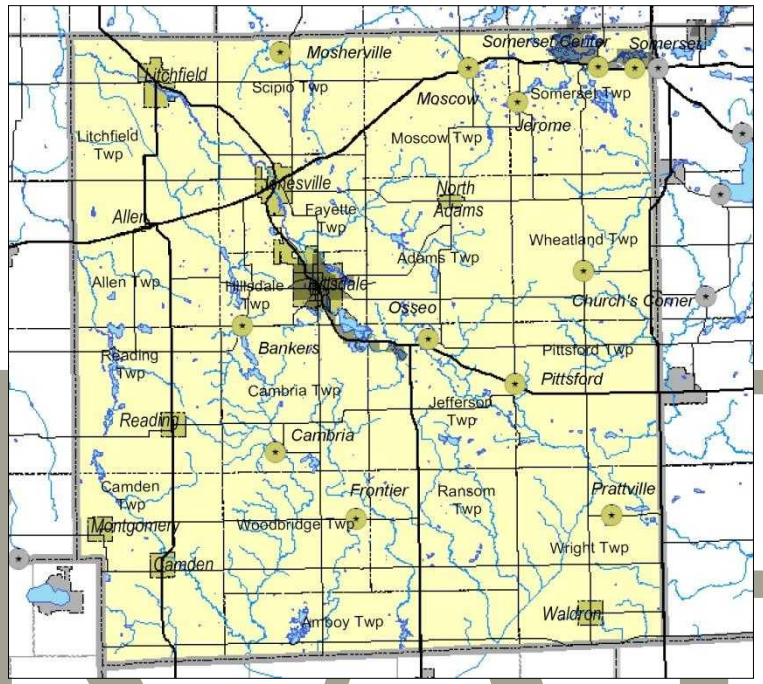

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Hillsdale County, Michigan
Hazard Mitigation Plan

Prepared by the Region 2 Planning Commission for the Hillsdale County
Board of Commissioners and Local Units of Government within Hillsdale County

Updated
January 2021

Hillsdale County Hazard Mitigation Plan

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Executive Summary

The Hillsdale County Hazard Mitigation Plan was developed to help protect the health, safety and economic interests of residents and businesses of Hillsdale County. The plan is intended to reduce the impacts of natural and technological hazards through planning, awareness, and implementation. The plan serves as the foundation for hazard mitigation activities and actions within Hillsdale County.

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Implementation of the recommendations identified whining the plan will reduce the potential for loss of life, destruction of property, and economic losses due to natural and technological hazards. The plan provides a path toward continuous, proactive reduction of vulnerability to hazards which result in respective and oftentimes severe social, economic and physical damage. The ideal end state is full integration of hazard mitigation concepts into day-to-day governmental and business functions and management practices.

The plan employs a broad perspective in examining multi-hazard mitigation activities and opportunities in Hillsdale County. Emphasis is placed on hazards which have resulted in treats to the public health, safety and welfare, as well as the social, economic and physical fabric of the community. The plan addresses such hazards as floods, tornadoes, windstorms, winter storms, forest fires, structural fires, hazardous material incidents, and secondary technological hazards which result from natural hazard events. Each hazard is analyzed from a historical perspective, evaluated for potential risk, and considered for possible mitigation action. The plan also lays out the legal basis for planning and the tools to be used for implementation.

The Hillsdale County Hazard Mitigation Plan contains many of the same elements that might be found in other community planning documents. In accordance with a format developed by the Federal Emergency Management Agency (FEMA), the plan includes a community profile, identifies possible hazards, sets goals and objectives, sets out mitigation strategies, identifies implementation measures, and provides methods to monitor plan progress.

Introduction

Purpose

In recent years hurricanes, massive flooding, and powerful earthquakes; natural disasters have rocked our country and the world. In our own community we have experienced massive ice and snow storms, hazardous material threats on our highways, powerful electrical storms, tornadoes, and a broken gas pipeline. These natural disasters affect our economy and our quality of life. They are costly, disruptive, and they threaten our health, welfare, and life style. Too often we ask, after the disaster, what could have been done to avoid, or lessen the impact of these catastrophic events?

The Federal Emergency Management Agency (FEMA) and the Michigan State Police (MSP) Emergency Management and Homeland Security Division (EMHSD) have partnered to encourage communities to plan for disasters and to develop and implement mitigation strategies to reduce the severity of these types of disasters. Grant funding originally provided for the preparation of this plan. Incentives are also occasionally made available through FEMA grant programs to communities for hazard mitigation, and to reduce the potential threat to life and property damage caused by natural and manmade disasters.

The Hazard Mitigation Plan is a community plan that anticipates natural, technological and human related disasters and identifies actions and activities to implement before disasters happen. Preparedness helps minimize damage to property and harm to our citizens. Hazard mitigation planning does not include emergency preparedness, nor does it include planning for emergency responses. Emergency preparedness and the planning for emergency responses are the responsibility of local public safety agencies and local units of government.

Hazard Mitigation Plans have a pre-disaster focus in order to develop strategies and implementation actions prior to the occurrence. This upfront planning can minimize the negative impacts associated with these disasters. Hazard mitigation planning must be comprehensive in order to address the many hazards that a community may face. Plans are implementation oriented and locally relevant. They contain both short and long-range action strategies.

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Our community faces a wide range of potential hazards. They include in no particular order the following:

- Civil Disturbances
- Earthquakes
- Subsidence
- Scrap Tire Fires
- Structural Fires
- Wildfires
- Riverine Flooding
- Dam Failures
- Energy Emergencies
- Significant Infrastructure Failures
- Passenger Transportation Accidents
- Hazardous Material Incidents
- Nuclear Power Plant Accidents
- Oil and Natural Gas Well Accidents
- Oil and Natural Gas Pipeline Accidents
- Nuclear Attacks
- Terrorism/Sabotage/WMD
- Public Health Emergencies
- Drought
- Extreme Temperatures
- Hail
- Lightning
- Severe Wind Events and Tornados
- Snowstorms
- Ice and Sleet Storms
- Invasive Species

The Hazard Mitigation Plan includes a review of these potential threats and an analysis to determine which threats are most likely to occur in our community. The plan includes a set of strategies to address those hazards which are most likely to occur, that affect a high percentage of population, have the potential for severity, and may have a negative impact on the economy. The preparation of a hazard mitigation plan requires the involvement of agencies and governmental departments which have responsibilities in emergency response, public utilities, community safety, and the environment. Local elected officials, planners, and citizens must also be encouraged to participate. The planning process offers opportunities for community collaboration in an attempt to maximize the effectiveness and efficiency of mitigation efforts. This maximization of efficiency and effectiveness helps to assure the maximum community benefit and avoiding expenditures for the mitigation of hazards which have low risk to the community.

The Hazard Mitigation Plan contains the following:

A community profile, the identification of hazards and risks facing the community, an assessment of vulnerabilities, goals and objectives for the community, mitigation strategies, implementation measures, and a means for monitoring the effectiveness of the plan recommendations.

Just as there is a wide range of hazards which potentially face our community, there is a wide range of alternative approaches for mitigating these hazards.

We can:

1. Remove the hazard.
2. Keep the hazard away from people.
3. Keep the people away from the hazard.
4. Alter design or construction to reduce the hazard.
5. Provide warnings and awareness to the community.

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Approaches to the mitigation of hazards generally fall into the following categories:

1. Corrective measures. These include the acquisition of land, the relocation of people or businesses, redevelopment of an area, or the modification of an area to mitigate potential negative impacts.
2. Public works measures.
3. Planning and regulatory measures including planning, the use of zoning, regulations and codes, disclosure, moratoria, the purchase of development rights, and open space planning.
4. Persuasion and encouragement including the use of incentives.
5. Public education and awareness including public information, dissemination, public relations, public hearings, surveys, and public education.

Finally, it is important that hazard mitigation planning be fully incorporated into the community planning process. Many of the mitigation strategies which may be employed to reduce the severity of hazards also contribute to community sustainability and the enhancement of quality of life. Good community planning offers the opportunity to recognize synergies whereby the collective impact of actions can result in the realization of community goals. From this context, efficiency can be obtained in the expenditure of scarce resources with a maximization of community benefit.

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Plan Preparation and Local Unit Involvement and Participation

Staff Involvement

The Hillsdale County Hazard Mitigation Plan originally was prepared by the staff of the Region 2 Planning Commission which was responsible for data collection and analysis. This update was prepared mainly by the staff of the County of Hillsdale Emergency Management office with outside input from several local sources.

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A number of entities have been identified as plan implementation agents. Given the nature of the hazards listed, it is not surprising that local units of government are being asked to participate to some degree in the implementation plan. Local agencies that have been identified as implementation agents include Hillsdale County Board of Commissioners, Cities of Hillsdale, Jonesville, Litchfield and Reading, Branch-Hillsdale-St Joseph Community Health Agency, Lifeways Community Mental Health, Community Action Agency, Hillsdale County Senior Services Center and the Hillsdale County Planning Board.

Just as there is a wide range of hazards which potentially face our community, there is a wide range of alternative approaches for mitigating these hazards.

The Hillsdale County Board of Commissioners was presented with the updated Hillsdale County Hazard Mitigation Plan at a public meeting on September 14, 2021. The presentation included a review of potential hazards facing the County, a proposed prioritization of hazards, goals and objectives, and hazard mitigation strategies. The updated plan will also be presented to the Hillsdale Chapter of the Michigan Townships Association on September 1, 2021. The updated plan was sent electronically on September 1, 2021 to the elected clerks of the townships of Adams, Allen, Amboy, Cambria, Camden, Fayette, Hillsdale, Jefferson, Litchfield, Moscow, Pittsford, Wheatland, Woodbridge and Wright, and to the cities of Hillsdale, Jonesville, Litchfield and Reading, and to the villages of Allen, Camden, Montgomery, North Adams and Waldron with a request that their respective bodies review and submit questions or suggestions. The updated plan was posted to the Emergency Management Page of the county website August 27, 2021 for additional opportunities for public review and comment. To date, no comments have been received.

