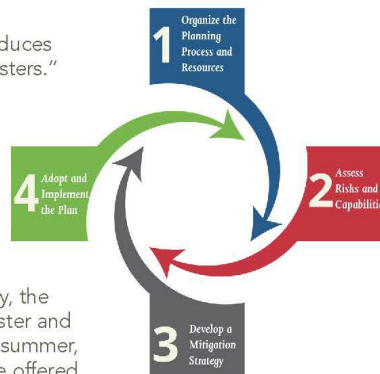
Orchard in Oceana County that will be impacted by the multiple EDA grants currently ongoing in the county

Local Government Services: Hazard Mitigation Update

The definition of hazard mitigation is “any sustainable action that reduces or eliminates long-term risk to people and property from future disasters.” Mitigation planning seeks to break the cycle of disaster damage, reconstruction, and repeated damage and includes long-term solutions that reduce the impact of disasters in the future.

WMSRDC is currently helping the counties of Lake, Mason, and Oceana update their respective countywide hazard mitigation plans. Each plan and planning process is designed to be “multi-jurisdictional,” meaning those local communities participate in the planning process. Once the plan is approved by the Federal Emergency Management Administration (FEMA) and adopted locally, the countywide plan will become eligible to apply to FEMA for pre-disaster and post-disaster hazard mitigation funding. Throughout the spring and summer, communities within the counties of Lake, Mason, and Oceana will be offered opportunities to participate in the hazard mitigation planning process.

In addition, there will be an announced review period near the end of the summer to offer the public an opportunity to review the proposed draft hazard mitigation plans. The plans are anticipated to be completed and adopted by each county before the end of calendar year 2023.



Public Meeting Notice #2 – September 2023

Affidavit of Publication

STATE OF MICHIGAN

§§


County of Mason

Mike Hrycko, being first duly sworn, says that he is the Publisher of the Ludington Daily News, a daily newspaper printed and circulated in said county of Mason, and that annexed hereto is a copy of a certain notice taken from said newspaper, in which the notice was published on the following dates, to wit:

September 7, 2023

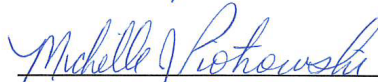
HAZARD MITIGATION PUBLIC MEETING

Public input is requested for the Mason County Hazard Mitigation Plan, which is being updated by Mason County Emergency Management with assistance from the West Michigan Shoreline Regional Development Commission (WMSRDC). Draft sections of the plan are available for public review at <https://wmsrdc.org/program/hazard-mitigation/overview/>. The public is invited to comment on these sections at the Board of Commissioners regular meeting on September 12th at 9:00 A.M. in the Mason County Airport Terminal conference room, 5300 US-10, Ludington, MI 49431. Written comments may also be emailed to scarlson@wmsrdc.org prior to the meeting. Please direct any questions to Stephen Carlson at (231) 722-7878 ext 110.



(Mike Hrycko, Publisher)

Subscribed and sworn to before me this
13th day of Sept. A.D 2023



Michelle J. Piotrowski

Notary Public for Mason County, acting in
Mason County

Commission Expires: 12-18-2026

Environmental: NOAA Regional Partnership Update

In 2020, WMSRDC entered the Lake Michigan Rivers and Coastal Wetlands Regional Partnership with the National Oceanic and Atmospheric Administration (NOAA). Since then, the Little Cedar Creek, Stony Creek, and White River projects were selected for funding. All projects have completed design plans and are at differing stages in the implementation process. At Little Cedar Creek, the 500 feet of instream habitat restoration and the culvert replacement at Sweeter Road stream crossing have been completed. The additional culvert replacement at Michillinda Road crossing began construction at the beginning of September. The White River project will replace three road stream crossings in Swinton Creek and one in Cushman Creek and restore 1,080 feet of instream habitat in Swinton Creek. This work is set to begin this fall. The Stony Creek project at Marshville Dam Park includes dam remnant removal, removal of two old bridges and three culverts, a bridge replacement, and 500 feet of instream habitat replacement. This work is anticipated to begin in the spring of 2024.

To complete all anticipated construction activities and post-monitoring efforts, WMSRDC has collaborated with NOAA to extend the project deadline through September 2024. Project partners for the three projects include Muskegon County Road Commission, Oceana County Road Commission, Grand Valley State University Annis Water Resources Institute, Conservation Resource Alliance, Oceana County Parks, watershed groups, and private landowners.



Sweeter Road and Little Cedar Creek crossing during pre-restoration monitoring and after construction.



Local Government Services: Hazard Mitigation

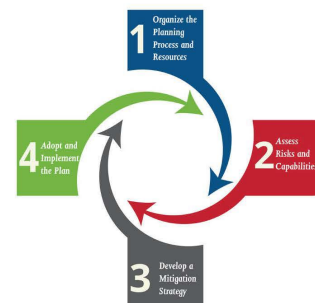
WMSRDC is nearing completion of a project to update Hazard Mitigation Plans for the counties of Lake, Mason, and Oceana. With FEMA-approved plans in place, each county and each local community that participated in the planning process will be eligible to adopt the county plan and become eligible to apply for federal pre-disaster and post-disaster funding.

The WMSRDC website wmsrdc.org/program/hazard-mitigation/ currently hosts draft

sections for public review. Local officials in the counties of Lake, Mason, and Oceana are especially encouraged to review and provide input on these materials to ensure their community will at least have the option to become eligible for mitigation funding.