Plan Preparation Oversight

Oversight for the preparation of the update to the Hillsdale County Mitigation Plan was provided by Hillsdale County Emergency Management. Several reviews and planning sessions were held.

Plan Review and Approval

Once approved by the Emergency Management and Homeland Security Division of the Michigan State Police and the Federal Emergency Management Agency (FEMA), the Hillsdale County Board of Commissioners will be asked to officially adopt the updated Hillsdale County Hazard Mitigation Plan at a public meeting. The updated plan will be sent again to all township, city and village clerks listed above with a request that their respective bodies review and adopt the plan. The plan will remain on the Emergency Management page of the county website for additional opportunities for public review and comment that can be used in future updates.

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Local units of government in the county were contacted and requested to indicate their support for the hazard mitigation planning effort.

Local citizens had opportunities to provide input and comments on this plan during the regularly scheduled local units of government meetings when this plan was discussed.

A listing of each local unit and their interest in participating in the hazard mitigation program may be found on the table entitled "Local Unit Involvement and Participation". Interest in the hazard mitigation plan as defined on the table is based upon the unit's expressed interest or continuous involvement in the preparation of the draft plan.

Hillsdale County Hazard Mitigation Plan
LOCAL UNIT INVOLVEMENT AND PARTICIPATION
Prepared December, 2020

Local Unit	Units of Governments with Zoning Ordinances	Member Community Planning Committee	Interest in Hazard Mitigation Program	Hazard Mitigation Plan Adoption
Adams Township	X			
Allen Township				
Amboy Township				
Cambria Township				
Camden Township				
Fayette Township	X		x	
Hillsdale Township	X		x	
Jefferson Township			x	
Litchfield Township	X		x	
Moscow Township	X			
Pittsford Township	X		x	X
Ransom Township				
Reading Township	X		x	
Scipio Township				
Somerset Township	X			
Wheatland Township	X			
Woodbridge Township				
Wright Township				
Village of Allen	X			
Village of Camden				
Village of Montgomery				
Village of North Adams				
Village of Waldron				
City of Hillsdale	X		x	
City of Jonesville	X		x	
City of Litchfield	X		x	
City of Reading	X		x	

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Community Profile

Regional Location

Hillsdale County is located in the south-central portion of the Lower Peninsula of Michigan. The State's Meridian — utilized by surveyors, land owners and other powers to identify the location of real property in Michigan— is also Hillsdale County's eastern border. US-127 (Meridian Road) roughly follows the Meridian. The southwest corner of the county is where the states of Michigan, Indiana, and Ohio meet.

Political Jurisdictions

The county is composed of 18 townships, 9 incorporated cities and villages, and a variety of crossroads hamlets and other small settlements. The townships and incorporated cities and villages are governed by elected boards and councils. County residents are also represented by the Hillsdale County Board of Commissioners. County residents are represented by one of the 5 commissioners serving on the governing body. The entire county is also part of Michigan House District 58, Michigan Senate District 16, and Michigan District 7 of the U.S. House of Representatives.

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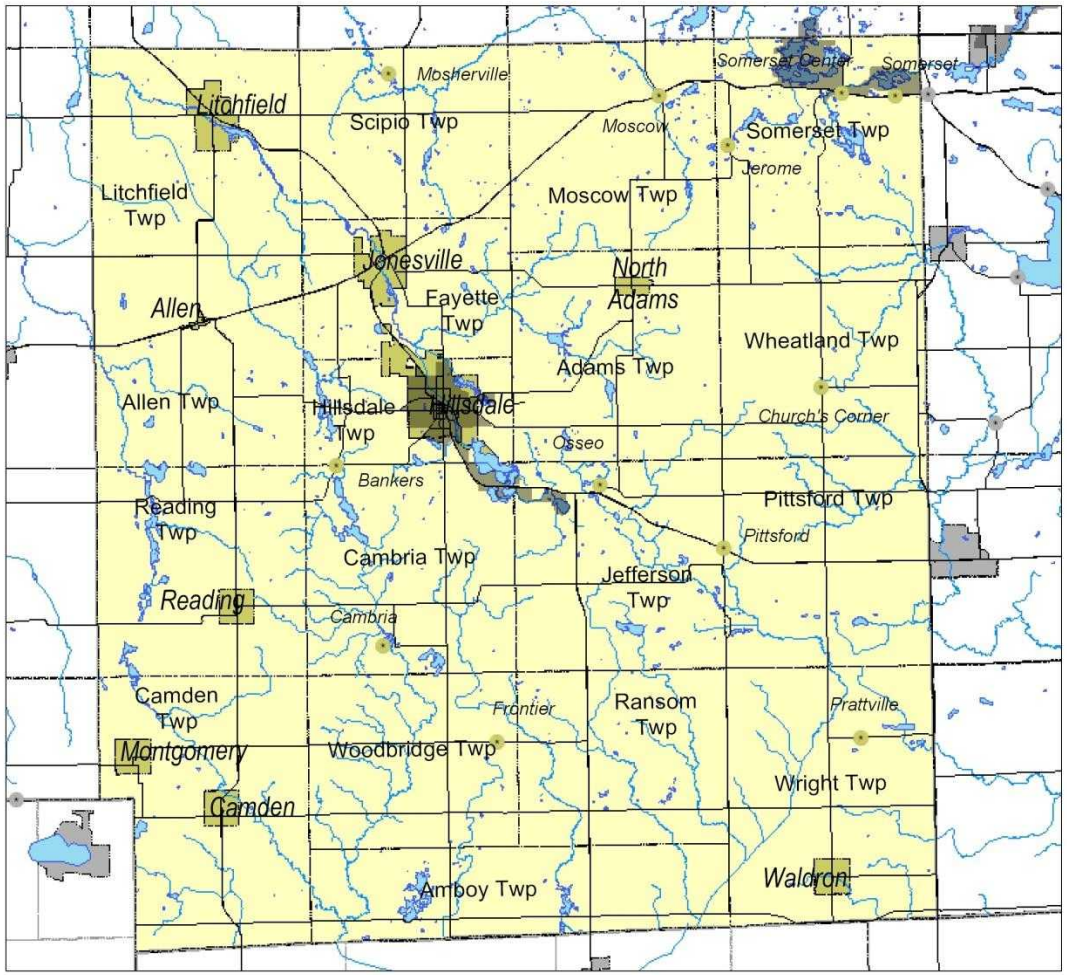

Hillsdale County Communities

Municipalities

- Cities & Villages
- Townships
- Other Settlements
- Urbanized Areas

Transportation Facilities

- State Highways
- Other Major Roads

Source:
Center for Geographic Information,
Universal Maps, & R2PC

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Hillsdale County Communities										
MCD	Plan Participation	County Comm. District	MI House District	MI Senate District	US House District	MCD	Plan Participation	County Comm. District	MI House District	MI Senate District	US House District
Cities						**Townships *(continued)***					
Hillsdale		1&2	58	16	7						
Jonesville		2	58	16	7	Camden		4	58	16	7
Litchfield		2	58	16	7	Fayette		2	58	16	7
Reading		3	58	16	7	Hillsdale		2	58	16	7
Villages						Jefferson		4	58	16	7
Allen		3	58	16	7	Litchfield		2	58	16	7
Camden		3	58	16	7	Moscow		2	58	16	7
Montgomery		3	58	16	7	Pittsford		5	58	16	7
North Adams		4	58	16	7	Ransom		4	58	16	7
Waldron		5	58	16	7	Reading		3	58	16	7
						Scipio		2	58	16	7
Townships						Somerset		5	58	16	7
Adams		4	58	16	7	Wheatland		5	58	16	7
Allen		3	58	16	7	Woodbridge		4	58	16	7
Amboy		4	58	16	7	Wright		5	58	16	7
Cambria		3	58	16	7						

Community Characteristics

Hillsdale County was home to 45,830 people according to the U.S. Census. The official estimate for the county in 2010 was 46,688 people, indicating slow population decline. Urban areas, which are based upon population density, existed around Hillsdale (including portions of Cambria and Jefferson Townships) and a portion of the Irish Hills Area (including the development around Lakes LeAnn and Somerset).

It is interesting to note that approximately 2/3 of the population lived in a township rather than a city or village in 2010. The following 2019 statistics about special groups of people also help to describe the population of Hillsdale County.

Cities	2019 Population	Population Density	Total Area	Land	Water	2000 Census	2010 Census
Hillsdale	8,097	1,402.9	6.19	5.92	0.27	8,233	8,305
Jonesville	2,409	781.3	2.92	2.89	0.03	2,337	2,258
Litchfield	1,208	547.6	2.54	2.50	0.04	1,458	1,369
Reading	998	1,067.3	1.01	1.01	0.0	1,134	1,078
Villages	**Population**	**Population Density**	**Total Area**	**Land**	**Water**	**2000 Census**	**2010 Census**
Allen	191	1,193.8	0.16	0.16	0.0	225	191
Camden	675	609.5	0.84	0.84	0.0	550	512
North Adams	566	917.3	0.52	0.52	0.0	386	477
Montgomery	393	342.0	1.00	1.00	0.0	514	342
Waldron	489	538.0	1.00	1.00	0.0	590	538
Townships	**Population**	**Population Density**	**Total Area**	**Land**	**Water**	**2000 Census**	**2010 Census**
Amboy	1,173	40.8	30.64	29096	0.68	1,224	1,173
Cambria	2,533	73.0	36.14	34.81	1.33	2,546	2,533
Reading	1,765	52.3	35.01	33.98	1.02	1,781	1,765
Somerset	4,623	128.2	35.56	33.41	2.15	4,277	4,623

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Population Density

The average density of population in the county was 76.6 PPSM (people per square mile) in 2017. However, population density varied across the county from a high of 531-1,553 PPSM in the cities and villages to a low of 75-136 PPSM in the townships. However, it is also important to note that, in all categories, the 10 unincorporated settlements within the county will have higher ratios or densities than the surrounding township.