Hazard mitigation is any sustainable action that reduces or eliminates long-term risk to people and property from future disasters. Mitigation planning seeks to break the cycle of disaster damage, reconstruction,

and repeated damage. Hazard mitigation includes long-term solutions that reduce the impact of disasters in the future.



September 2023 – WMSRDC Facebook posting

West Michigan Shoreline Regional Development Commission (WMSRDC)
1d · 🌐

WMSRDC is helping the counties of Lake, Mason, and Oceana update their Hazard Mitigation Plans. Go to the WMSRDC website for more information and to preview and comment on draft sections of each plan, including hazard vulnerabilities, community profiles, and goals & objectives. Come back in December to download the completed plans!

WMSRDC.ORG
Hazard Mitigation « Programs « West Michigan Shoreline Regional...
What's New: In 2021, WMSRDC received a FEMA grant to update hazard mitigation plans for the counties of Lake, Mason, and Oceana. This...

👍 Stephen Carlson

👍 Like 💬 Comment ➦ Share

Windows taskbar: 68°F, 12:07 PM, 9/29/2023, 23 notifications

Appendix F:
Potential Hazard Mitigation Funding Sources

This Appendix provides a compendium of federal, state, and private sector funding sources for hazard mitigation projects, and is intended to serve as a tool for local communities to use in developing funding "packages" to implement hazard mitigation projects in support of their hazard mitigation plan. It is NOT the "be-all, end-all" information source for hazard mitigation project funding. Rather, it is intended to serve as a roadmap to other, more detailed information sources such as the Federal Assistance Listing, federal and state-agency web sites, and private philanthropic organization web sites. Information in this section was compiled by personnel in the MSP/EMHSD and included in the 2019 Michigan Hazard Mitigation Plan.

Funding sources open to local governments or that directly or indirectly benefit local governments, are listed in this compendium. Those programs that benefit a designated group only (i.e., Indian Tribes) are not included, nor are those programs for which a State Agency is the only eligible applicant. (However, it is possible that projects could be funded under a partnership arrangement with a State Agency. Such requests would have to be directed in writing to that agency.) The mere availability of funding for mitigation projects does not guarantee success. "Grantsmanship"—the ability to formulate projects, determine probable costs, identify probable funding sources, coordinate with project "partners", and write successful project proposals—is an essential skill for today's emergency management professionals. Someone in the community has to have the "vision" to identify potential projects, handle the mechanics of obtaining funding, and then see the project through to fruition. Grantsmanship is both an art and science. There are definite right and wrong ways to prepare project proposals. That is the science part of the equation. However, it is the "art" involved—the ability to see what others might not and then have the wherewithal to make something happen—that makes some communities successful and others not. Fortunately, technical assistance in proposal development and grant writing is available from a variety of sources. Many local communities may have their own Grants Coordinator on staff or under contract to assist local agencies in grant-related activities. Guidance on developing and writing grant proposals is also included within this section.

Two types of problems frequently appear when mitigation efforts are being considered. The first is when a planner or emergency manager doesn't even consider many mitigation possibilities because an area's hazards may seem too large-scale, expensive, or technically demanding for the resources of his or her community to address. On the other hand, you may have dared to "dream big" and produced a lengthy "wish list" of excellent hazard mitigation ideas for your community, but now you need to determine whether any of these solutions are realistically achievable within the technical and financial limits of your community's emergency management program. This section is intended to encourage planners to dare to "think big" in creating their ideas for hazard mitigation projects, and then to be able to realistically assess the feasibility of implementing these projects. This section hopes to enable you to explore a wider range of possibilities for gaining the technical and financial capabilities needed to implement your project ideas. Before you give up a great idea that you were bold enough to envision, you should read through this section to see if, just maybe, there is a way to assemble all the funding and technical requirements that will make it work. There may be cases where a proposal is rejected as almost but not quite feasible, because it lacks that last bit of funding or technical expertise that would ensure its viability for the community, and everyone wonders if there weren't some source of funding or expertise that could have provided the project with the last little "push" it needed to get rolling. Hopefully, the reader will gain more ideas and capability to implement his or her mitigation ideas as a result of this section.

"Start at Home" **(Local Sources of Funding and Technical Assistance for Hazard Mitigation Projects)**

The hierarchy of emergency management functions in the United States is arranged so that assistance from higher levels of the hierarchy serves to supplement local resources when they would otherwise be exhausted. It is therefore important to ensure that local resources really are being fully utilized before appealing to state or federal government for assistance. It is also at the local level that the clearest picture is seen of what types of projects are needed, and for what purposes. Frequently, a great amount can be accomplished at the local level alone, as emergency managers learn to build partnerships and find creative ways to accomplish mitigation-oriented tasks in coordination with other types of community improvement projects.

It is good to assess what capabilities your community currently possesses with which to carry out your mitigation project ideas, and what resources will be needed from other sources. It is essential to consider the nature of the mitigation project and its scope. Who will it affect in the community? Who will benefit the most from it? Answering these questions will

often point to local people and organizations who can be asked to assist or participate in implementing the mitigation project.

Some mitigation strategies involve local ordinances or construction and safety codes. This sort of project would call for the mobilization of political and popular support to achieve the mitigation objective. Some strategies may entail a public education or awareness campaign that would involve local schools, community centers, or newspapers. Other projects may be physical construction or renovation projects that require engineering expertise and lots of funding to implement. The building of local partnerships and community awareness and support often is required for all these types of projects, and so this section will present many ideas emergency managers will want to explore from the outset. It is frequently the case that the amount of assistance available locally is far greater than that which is available from outside the community.