Populations with Special Needs

Several population groups within the county have special needs which must be given consideration in any serious analysis of the risks to residents:

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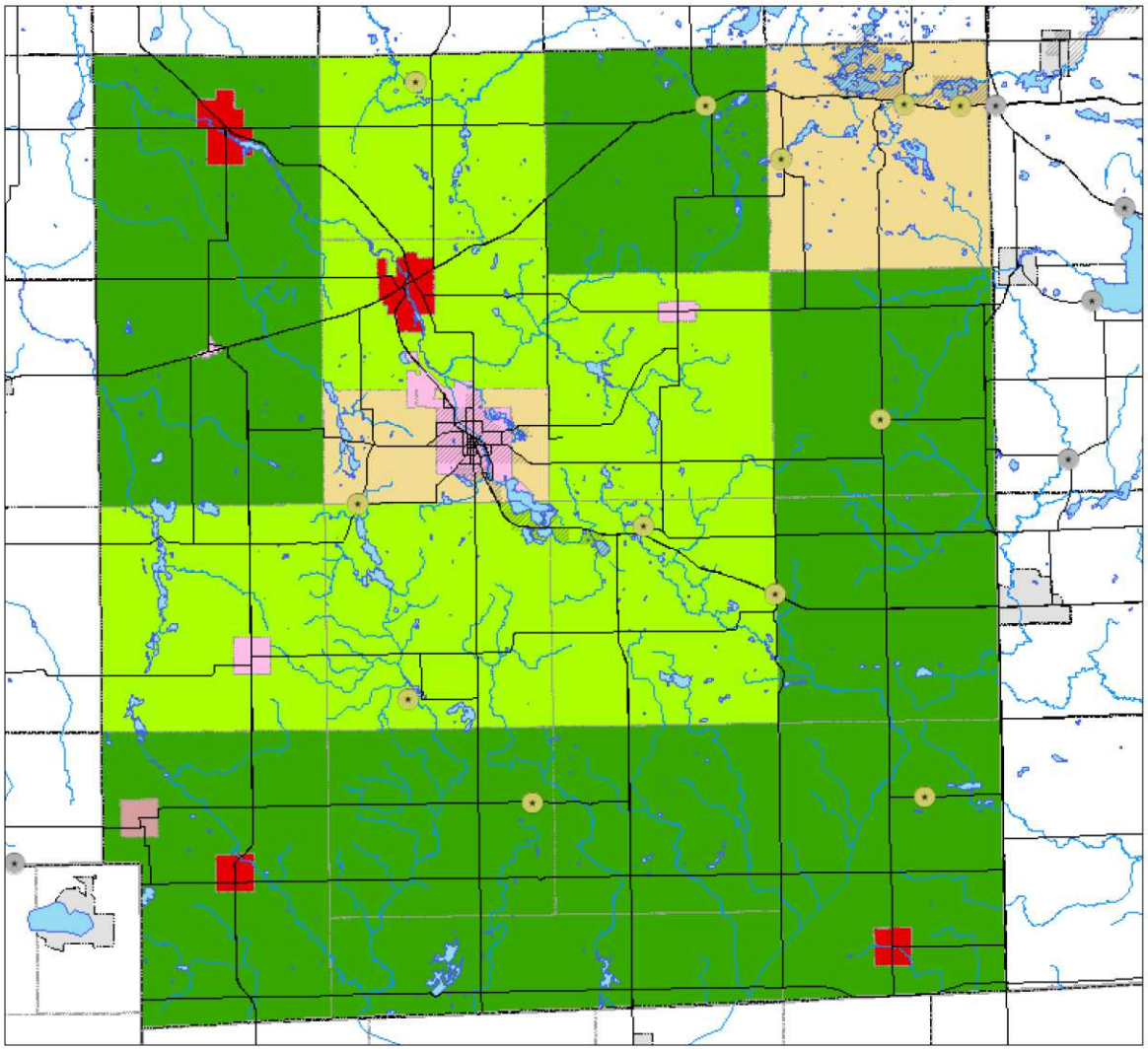
Elderly Residents

Approximately 12.9% of Hillsdale County residents were at least 65 years old in 2018 (ACS). For example, Somerset Township (15.8%), Amboy Township (14.9%), Cambria Township (14.5%) and Jefferson Township (14.1%) had the highest ratios of elderly residents. City of Jonesville (10.3%) City of Litchfield 10.3%) the City of Reading (7.5%), Ransom Township (7.4%), and Woodbridge Township (5.9%) had the lowest ratios. A couple of municipalities also host retirement/nursing homes and/or hospitals:

- The City of Hillsdale is the location of the Hillsdale County Medical Care Facility, Drew's retirement/nursing homes at several locations and the "Mac" McGuire and the MacRitichie Skilled Nursing Units located in the Hillsdale Hospital.



Hillsdale County Population Density

People Per Sq. Mile

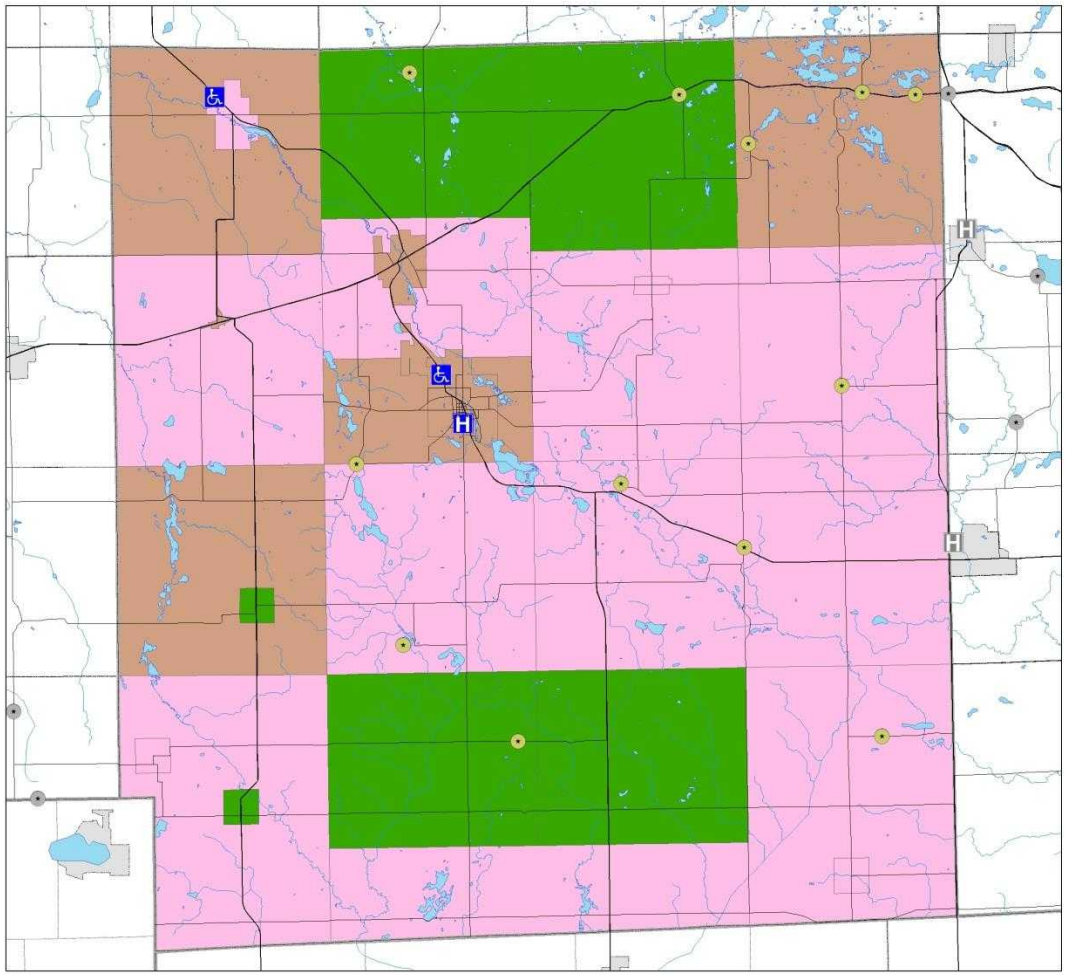
- 28 - 45 ppsm
- 46 - 88 ppsm
- 89 - 156 ppsm
- 157 - 386 ppsm
- 387 - 866 ppsm
- 867 - 1,553 ppsm

Settlements

- Unincorporated Settlements
- Urbanized Areas

Source(s):
2010 US Census, Universal Maps and R2PC

Universal Maps, & R2PC



Hillsdale County Communities

Elderly Population

Population Over 64 Years of Age

- 09.00% - 11.99%
- 12.00% - 14.99%
- 15.00% - 18.00%

Hospitals and retirement/ nursing homes

H hospitals

retirement/ nursing homes

Source(s):
2010 US Census, Carepathways.com, retirementhomes.com and doctordirectory.com

Disabled Residents

The 2010 U.S. Census surveyed the number of disabled people in two age groups:

- **5-20 years of age.** Approximately 12% of residents between the ages of 5 and 21 were disabled in some way in 2010. For example, the Townships of Hillsdale (15%) and Jefferson (15%) had the highest ratios of disabled residents within the age group and the Villages of Allen (5%), Montgomery (5%) and, North Adams (5%); and the Townships of Ransom (5%), Wheatland (5%), and Woodbridge (6%) had the lowest ratios. It is interesting to note that all of the townships located on the periphery of the county had the smallest ratio
- **21-64 years of age:** Approximately 20% of residents between the ages of 21 and 65 were disabled in some way in 2010. For example, the City of Litchfield (26%) and the Villages of Camden (29%) and Montgomery (47.5%), and the Townships of Allen (26%) and Camden (29%) had the highest ratios of disabled residents within the age group. The Townships of Hillsdale (16%), Pittsford (16%), Ransom (14%), North Adams (17.8%) and Somerset (16%) had the lowest ratios.