Building Community Awareness and Support through Volunteer Resources and Organizations

It is important to have community members aware of hazards so that they are less likely themselves to act in ways that increase risks to themselves or others, or to the community's property and environment. Community awareness and support has not only an educational and political component to it, however. Every community contains people with a wide variety of skills and knowledge, and a willingness to help out in circumstances where they see a need for it. Advice, technical expertise, labor, and even funds might be available through the donations of community members who have come to believe in the importance of the mitigation objective that has been proposed. Individuals may be able to volunteer their knowledge and skills, labor, power, and money to support a good project. Local businesses may be willing to donate labor, materials, or funds for projects that benefit them. Many wealthy persons have been known to contribute generously to causes they believe in—especially if it benefits the community in which they live and work. More information on this aspect of fundraising can be found at <http://staff.lib.msu.edu/harris23/grants/index.htm>.

Contributions and volunteerism need not occur individually but can be achieved through local community organizations that are able to inform their members about the need for the project and coordinate their members' efforts to promote the project's success. Many local organizations will be glad to participate in worthy local causes, and such participation helps strengthen their cohesion and sense of community as well. Local organizations are often experienced at fundraising, and frequently have members of local political importance who can be vital to the success of a mitigation project. Emergency managers should consider what kinds of local organizations are present in the community and how to involve them or their members in support of the proposed mitigation project.

The Use of Public/Private Partnerships

Emergency managers should also identify who the most important for-profit institutions are in the local community. Major employers, financial institutions, and insurance companies may all have an interest in supporting a mitigation project that benefits the community. (Such support is often needed to gain state or federal support for the project as well.) Often, large companies already have a corporate giving program or an associated foundation that will provide assistance. Utilities and transportation service providers should similarly be investigated to see if they can assist. A large number of insurance organizations can be found listed at <http://www.aiadc.org/>.

Assistance Through Creative Coordination with Other Projects and Local Government Functions

Many mitigation projects have elements of overlap with other projects or coincide in some way with established goals of the community, some of its residents, or one of its governmental agencies. Emergency managers who have an ability to identify common elements that his/her mitigation project shares with other community or organizational activities will often be able to find ways to coordinate his/her mitigation efforts with those of the related activities. In some cases, the process may be very formal, as when a mitigation project is being linked in with some ongoing government function or project. In other cases, there may merely be some small alteration of an existing project to include mitigation goals (or to avoid interference with such goals). A local government has many types of activities that often affect hazard mitigation prospects in the community, such as capital improvement projects, and initiatives for community and economic development. It may be that, after examining each other's projects, the emergency manager and some other local official will find that the two are mutually beneficial, and some degree of coordination can help everyone's resources go farther. In some cases where all that is needed is some staff time or technical advice, it may be very easy for mutual assistance to occur.

Sometimes, an important mitigation project may deserve some sort of distinct local government support mechanism. This could involve the use of government bonds to support the project, the formation of a benefit assessment district, or the adjustment of the municipal budget to provide funding for the project. In such cases, the emergency manager will benefit greatly from whatever popular and political support were gained through the building of community awareness. More information on government bonds can be found through the Michigan Municipal Bond Authority. Please see the website at https://www.michigan.gov/documents/dleg/016077-121-1753_37602_37604---001_220892_7.html.

Nonprofit Organizations and Foundations

Foundations can be investigated through the Council of Michigan Foundations (www.cmif.org) or The Foundation Center (<http://fdncenter.org>). There are more web sites on foundations at <http://staff.lib.msu.edu/harris23/grants/privcomm.htm>. Some foundations are private and some are company sponsored. The National Science Foundation has an Earthquake Hazards Mitigation Program and a Natural and Technological Hazards Mitigation Program. In addition, Michigan has a number of community foundations, a list of which can be found at the website listed above. If there is no such foundation for your area, perhaps one can be organized.

Not-for-profit organizations (and grant making public charities) may also be interested in helping, and at the very least tend to be excellent sources of information, advice, and favorable publicity that almost any project can benefit from. By talking with a variety of professionals, the local emergency manager will be able to assemble a lengthy list of professional organizations pertinent to local mitigation projects. Here are some examples:

- Advocates for Highway and Auto Safety
- American Institute of Architects
- American Planning Association
- American Public Works Association, Emergency Management Committee
- American Society for Civil Engineers
- Association of Contingency Planners
- Association of State Dam Safety Officials
- Association of State Floodplain Managers
- Building Officials and Code Administrators International (BOCA) – International Code Council (ICC)
- Building Seismic Safety Council
- Business and Industry Council for Emergency Planning and Preparedness
- Earthquake Engineering Research Institute
- Engineers Without Borders USA
- Institute for Business and Home Safety
- Insurance Institute for Highway Safety
- Insurance Services Office – Verisk Analytics, Inc.
- International Assn of Emergency Managers (IAEM)
- International City/County Management Association
- Michigan Assn of County Drain Commissioners
- Michigan Fire Chiefs Association
- Michigan State Firemen's Association
- Michigan Stormwater-Floodplain Association
- Multidisciplinary Center for Earthquake Engineering Research (MCEER)
- National Association of State Foresters
- National Emergency Mgmt Association (NEMA)
- National Conference of States on Building Codes and Standards
- National Fire Protection Association
- National Lightning Safety Institute (NLSI)
- National Assn of Abandoned Mine Land Programs
- State and Local Emergency Management Data Users Group (FEMA: HAZUS User Groups)
- U.S. Fire Administration

In the local section of this funding overview, local volunteer assistance was mentioned. It may also be possible to involve state or national volunteer groups as well. A good place to start is by contacting Michigan Voluntary Organizations Active in Disaster (MIVOAD). The National American Red Cross, religiously affiliated organizations (such as the Salvation Army or Southern Baptists Disaster Relief Services), or charitable organizations such as the United Way may also be of assistance in some cases.

Governmental Assistance

Much of the information collected here on state and federal sources of assistance can be found on the Internet. The simplest way to access information on federal government assistance is through the Federal Assistance Listing. Its web address is <http://www.beta.SAM.gov>. The program listings included in this document are organized by the reference numbers used by the Federal Assistance Listing, to make it easy for anyone to locate the program in the federal catalog.

Unfortunately, the State of Michigan has no such catalog of assistance programs, making it necessary to search through information from many state agencies' web sites to come up with a list of programs. A good place to start such a general

search is the Michigan Government Home Page at <http://www.michigan.gov/>. Click on the State Departments tab and then go to the specific agency desired.

For this document, searches were narrowed by focusing on activities that had a clear emphasis on, or applications toward, hazard mitigation and emergency management. However, it is possible that extra assistance may be obtained through programs not included here. As described in the section on local funding, it is sometimes possible to find areas where mitigation concerns overlap with other subjects, and to coordinate both concerns in existing projects funded from other sources. Consider the special features of your community that might be affected by hazards. Programs dealing with housing, farms, fisheries, natural resources, parks and wildlife, for example, may in some way be applicable to a hazard mitigation goal in your community. There are many state and federal programs and projects dealing with pollution, the environment, conservation, and economic development. Upon discussion, their administrators might approve some mitigation components in these programs/projects, or at least ensure that hazards are not worsened by program/project implementation.

Consider also the special assistance that may be available because of the presence of particular institutions or government-owned resources. The presence of a university or military installation often means many more resources that a community can use. Such institutions are often willing, able, and eager to also provide assistance on technical matters involving hazard mitigation projects which benefit their surrounding communities whenever the chance arises. Many universities have "extension" programs whose purpose is to find and provide such beneficial services. Many technical and engineering projects can be assisted by special research grants gained through partnering with colleges and universities, or by requesting the expertise of an organization such as the U. S. Army Corps of Engineers.

Projects dealing with school (and college) improvements may have mitigation components included in them. Other institutional facilities such as prisons, nursing homes, and health care providers should also have an interest in supporting mitigation projects that affect them. Additional funding may be available in some cases when a project involves the protection of designated historic districts or other areas of cultural or economic significance. Hazards that threaten businesses and tourism might merit funding from programs whose goal is economic development (or business attraction and retention).

In addition, areas of the community that have concentrations of persons from particular ethnic groups may provide an opportunity for organizations serving that group to become involved in mitigation projects that help maintain or improve its inhabitants' quality of life. There are a number of federal programs that make assistance available to Indian tribes, for example. Consultation with any such groups in your area might reveal useful means of facilitating or promoting mitigation projects.

More Information

There are many books and documents that give more advice on ways to collect funding information, write grant proposals, and so on. The Foundation Center has a number of libraries throughout Michigan that have extensive grants and funding information. Below is a list of the general locations, with web sites. A complete list with address, phone and contact information can be found at <http://staff.lib.msu.edu/harris23/grants/michigan.htm>.

Using Environmental and Economic Development Programs in Commercial Flood Acquisition, Relocation, and Infrastructure-Oriented Hazard Mitigation Projects*

*NOTE: A number of federal or state administered environmental and economic development programs could possibly be used in concert with other funding sources to develop a funding "package" for implementing hazard mitigation projects. Such a project would undoubtedly be multi-objective in nature. That is, the purpose of the project would include not only hazard vulnerability reduction, but also enhancement of the environment or the community's economic development posture. When assembling such a funding "package", it is important to be flexible and creative. Projects that achieve more than one objective are almost always more desirable and beneficial than are projects that simply achieve a reduction in the community's hazard vulnerability. Although they are more difficult and take longer to implement, multi-objective projects and partnerships can help build lasting bridges between governmental agencies and between government and the private sector. Those bridges, in turn, can lead to enhanced coordination and cooperation in future community endeavors, and better integration of hazard mitigation principles and practices in day-to-day public and private sector activities.

Examples of possible commercial flood acquisition/relocation or infrastructure mitigation projects might include:

- Strengthening infrastructure that services commercial and industrial areas to prevent failure and loss of critical services.
- Creating new business sites so that existing businesses in the floodplain can be more easily relocated to less hazardous areas within the community.
- Cleaning up "brownfields" and making them into productive business sites so that businesses in the floodplain or other hazardous areas can relocate to them.
- Floodproofing or elevating existing businesses to prevent flood-related damage and negative economic impacts for the community.
- Stabilizing river and stream banks and road crossings to prevent sedimentation, reduce flood potential, and prevent the loss of roadway or other community infrastructure due to collapse from flooding.
- Constructing wetlands and retention and detention basins to manage stormwater and create wildlife habitat and environmental conservation areas.
- Stabilizing the Great Lakes shoreline property to prevent erosion, sedimentation, and possible physical damage to commercial and residential structures.
- Acquiring and demolishing waterfront structures and then using the site for other, more appropriate uses such as park and recreation land or less vulnerable commercial activities.