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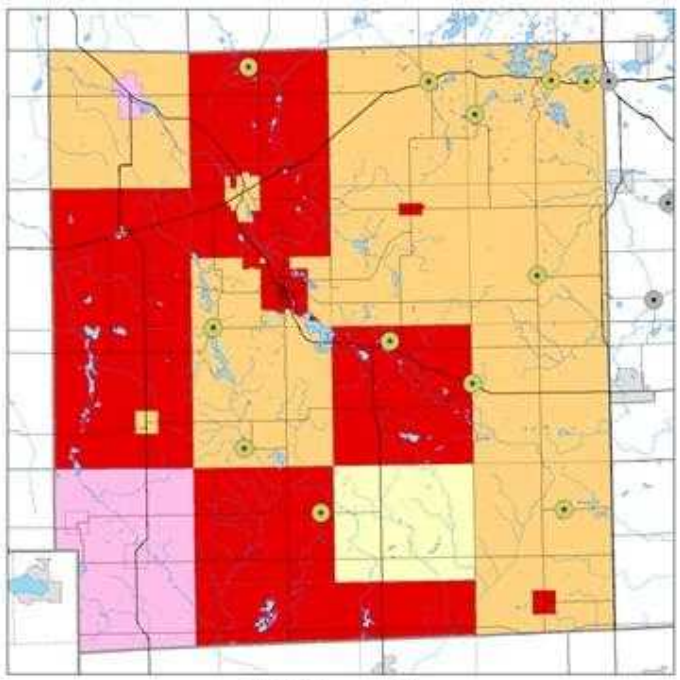
5-20 Years of Age



20-64 Years of Age

5.0% - 9.9%
10.0% - 14.9%
15.0% - 19.9%
20.0% - 24.9%
25.0% - 30.0%

Source(s):
2010 US Census, Center for Geographic Information, Universal Maps and R2PC

Hillsdale County Communities

Disabled Population

Impoverished Residents

Approximately 10% of Hillsdale County residents were considered poor by the US Census in the Year 2010. For example, the City of Reading (17.1%), Village of North Adams (16.3%) and the Townships of Camden (20.3%), Waldron (20.1%), and Amboy (17.1%) which are all located on the southern border of the county, had the highest ratios of poor residents. The Townships of Pittsford (9.8%), Hillsdale (7.3%), Reading (7.3%), Fayette (6.1%) and Somerset (5.9%) had the lowest ratios.

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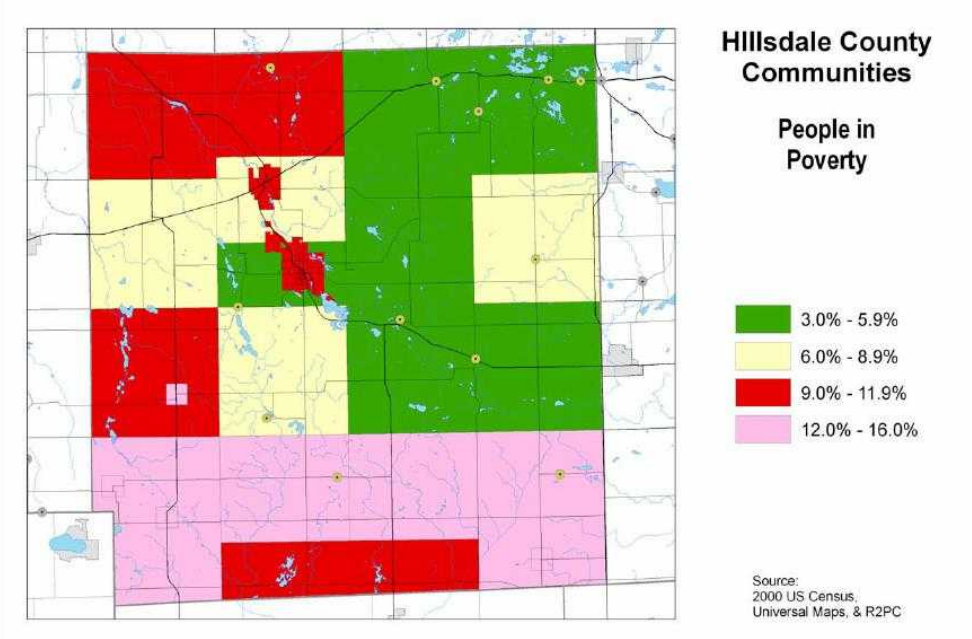
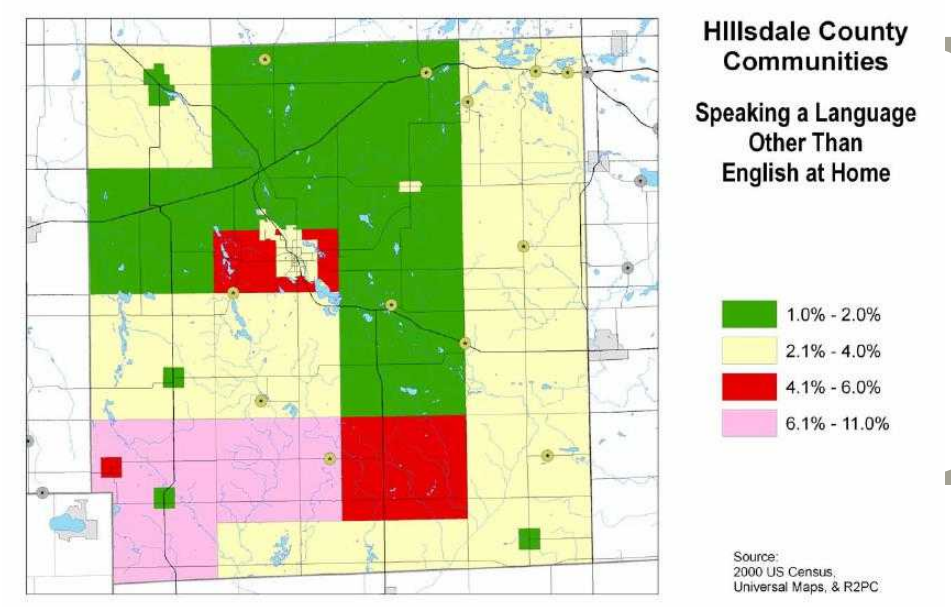


Foreign Language Residents

Approximately 4.01% of county residents spoke a language other than English at home in 2010. According to 2019 census date 8.1% spoke a language other than English. For example, the Townships of Amboy (11.9%), Cambria (9.6%), Wright (5.7%) and City of Hillsdale (4.6%) had the highest ratios of foreign language speakers. The Cities of Litchfield (2.2%), and Reading (2.4%); the Townships of Jefferson (.05%), Adams (.08%) and Hillsdale (1.05%) had the lowest ratios.



Community Profile

School Populations

Children congregate daily during the school year within the school facilities located in Hillsdale County.

Public School Facilities

Hillsdale Intermediate School District

Most of the students within the county are enrolled in schools that are part of the Hillsdale Intermediate School District:

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- **Camden-Frontier School** Camden-Frontier Elementary, Middle, and High School are parts of one building.
- **Hillsdale Community Schools:** Bailey Elementary (PK), Gier Elementary (PK-K-4), Davis Middle (5-8), and Hillsdale High (9-12).
- **Jonesville Community Schools:** Williams Elementary (K-5), Jonesville Middle (6-8), Jonesville High (9-12) and Jonesville Alternate High (9-12).
- **Litchfield Community School** Litchfield Elementary (K-5) and Litchfield High (6-12) are parts of one building.
- **North Adams-Jerome School** North Adams-Jerome Elementary (K-6) and High (7-12) are parts of one building.
- **Pittsford School.** Pittsford Area Elementary (K-6) and High (7-12) are parts of one building.
- **Reading Community School.** Reynolds Elementary (K-6) and Reynolds High (7-12)

- **Waldron Area School.** Waldron Elementary (K-5), Middle (6-8), and High (9-12) are parts of one building.

- **Charter Schools.** There are 2 charter schools in Hillsdale County. Hillsdale Preparatory (K-8) and Will Carleton Academy (K-12).

Private School Facilities

There are eight private schools operating in Hillsdale County. Amish School #1 (1-8), Cooper Amish (1-8), Freedom Farm Christian (K-12), Bird Lake Bible (K-12), Hillsdale College Academy (K-12), Ridgeview (1-8), Prattville SDA Elementary (K-8) and Countryside Montessori (PK).

Other Local Public School Districts

Significant portions of the Addison Community Schools, Hudson Area Schools, and Quincy Community Schools extend into Hillsdale County, although none have facilities within the county. Smaller portions of the Hanover-Horton Schools and Homer Community Schools also extend into the county.