(See the MDEQ Clean Michigan Initiative web site for a listing of implemented multi-objective projects that have a mitigation component: https://www.michigan.gov/deq/0,4561,7-135-3307_3515-314499--,00.html.)

STATE AGENCY HAZARD MITIGATION FUNDING PROGRAMS

The following page presents a table that summarizes Michigan programs potentially available to support hazard mitigation activities.

STATE AGENCY HAZARD MITIGATION FUNDING PROGRAMS	Drought	Earthquake	Extreme Temperatures	Wildfire	Dam Failure	Riverine Flooding	Great Lakes Shoreline Flooding and Erosion	Subsidence	Hail	Lightning	Severe Wind	Tornadoes	Ice and Sleet Storms	Snowstorms	FINANCIAL ASSISTANCE	TECHNICAL ASSISTANCE
Funding Sources for Hazard-Specific Measures																
MICHIGAN DEPARTMENT OF AGRICULTURE																
Conservation Reserve Enhancement Program (CREP)						X	X				X				X	X
Intercounty Drain Program (Available to drain commissioners only)					X	X										X
MICHIGAN DEPT. OF ENVIRONMENTAL QUALITY																
Coastal Management Program							X								X	X
Michigan Great Lakes Protection Fund							X								X	
State Revolving Fund (Loan)						X									X	
Wetland Program Development (USEPA) (see CFDA 66.461)						X	X								X	
MICHIGAN DEPT. OF NATURAL RESOURCES																
Land & Water Conservation Fund						X	X								X	
Michigan Habitat Improvement Fund Project Grants						X									X	
Michigan Natural Resources Trust Fund				X		X									X	
Michigan Volunteer Fire Assistance				X											X	
Snowmobile and ORV Trail Improvement Program						X	X								X	
Outdoor Recreation and Legacy Partnership Program						X	X			X	X	X			X	
Land and Water Conservation Fund						X	X			X	X	X				
Community Forestry Program											X	X	X		X	X
MICHIGAN DEPARTMENT OF STATE POLICE																
Emergency Management Performance Grants (see CFDA 97.042)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Flood Mitigation Assistance (see CFDA 97.029)						X	X								X	
Hazard Mitigation Grant Program (see CFDA 97.039)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Federal Disaster Assistance to Individuals and Households in Presidential Declared Disaster Areas (see CFDA 97.048)		X		X		X	X	X			X	X			X	
Presidential Declared Disaster Assistance - Disaster Housing Operations For Individuals And Households (CFDA 97.049)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Presidential Declared Disaster Assistance To Individuals And Households - Other Needs (see CFDA 97.050)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Disaster Grants-Public Assistance (Presidentially Declared Disasters) (see CFDA 97.036)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pre-Disaster Mitigation (see CFDA 97.047)			X	X		X	X				X	X			X	
Severe Loss Repetitive Program (see CFDA 97.110)						X	X								X	
Repetitive Flood Claims (see CFDA 97.092)						X	X								X	
MICHIGAN DEPARTMENT OF TRANSPORTATION																
Transportation Economic Development Fund						X	X								X	
MICHIGAN ECONOMIC DEVELOPMENT CORP																
Community Development Block Grant Program (also see 14.218 and 14.228 in CFDA) Some are Disaster Resilience (DR) grants.						X	X								X	
Urban Land Assembly						X	X								X	
MICHIGAN STATE HOUSING DEVELOPMENT AUTHORITY																
CDBG Housing Resource Fund (Inc HOME) (CFDA 14.239)						X	X		X		X	X			X	
Home/Property Improvement Loans						X	X		X		X	X			X	
MICHIGAN DEPARTMENT OF TREASURY																
Michigan Finance Authority-Local Gov't Loan Program	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Michigan Finance Authority-State Aid Note Program	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

**FEDERAL AGENCY HAZARD MITIGATION FUNDING PROGRAMS
(FROM THE FEDERAL ASSISTANCE LISTING)**

Federal Assistance Listing: Index of Agencies

Agency Code	Agency
10	U.S. Department of Agriculture
11	U.S. Department of Commerce
12	U.S. Department of Defense
14	U.S. Department of Housing and Urban Development
15	U.S. Department of the Interior
47	National Science Foundation
59	Small Business Administration
66	U.S. Environmental Protection Agency
81	U.S. Department of Energy
97	Department of Homeland Security