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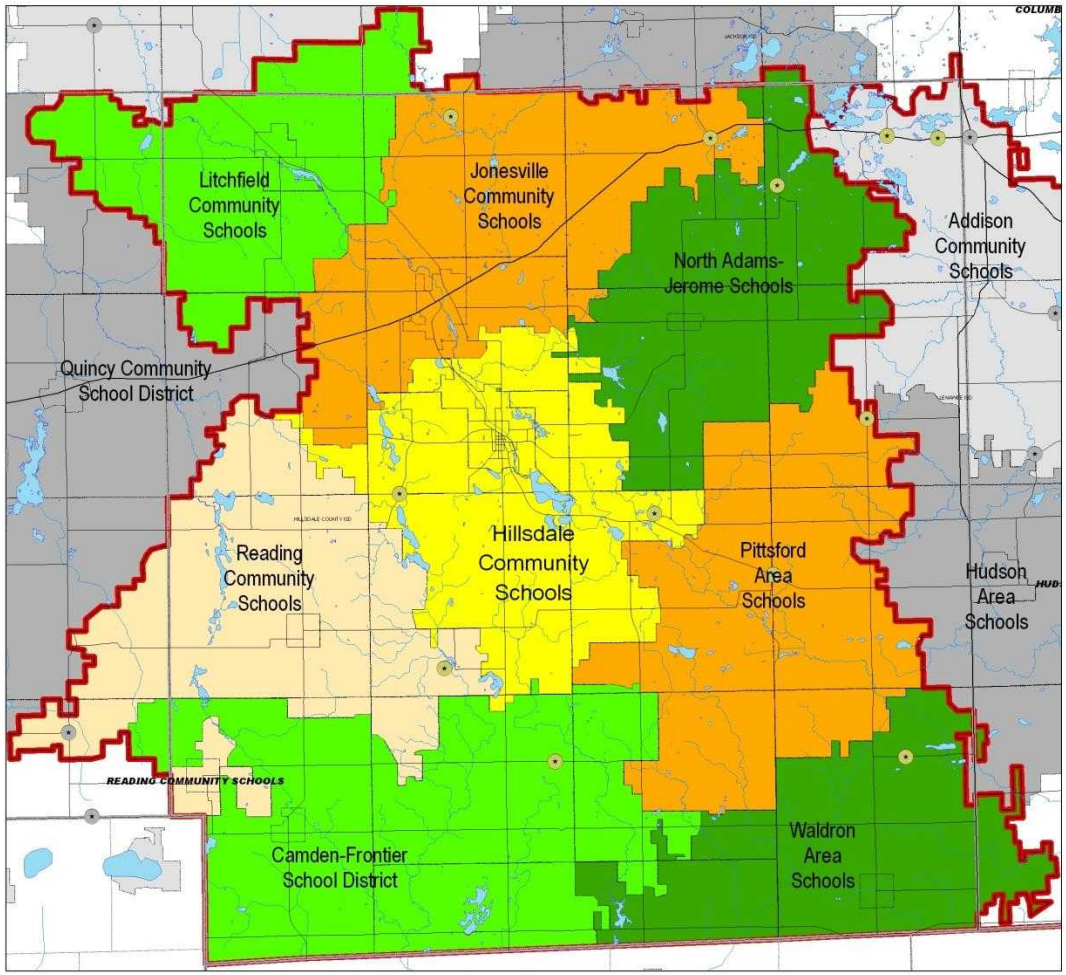

Hillsdale County Communities

School Facilities

Hillsdale County Boundary

Intermediate Scholl District Boundaries

Local Schools in the Hillsdale Intermediate School District

Local Schools in other Intermediate School Districts

Source:
www.greatschools.net & R2PC

Public Safety Organizations

Organizations that provide fire protection, emergency medical services (EMS), and police protection are found throughout Hillsdale County.

Fire Departments

There are 14 fire departments serving county residents: Allen Township FD, Camden FD, Hillsdale City FD, Hillsdale Township FD, Jonesville FD, Litchfield FD, Montgomery FD, Moscow Township FD, North Adams FD, Jefferson Township FD, Reading Community FD, Somerset Township FD, Wright-Waldron FD, and Woodbridge Township FD. Most fire stations are located in or near settlements and serve those population centers and the surrounding countryside. In addition, two Lenawee County fire departments, Addison and Hudson, provide coverage in areas of Eastern Hillsdale County. Several county fire departments provide fire coverage and/or mutual aid coverage to areas outside of the county and in Ohio and Indiana.

Emergency Medical Services

Reading Emergency Unit serves the county with Advanced Life Support (ALS) and in some cases Basic Life Support (BLS) mobile units stationed in the Cities of Reading (#1), Hillsdale (#2), and Litchfield (#3).

Somerset Township Fire and EMS, the City of Hudson EMS and the Village of Addison Fire and EMS also serve portions of the eastern side of the county with ALS and in some cases BLS units. Wright-Waldron Fire and EMS serves a portion of the southeastern part of the county with a Basic Life Support (BLS) unit. EMS services are also provided by the Hillsdale City FD, Moscow Township FD, Montgomery Village FD, North Adams Village FD, Jefferson Township FD, Pioneer (Ohio) FD, Wright-Waldron FD, and the Woodbridge Township FD with Medical First Responders (MFR) units.

Police Departments

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County residents are served by a number of law enforcement agencies:

- **State Police Posts.** State Police Jackson Post #13 serves Hillsdale County with a detachment (satellite office) located in Jonesville.
- **Sheriff's Office.** The County Sheriff's Office is located in Hillsdale.
- **Local Police Stations.** The following municipalities are served by their own municipal police force: the Cities of Hillsdale, Litchfield, Jonesville and Reading, and the Township of Somerset.

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Seasonal Housing

Approximately 9% of housing units in Hillsdale County were used seasonally in 2010 according to the U.S. Census. The variability between the local units of government, however, is quite dramatic. For example, a

percentage of housing units in Reading (39%), Amboy (23%), Somerset (18%), Cambria (18%), and Jefferson (18%) Townships are used seasonally. In comparison, none of the housing units in the City of Reading, the Village of Montgomery, or Wright Township were used seasonally. It is also important to note that seven organized camps including Kimball, Michindoh, Selah and St. Frances are scattered across the county. Within the City of Hillsdale; Hillsdale College has residential housing on campus.

Median Home Values

The median home value in Hillsdale County was $120,100 in 2020. Given the county's median home value and a total of 21,960 housing units, the housing stock within Hillsdale County was valued at almost $137,428,986 million. The variability in housing values between the local units of government, however, was quite dramatic. For example, the medium home values within Somerset ($172,900), Amboy ($99,100), and Hillsdale ($170,500) Townships were all over $100,000. In fact, those three jurisdictions accounted for almost 1/3 of the total value of residential real estate in the county. In comparison, the median home values in the City of Reading ($56,700), the Village of Camden ($60,800), and the Township of Wright ($58,100) were all under $61,000.

Future Land Use

Hillsdale County's future land use plan places concentrated residential, commercial, and industrial land uses around existing cities and villages, ponds and lakes, as well as some of the unincorporated settlements located along major roadways. However, scattered residential development already occurs along many of the roadways in the county --whether state highway, county primary road, or gravel road—creating greatly dispersed ribbons of low-density residential development.

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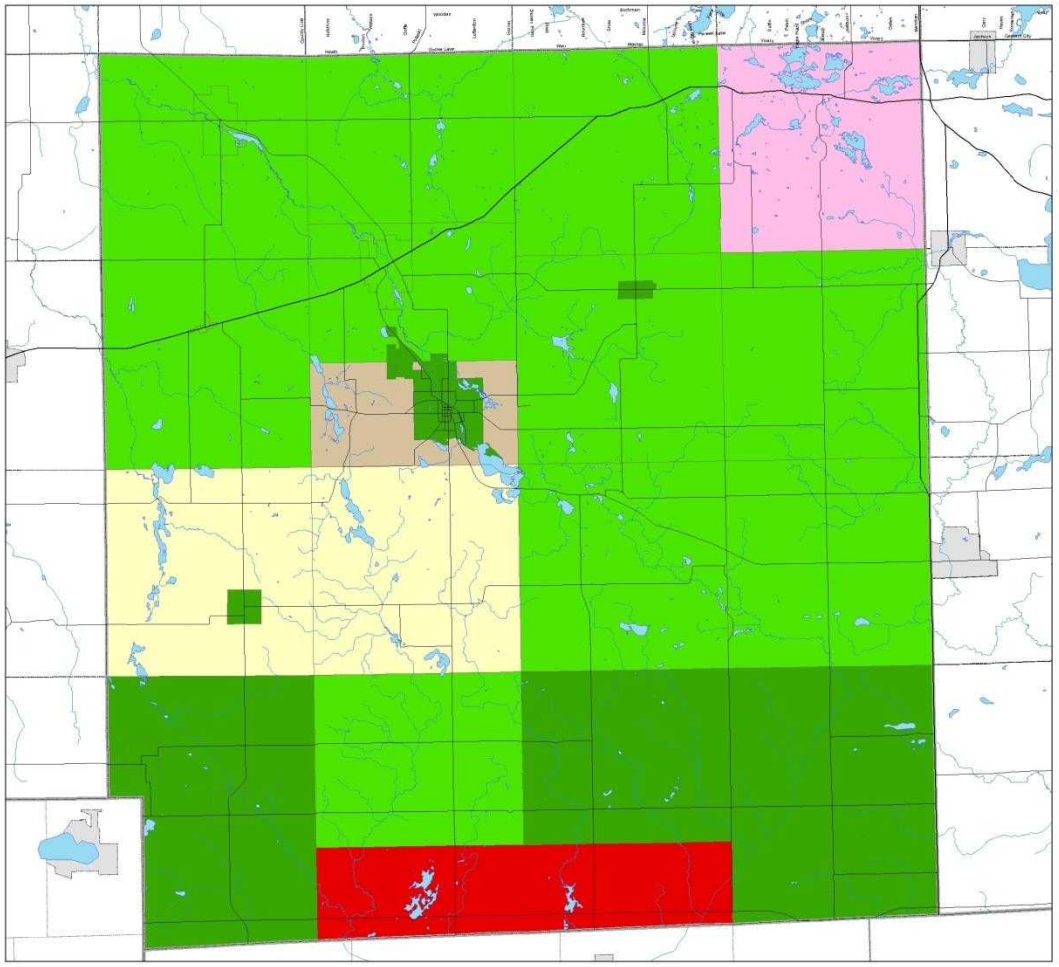
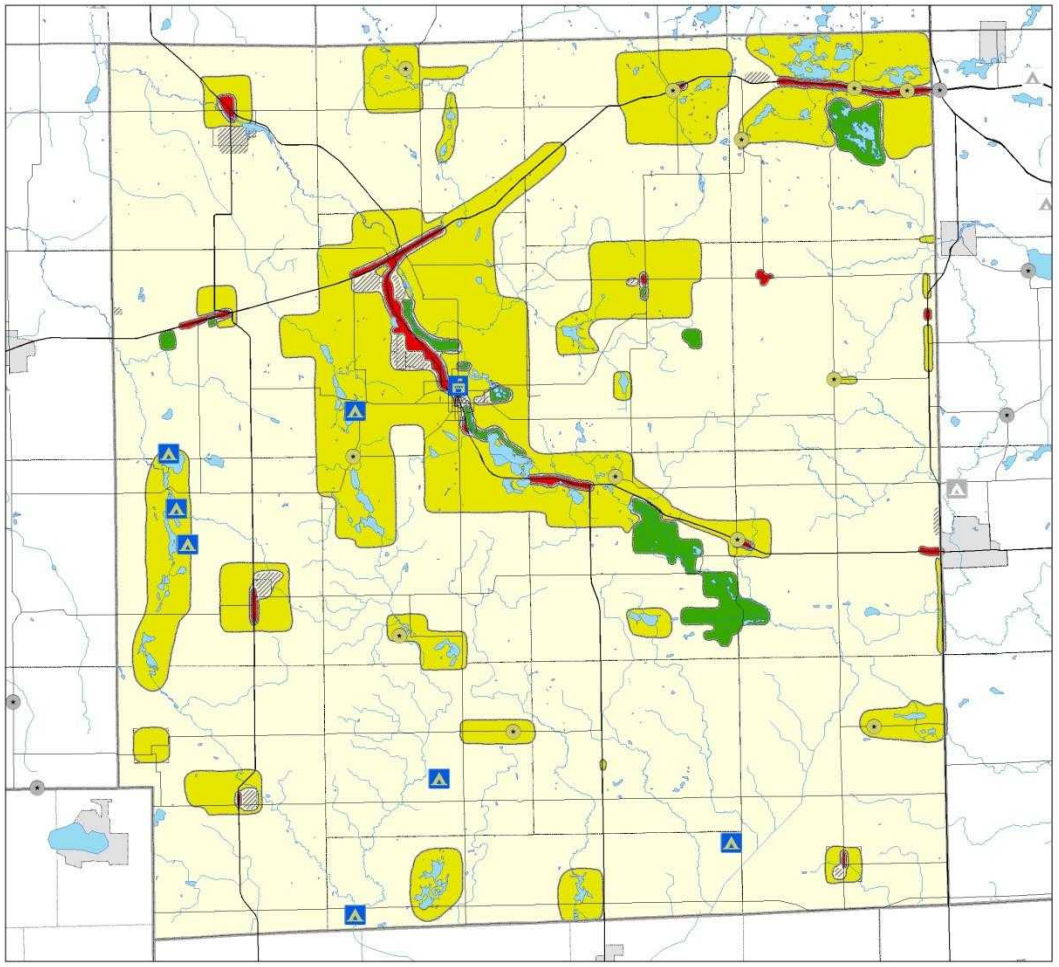


Hillsdale County Communities

Median Housing Values

- $54,700 - $72,499
- $72,500 - $89,999
- $90,000 - $107,499
- $107,500 - $124,999
- $125,000 - $142,499
- $142,500 - $146,300

Source(s):
2010 US Census, Universal Maps and R2PC



Hillsdale County Communities

Future Land Use

- Low Density Residential
- Commercial
- Industrial
- Public

Source(s):
2010 US Census, Universal Maps and R2PC

Emergency Warning Sirens

A coordinated system of emergency warning sirens to warn residents of the approach of tornadoes or nuclear attack is in place. These sirens are all owned by the municipality or organization where they are located but they are activated from either Hillsdale County Emergency Management or Central Dispatch. A listing of these sirens and their location are shown on the table entitled, "County Hazard Mitigation Plan – Emergency Warning Sirens". Twenty-two sirens are located primarily in population centers or in lake areas. While these urbanized areas are well covered with sirens, much of the rural area of the county is not served by a warning siren. The location of sirens is shown on the map entitled, "Warning Siren Location Map".

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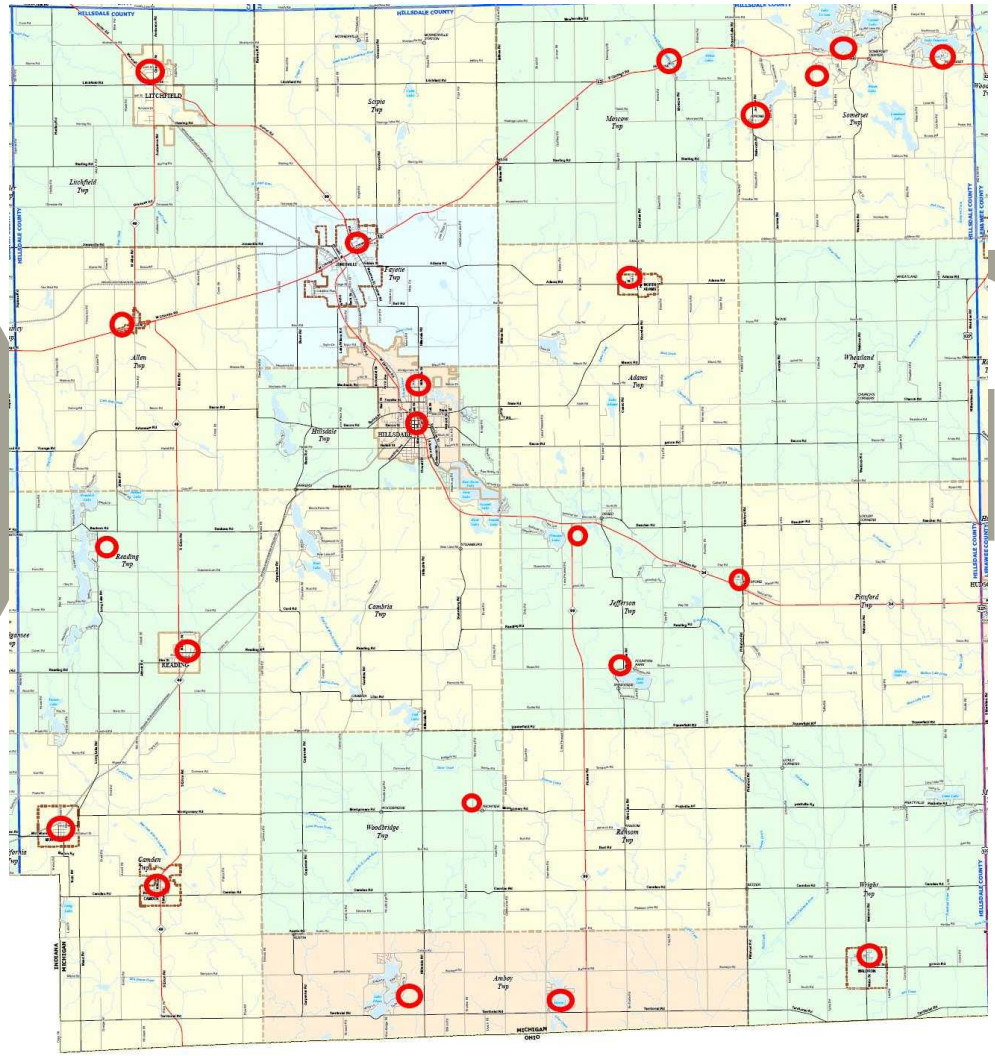
Hillsdale County Hazard Mitigation Plan
EMERGENCY WARNING SIREN
2018

Siren Name	Make	Model	Range	Street	Remote
1	Federal	1000 at	128 DB	32 E. Carleton Rd, Hillsdale	Radio
1A	Federal	2001 SRN	2 Miles	40 E. College St., Hillsdale	Radio
2	Federal	1100 Thunderbolt	5 Miles	114 E. Chicago St. Jonesville	Radio
3	Federal	2001 AC\DC	2 Miles	221 Jonesville St., Litchfield	Radio
4	Federal	5 UK	2 Miles	7731 E. Chicago Rd., Moscow	Radio
5	Federal	2001 AC\DC	2 Miles	229 W. Chicago Rd., Allen	Radio
6	Federal	2001 AC\DC	2 Miles	101 S. Pittsford Rd., Pittsford	Radio
7	Federal	2001 AC\DC	2 Miles	112 E. Center St., Waldron	Radio
8	Federal	5th 10B	3 Miles	200 Michigan St., Reading	Radio
9	Unknown	Unknown	2 Miles	100 N. Main St., Camden	Siren Site
10	Federal	AU37X	2 Miles	125 W McCallum St., Montgomery	Siren Site
11	Federal	Unknown	2 Miles	2216 E. Montgomery Rd., Frontier	Siren Site
12	Federal	1000 3-B	128 DB	129 W. Main St., North Adams	Radio
13	Federal	2001 SRN	2 Miles	9223 Shannon Dr., Somerset Township	Radio
14	Federal	2001 SRN	2 Miles	11611 Sauk Trail, Lake LeAnn, Somerset Township	Radio
15	Federal	2001 SRN	2 Miles	10008 Baker Rd., Somerset Township	Radio
16	Federal	2001 SRN	2 Miles	Jerome/Moore Rd., Somerset Township	Radio
17	Federal	2001 AC\DC	2 Miles	Long Lake Road/Chief St., Reading Township	Radio
18	Federal	2001 AC\DC	2 Miles	4500 S. Bird Lake Rd., Jefferson Township	Radio
19	Federal	2001 AC\DC	2 Miles	3255 Pioneer Rd, Jefferson Twp.	Radio
20	Federal	2001 AC\DC	2 Miles	14419 W. Territorial Rd., Lake Diane - Amboy Township	Radio
21	Federal	2001 AC\DC	2 Miles	4120 E. Territorial Rd., Merry Lake - Amboy Township	Radio

Warning Siren Location Map



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FEMA Hazard Mitigation Assistance

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.