FEDERAL HAZARD MITIGATION FUNDING SOURCES																
Funding Sources for Hazard-Specific Measures	Drought	Earthquake	Extreme Temperatures	Wildfire	Dam Failure	Riverine Flooding	Gt Lakes Shoreline Flooding / Erosion	Subsidence	Hail	Lightning	Severe Wind	Tornadoes	Ice and Sleet Storms	Snowstorms	FINANCIAL ASSISTANCE	TECHNICAL ASSISTANCE
10.054 Emergency Conservation Program	X					X					X	X			X	
10.069 Conservation Reserve Program						X					X	X			X	X
10.202 Cooperative Forestry Research				X							X	X			X	
10.410 Very Low to Moderate Income Housing Loans			X	X		X	X	X	X	X	X	X			X	
10.417 Very Low Income Housing Repair Loans/Grants			X	X		X	X	X	X	X	X	X			X	
10.652 Forestry Research						X	X				X	X			X	
10.664 Cooperative Forestry Assistance				X											X	
10.760 Water & Waste Disposal Sys. for Rural Comm.						X	X								X	
10.763 Emergency Community Water Assistance Grants	X					X	X								X	
10.766 Community Facilities Loans & Grants	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10.768 Business and Industry Loans	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10.770 Water/Waste Disposal Loans/Grants						X	X								X	
10.773 Rural Business Opportunity Grants						X	X								X	
10.850 Rural Electrification Loans and Loan Guarantees										X	X	X	X	X	X	
10.902 Soil and Water Conservation	X	X	X	X		X	X									X
10.904 Watershed Protection and Flood Prevention					X	X	X								X	X
11.300 Investments for Public Works and Economic Development Facilities					X	X	X								X	
11.303 Economic Development Technical Assistance						X	X								X	X
11.307 Economic Adjustment Assistance					X	X	X				X	X			X	
11.419 Coastal Zone Mgmt. Administration Awards							X									X
11.462 Hydrologic Research	X				X	X	X								X	
11.463 Habitat Conservation							X								X	
11.478 Center for Sponsored Coastal Ocean Research Coastal Ocean Program							X								X	
12.101 Beach Erosion Control Projects							X								X	

FEDERAL HAZARD MITIGATION FUNDING SOURCES Funding Sources for Hazard-Specific Measures	Drought	Earthquake	Extreme Temperatures	Wildfire	Dam Failure	Riverine Flooding	Gt Lakes Shoreline Flooding / Erosion	Subsidence	Hail	Lightning	Severe Wind	Tornadoes	Ice and Sleet Storms	Snowstorms	FINANCIAL ASSISTANCE	TECHNICAL ASSISTANCE
12.102 Emergency Rehabilitation of Flood Control Works or Federally Authorized Coastal Protection Works					X	X	X								X	
12.103 Emergency Operations Flood Response & Post-Flood Response					X	X	X								X	
12.104 Flood Plain Management Services					X	X	X									X
12.105 Protection of Essential Highways, Highway Bridge Approaches, and Public Works					X	X	X								X	
12.106 Flood Control Projects					X	X	X								X	
12.108 Snagging and Clearing for Flood Control					X	X	X								X	
12.109 Protection, Clearing and Straightening Channels						X	X								X	
12.111 Emergency Advance Measures for Flood Protection					X	X	X								X	
14.218 Community Development Block Grants/Entitlement Grants	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
14.228 Community Development Block Grants-State's Program	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
14.239 HOME Investment Partnerships Program						X	X		X	X	X	X			X	
15.623 North American Wetlands Conservation Fund						X	X								X	
15.904 Historic Preservation Fund Grants-In-Aid						X	X	X	X	X	X	X	X	X		X
15.916 Outdoor Recreation-Acquisition, Development and Planning (Land and Water Conservation Fund Grants)						X	X								X	
15.918 Disposal of Federal Surplus Real Property for Parks, Recreation, and Historic Monuments						X	X									
15.921 Rivers, Trails, and Conservation Assistance						X	X									X
47.041 Engineering Grants	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
59.008 Disaster Assistance Loans		X		X		X	X	X	X	X	X	X	X	X	X	
66.461 Regional Wetlands Program Development Grants						X	X								X	

FEDERAL HAZARD MITIGATION FUNDING SOURCES Funding Sources for Hazard-Specific Measures	Drought	Earthquake	Extreme Temperatures	Wildfire	Dam Failure	Riverine Flooding	Gt Lakes Shoreline Flooding / Erosion	Subsidence	Hail	Lightning	Severe Wind	Tornadoes	Ice and Sleet Storms	Snowstorms	FINANCIAL ASSISTANCE	TECHNICAL ASSISTANCE
66.469 Great Lakes Program							X								X	
81.042 Weatherization Assistance for Low-Income Persons			X												X	
97.018 National Fire Academy Training Assistance				X												X
97.022 Flood Insurance						X	X									X
97.023 Community Assistance Program - State Support Services Element (NFIP)						X	X									X
97.024 Emergency Food and Shelter National Board Program	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
97.026 Emergency Management Institute- Training Assistance	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
97.028 Emergency Mgmt Institute- Resident Education Program	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
97.029 Flood Mitigation Assistance						X	X								X	
97.030 Community Disaster Loans	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
97.036 Disaster Grants - Public Assistance (Presidentially Declared Disasters)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
97.039 Hazard Mitigation Grant Program	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
97.041 National Dam Safety Program					X											X
97.042 Emergency Management Performance Grants	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
97.044 Assistance to Firefighters Grant				X											X	
97.045 Cooperating Technical Partners						X	X								X	
97.046 Fire Management Assistance Grant				X											X	
97.047 Pre-Disaster Mitigation		X		X		X	X	X			X	X			X	
97.048 Federal Disaster Assistance to Individuals and Households in Presidential Declared Disaster Areas	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
97.050 Presidential Declared Disaster Assistance to Individual and Households - Other Needs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
97.092 Repetitive Flood Claims						X	X								X	
97.110 Severe Repetitive Loss Program						X	X								X	

Key FEMA programs dedicated specifically to hazard mitigation projects

Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) was created by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 93-288, as amended). The HMGP provides funding for states and local communities to implement long-term hazard mitigation measures that reduce or eliminate risk to people and property from natural hazards and their effects. Funding for Michigan's HMGP is made available following a federal Major Disaster Declaration in the state. The amount available to the State for HMGP projects is based on 15% of the federal funds expended on the Public and Individual Assistance programs for the disaster, with an option to increase that amount to 20% with an approved "enhanced" state mitigation plan in place. The objective of the HMGP is to protect lives and property and significantly reduce or eliminate future disaster expenditures.