FEMA's hazard mitigation assistance provides funding for eligible mitigation measures that reduce disaster losses. It also:

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- Reduces vulnerability of communities to disasters and their effects.
- Promotes individual and community safety and their ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies (resilience).
- Promotes community vitality after a disaster.
- Lessens response and recovery resource requirements after a disaster.
- Results in safer communities that are less reliant on external financial assistance.

Hazard Mitigation Grant Program (HMGP)

Assists in implementing long-term hazard mitigation planning and projects following a Presidential major disaster declaration.

HMGP Post Fire Grant

Assistance available to help communities implement hazard mitigation measures after wildfire disasters.

Flood Mitigation Assistance (FMA) Program

Provides funds for planning and projects to reduce or eliminate risk of flood damage to buildings that are insured annually under the National Flood Insurance Program.

Building Resilient Infrastructure & Communities (BRIC)

Support for states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards.

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Potential Hazards

The following table lists the general hazards facing the County area.

Numbers in the column "Potential Hazards Generated" correspond to numbers in the first column. Example: Fire hazard (#10) may generate other potential hazards such as hazardous materials incidents (#12), severe and prolonged utilities loss (#5) and civil, gang or prison disturbance (#19).

Hazard #	Hazard	Probability	Potential Hazard #'s Generated	Primary Risk
1	Thunderstorm Hazards: High Winds,	High – Medium	5	Lives, Property, Reduced Communications, Municipal Infrastructure
2	Thunderstorm Hazards: Lightening	High – Medium	5, 9, 10, 12	Lives, Property, Reduced Communications, Municipal Infrastructure
3	Severe Winter Weather Hazard: Ice/Sleet Storms	Medium	5, 9, 10, 11, 13	Lives, Property, Reduced Communications, Municipal Infrastructure, Transportation Problems

Listed in Order of Probability – continued				
Hazard #	**Hazard**	**Probability**	**Potential Hazard #'s Generated**	**Primary Risk**
4	Severe Winter Weather Hazard: Heavy Snow	Medium	5, 9, 10, 11, 13	Lives, Property, Reduced Communications, Municipal Infrastructure, Transportation Problems, Weakly Constructed or Aged Buildings
5	Severe Prolonged Communications & Utilities Loss	Medium	9, 10, 12, 13, 19	Reduced Communications, Municipal Infrastructure, Emergency Services, Home Health Care, Transportation Problems
6	Thunderstorm Hazard: Hailstorm	Medium – Low	5, 11, 13	Weakly Constructed Buildings, Damage to Buildings, Transportation Problems, Reduced Communications
7	Extreme Temperatures	Medium – Low	5, 19	Lives, Property, Municipal Infrastructure
8	Thunderstorm Hazard: Tornadoes	Medium – Low	5, 9, 11, 12, 13, 18, 19	Lives, Property, Municipal Infrastructure, Reduced Communications, Weakly Constructed or Anchored Building, Transportation Problems, Emergency Services
10	Fire Hazard: Pipeline/Facility	Medium Low	5, 12, 18	Lives, Property, Municipal Infrastructure, Water System
11	Hazardous Materials Incident: Transportation	Medium Low	5, 18	Lives, Property, Emergency Services, Transportation Problems, Evacuation and Sheltering
12	Hazardous Materials Incident: Fixed Site	Medium Low	5, 18	Lives, Property, Emergency Services, Transportation Problems, Evacuation and Sheltering
13	Aircraft Incident	Low	5, 9, 11, 12, 18	Lives, Property
14	Fire Hazard: Scrap Tire Fires	Low	12	Lives, Property
15	Dam Failure/Slow Rising Water/Flood	Low	5, 12, 18, 19	Lives, Property, Crops Along River, Flood Plain, Emergency Services, Transportation Problems, Evacuation and Sheltering
16	Drought	Low	17	Lives, Property, Water System, Crop Failure

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Listed in Order of Probability – continued				
Hazard #	**Hazard**	**Probability**	**Potential Hazard #'s Generated**	**Primary Risk**
17	Major Epidemic	Low	18, 19	Lives, Medical Services
18	Mass Casualty Incident	Low	19	Lives, Emergency Services
19	Civil, Gang, Prison Disturbance	Low	5, 18	Lives Property, Emergency Services
20	Terrorist Attack (Nuclear or Conventional)	Low	5, 9, 10, 11, 12, 13, 17, 18, 19	Reduces Communications, Lives, Property, Emergency Services
21	Earthquake	Low	5, 9, 10, 11, 12, 15, 18	Lives, Property, Municipal Infrastructure

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The effects of many of these hazards are interrelated. For example, several types of extreme weather hazards such as severe winter storms, tornadoes; and lightning resulting from severe thunderstorms, comprise 1/2 of the top hazards. A significant cause of energy emergencies and significant infrastructure failures is extreme weather.

Structural fires can be caused by lightning strikes or utilities damaged by severe weather. Structural fires occurring in wooded areas can lead to wildfires. Of course, wildfires can also cause damage to nearby residential structures. Some attention must be paid to the interface between new development and its context within the natural environment.

The density of development, access to essential services, and the location of population with special needs (the elderly, the disabled and the seasonal residents), must also be taken into account when developing mitigation strategies. Finally, the value of current development will also hint at the costs associated with its replacement if no mitigation efforts are made and a disaster strikes.

Previous Presidential Declarations:

The President has been vested with the ability to declare major disaster declarations, emergency declarations, and fire suppression declarations since 1953. Of the 38 declarations made in the State of Michigan between 1953 and 2020, 9 of those involve Hillsdale County.

- DR (190) Tornado affecting 16 counties including Hillsdale - April 1965
- DR (429) Tornado affecting Hillsdale county - April 1974
- EM (3030) Blizzard/snowstorm affecting 15 counties including Hillsdale - January 1977
- EM (3057) Statewide blizzard/snowstorm January 1978
- EM (3160) Blizzard/Snowstorm affecting 39 counties including Hillsdale - December 2000
- EM (3189) Northeast Blackout power outage affecting 14 Michigan counties - September 2003
- EM (3225) Hurricane Katrina evacuation 83 counties September 2005
- EM (3455) Statewide COVID-19 March 2020
- DR (4494) Every state COVID-19 Pandemic March 2020

Previous Gubernatorial Declarations:

- April 11, 1965 Palm Sunday Tornado Outbreak
- April 3, 1974 Tornado Hillsdale County only
- January 28, 1977 Blizzard/Snowstorm 15 counties including Hillsdale
- January 26, 1978 Blizzard/Snowstorm statewide
- August 15, 2003 Northeast Blackout 5 counties *
- September 7, 2005 Hurricane Katrina evacuation statewide
- March 2020 COVID-19 Pandemic

Notes: Some incidents have resulted is multiple declarations for the same incident (each jurisdiction declared separately). These are counted as one declaration only for the purpose of this list. Declarations since 1977 were issued under 1976 PN 390, as amended (Emergency Management Act). A “State of Emergency” was also declared for this incident under 1945 PA

* Presidential Declarations covered Hillsdale and 13 other counties.

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1. Civil Disturbances - Correctional Facility Uprisings and Other Civil Disturbances

Civil disturbances fall into two categories; correctional facility uprisings and other civil disturbances.

Correctional Facility Uprisings

Correctional facility uprisings consist of riots and other disturbances at correctional facilities within the county. These are often related to perceived unjust rules or living conditions or gang rivalries.

The county jail is the only correctional facility in Hillsdale County. No serious uprisings in the county jail are known to have occurred.

Other Civil Disturbances

According to the Hillsdale County Emergency Management Director, when civil disturbances occur, they are usually an offshoot or result of one or more of the following events:

1. labor disputes where there is a high degree of animosity between the participating parties,
2. high-profile/controversial judicial proceedings,
3. implementation of controversial laws or other governmental actions,
4. resource shortages caused by a catastrophic event,
5. disagreements between special interest groups over a particular issue or cause, or
6. a perceived unjust death or injury to a person held in high esteem or regard.

Many of these disturbances are designed to interfere with normal business functions in an attempt to make a political statement. While generally uncommon, the potential still exists for these to occur. Civil disturbances can occur at local schools and colleges, during labor disputes with major employers in the county, at various city and township public meetings, the county courthouse, as sites of local disasters and at several other unanticipated venues.