HMGP grants can be awarded to eligible applicants throughout the state, regardless of the boundaries of the disaster declaration. Eligible applicants include state agencies, local governments, certain private non-profit organizations, and Indian Tribes or authorized tribal organizations. Federal funds are available for up to 75% of eligible project costs ONLY for those applicants that have in place or are covered under an approved hazard mitigation plan that meets the requirements of the federal Disaster Mitigation Act (DMA) of 2000. The remainder of the cost for the project is the responsibility of the applicant.

The HMGP can be used to fund projects to protect either public or private property. Examples of the types of projects that can be funded by the HMGP include, but are not limited to:

- Voluntary acquisition or elevation of flood-prone structures
- Stormwater management projects that reduce flood risk
- Protective measures for utility infrastructure
- Vegetation management for dune restoration or wildfire prevention
- Construction of safe rooms
- Retrofitting structures for wind protection
- Development of community hazard mitigation plans (or the update of an existing hazard mitigation plan)

Applicants must apply for the HMGP through the MSP/EMHSD. The MCCERCC will set priorities for the HMGP following a disaster declaration. Based on those priorities, notification of available funding will be made to appropriate entities and organizations. The MCCERCC will review and prioritize eligible applications. Selected formal project applications will then be submitted by the MSP/EMHSD to FEMA for final funding approval. Following a disaster declaration, prospective applicants, if not notified of available HMGP funds, may want to contact their local office of emergency management to see if HMGP funds are available. For additional information about the HMGP contact Matt Schnepf, State Hazard Mitigation Officer, by phone at (517) 284-3950 or by e-mail at schnepfm1@michigan.gov.

Flood Mitigation Assistance Program

On September 23, 1994, the National Flood Insurance Reform Act (NFIRA) was signed into law. The purpose of the NFIRA is to improve the financial condition of the National Flood Insurance Program (NFIP) and to reduce the federal expenditures for federal disaster assistance to flood damaged properties. With the passage of the NFIRA, Congress authorized the establishment of a federal grant program to provide financial assistance to states and local communities for flood mitigation planning and activities. (Note: Flood mitigation is defined as any action taken before, during or after a flood to permanently eliminate or reduce the long-term risk to human life and property.) FEMA has designated this as the Flood Mitigation Assistance Program (FMAP). Under the FMAP, FEMA provides assistance to states and local communities for activities that will reduce the risk of flood damage to structures insurable under the NFIP.

The FMAP is a state administered, cost-sharing program through which the States and communities can receive grants for flood mitigation activities. FEMA encourages the State to assist the local community in prioritizing mitigation activities outlined in their hazard mitigation plan and to fund projects that will greatly reduce the risk of flood damage to buildings, manufactured homes and other NFIP-insurable structures. Mitigation of substantially damaged and repetitive loss structures is a high priority.

Mitigation measures under the FMAP are funded on a 75% federal / 25% non-federal basis. (Note: Unless by special appropriation of the Michigan Legislature, no state funding will be used for the 25% match. Contributions of other state agencies may be used as an in-kind contribution toward the 25% match.)

Applications for FMAP grants are made via the federal E-Grants system. The MCCERCC reviews all of the applications received and prioritizes applications. FEMA makes final project selections and approvals. For additional information about the FMAP contact Matt Schnepf, State Hazard Mitigation Officer, by phone at (517) 284-3950, facsimile at (517) 333-4987, or e-mail at schnepfml@michigan.gov.

Pre-Disaster Mitigation Program

The Pre-Disaster Mitigation Program (PDMP) provides funding to states and local communities for cost-effective hazard mitigation activities that complement a comprehensive mitigation program and reduce injuries, loss of life, and damage and destruction of property. The PDMP was authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by Section 102 of the Disaster Mitigation Act of 2000. The PDMP is an annually appropriated, nationally competitive grant program.

States, local communities, and Indian Tribes can receive grants for mitigation activities such as planning and the implementation of projects identified through the evaluation of natural hazards. FEMA will set priorities for each appropriation of the PDMP. Eligible activities for the PDMP may include:

- Voluntary acquisition or elevation of flood-prone structures
- Stormwater management projects that reduce flood risk
- Protective measures for utility infrastructure
- Vegetation management for dune restoration or wildfire prevention
- Construction of safe rooms
- Retrofitting structures for wind protection
- Development of community hazard mitigation plans (or the update of an existing hazard mitigation plan)

Mitigation measures under the PDMP are funded on a 75% federal / 25% non-federal basis. (Note: Unless by special appropriation of the Michigan Legislature, no state funding will be used for the 25% match. Contributions of other state agencies may be used as an in-kind contribution toward the 25% match.) Grants to small and impoverished communities may receive a federal cost share of up to 90% of the total cost to implement eligible PDMP activities.

Applications for PDMP grants are made via the federal E-Grants system. The MCCERCC reviews all of the applications received and prioritizes applications. The MCCERCC priority order is a factor in the national competitive grant review and scoring process. FEMA makes final project selections and approvals. For additional information about the PDMP contact Matt Schnepf, State Hazard Mitigation Officer, by phone at (517) 284-3950 or by e-mail at schnepfml@michigan.gov.

Building Resilient Infrastructure and Communities

The Building Resilient Infrastructure and Communities (BRIC) program aims to categorically shift the federal focus away from reactive disaster spending and toward research-supported, proactive investment in community resilience. Examples of BRIC projects are ones that demonstrate innovative approaches to partnerships, such as shared funding mechanisms, and/or project design.

For example, an innovative project may bring multiple funding sources or in-kind resources from a range of private and public sector partners. Or an innovative project may offer multiple benefits to a community in addition to the benefit of risk reduction.

Through BRIC, FEMA continues to invest in a variety of mitigation activities with an added focus on infrastructure projects benefitting disadvantaged communities, nature-based solutions, climate resilience and adaption, and adopting hazard resistant building codes.

Project Prioritization Criteria

A project will be evaluated based on the following criteria:

- The project demonstrates sound hazard mitigation techniques.
- The project is listed in the applicable local hazard mitigation plan.
- The project supports the Michigan Hazard Mitigation Plan.
- The project meets the required eligibility criteria.
- The project is suitable for funding under the HMGP, FMAP, or PDMP rather than other funding programs.
- The project is consistent with the MCCERCC approved strategy for the federally declared disaster (if applicable).
- The project completely or substantially solves the problem.
- The project provides a permanent or long-term solution.
- The project is likely to be cost-effective based on physical damages prevented. (NOTE: structures that were officially designated as “repetitive loss properties” or “severe repetitive loss properties” have already been identified from an NFIP perspective as meriting flood mitigation activities, and Michigan has tended to agree with and actively support such classifications and efforts, as described earlier in this appendix under the subsection called “Repetitive Losses.”)
- The project will not create negative environmental effects.
- The project is consistent with other projects, initiatives, and state agency priorities.
- Communities with the highest risk.
- Communities with the greatest number of repetitive loss properties.
- Communities with the greatest number of NFIP insured structures.
- Communities with the most intense development pressures.
- Communities with the largest increases in population and/or physical development.
- Communities that have the ability to successfully implement hazard mitigation projects within the required timeframes.
- Communities that have expressed interest in hazard mitigation activities.

Project Eligibility Criteria

FEMA considers a project eligible for HMGP, FMAP, or PDMP funding only if the project:

- Conforms to the State Hazard Mitigation Plan.
- Conforms to environmental laws and regulations.
- Is cost-effective.
- Solves a problem independently or constitutes a functional portion of a solution.
- Cannot be funded by another program.
- The applicant community is a member, in good standing, of the NFIP (flood related projects only).

*Note – technical study type projects may be eligible for funding if they are accompanied by a second project (phase II) for construction measures that are developed and determined eligible by the study project (phase I).

Eligible Project Types

Following is a list of potentially eligible project types as outlined in federal guidance (this list is not all inclusive):

- **Acquisition of real property** in a hazard area; **physical relocation of structures** from a hazard area.
- **Elevation of structures** in compliance with federal, state and local ordinances.
- **Retrofit of structures** – wet or dry floodproofing (according to local code and building standards, compliant with NFIP standards); high wind bracing; seismic strengthening of structures or their non-structural components; application of wildfire resistant materials; and structural fire safety measures.
- **Minor structural flood risk reduction measures** – debris basins; stormwater detention basins or infiltration wells; culvert upgrades; diversions; flapgates or floodgates; localized flood risk reduction system to protect critical facilities.
- **Vegetation management** – natural windbreaks; living snow fences; shoreline stabilization; natural stabilization; wildfire defensible space, etc.
- **Phase I or II design, engineering or feasibility study** for complex mitigation projects that are reasonably expected to be funded and implemented.

Explanation: Complete Solution

Approved projects should either completely solve a site-specific problem or be an element of a larger solution where there is assurance of project completion.

Explanation: Long-term Solution

Mitigation measures funded under the HMGP, FMAP, and PDMP are intended to provide a long-term or permanent solution. Ideally, the measure would be effective for the life of the property being protected. (For example, erecting an emergency berm on a beach to prevent wave damage to structures is a short-term solution, as opposed to a long-term solution such as elevation or relocation of the structures.)

Explanation: Cost Effective

For a project to be considered cost effective, the benefits gained by completing the project must be greater than the cost of the project. Cost effectiveness should take into account the following:

- The cost to complete the project.
- The life of the project.
- Past damages that have resulted from the situation that will be mitigated as a result of the project.
- The frequency and extent of damage that is likely to occur if the project is not completed.
- Annual costs of maintaining the project.

Explanation: Environmental Effects

All HMGP, FMAP, and PDMP projects must be in conformance with applicable environmental laws and regulations, including but not limited to:

- The National Environmental Policy Act.
- The National Historic Preservation Act.
- The Endangered Species Act.
- Executive Order 11988, Floodplain Management.
- Executive Order 11990, Protection of Wetlands.
- Executive Order 12898, Environmental Justice.

(Note: a project should not create an environmental problem or shift a hazard to a new location.)

Explanation: Consistent with Other Initiatives

HMGP, FMAP, and PDMP projects should be complementary to other mitigation projects, initiatives, and state agency priorities. At a minimum, projects should not undermine other identified mitigation priorities and activities.