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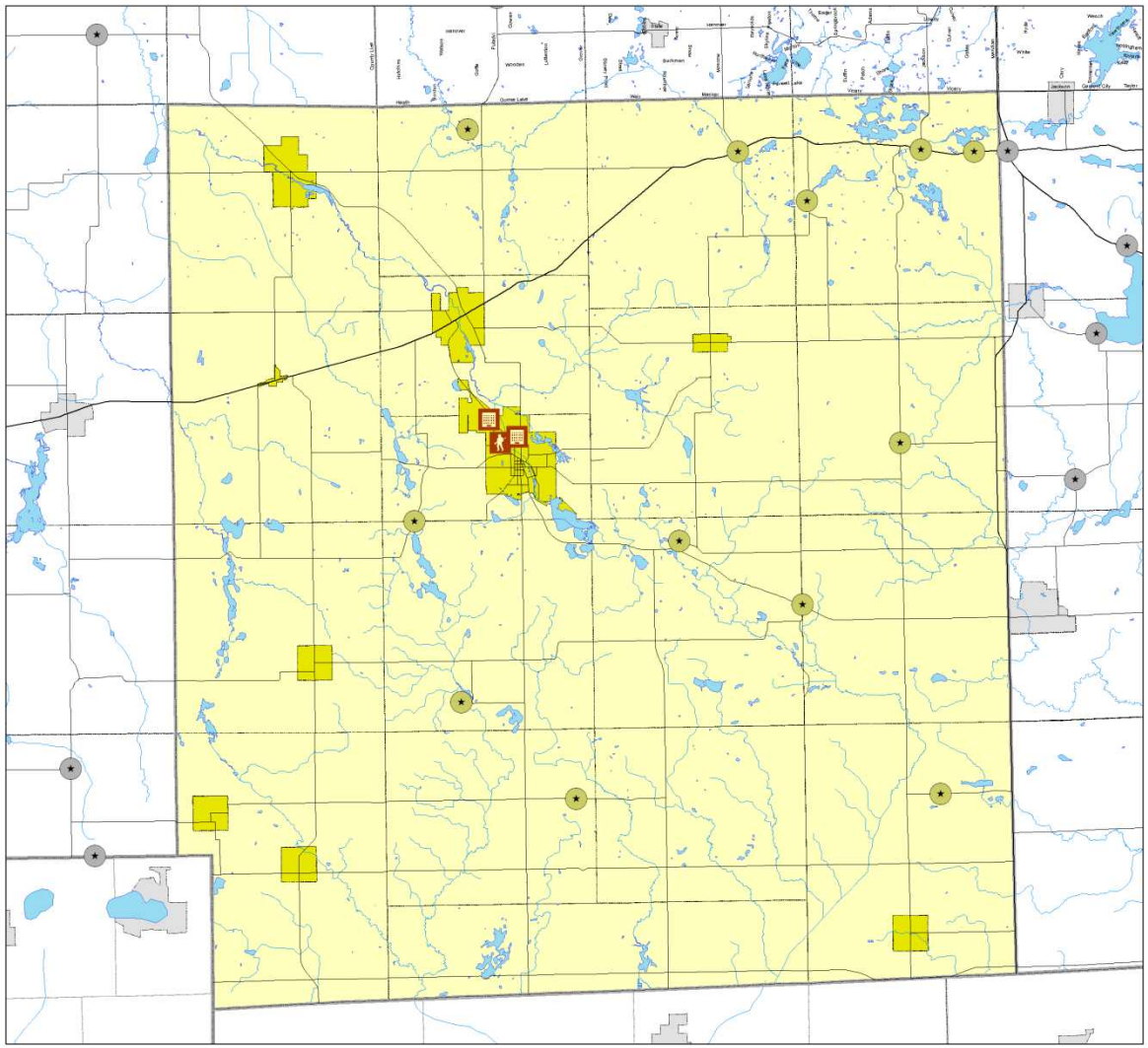
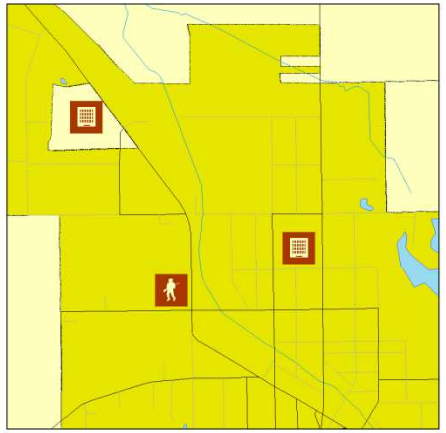
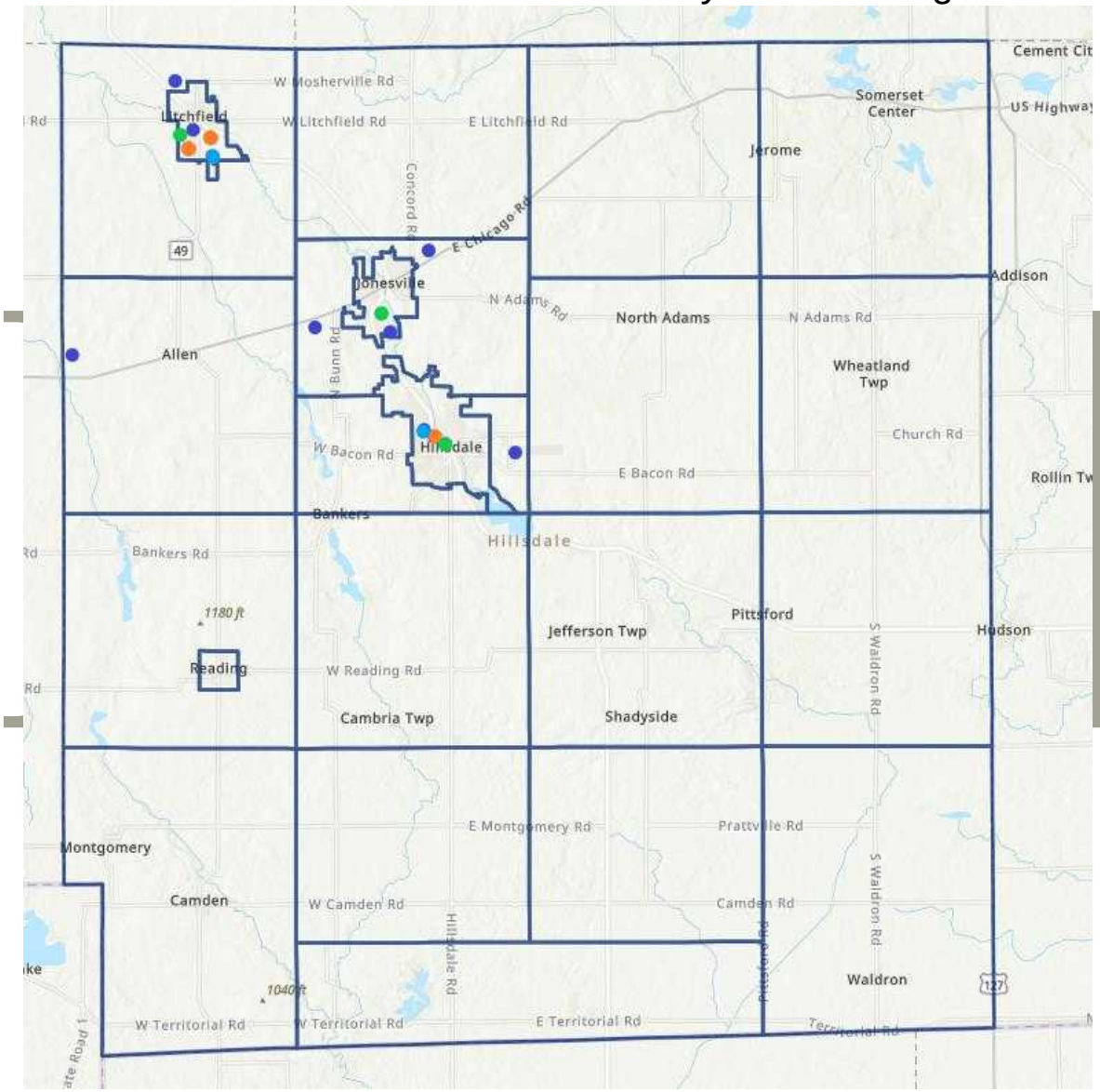


Potential Sites for Civil Disturbances in Hillsdale County

Hillsdale County Jail

Colleges





Manufacturing Sites for Potential Civil Disturbances in Hillsdale County

Litchfield

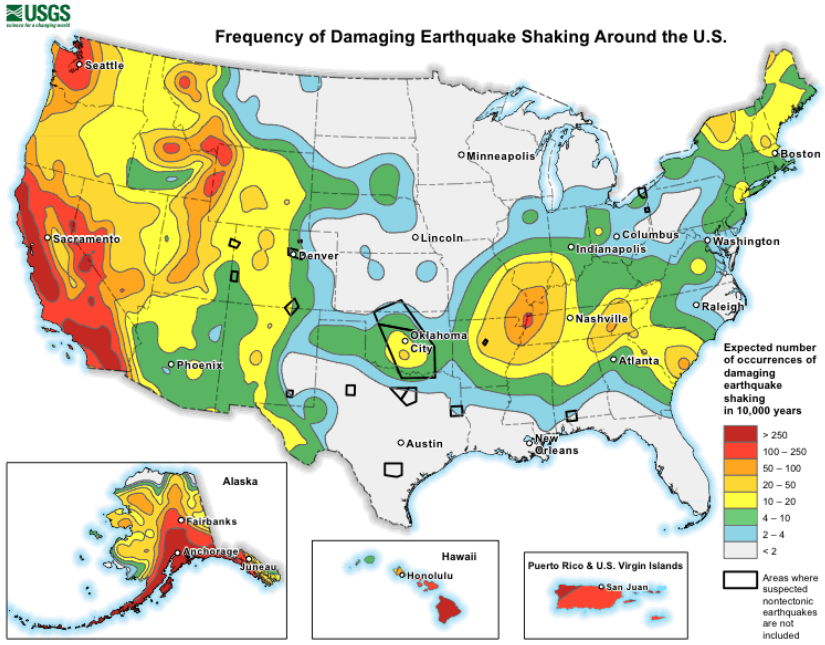
Allen Township

Jonesville

Hillsdale

2. Earthquakes

Hillsdale County "is in an area in which there is a low probability of earthquake occurrences. The area may be affected by distant earthquakes that occur in the New Madrid Seismic Zone and upstate New York. The New Madrid Seismic Zone poses the most significant threat."



If an earthquake were to hit Hillsdale County, there would only be a 1-in-50 chance of the resulting horizontal shaking accelerating more than 4-8% in the next 50 years. Fortunately, less than 1.5% of the land in the county is involved in landslides.

"The greatest impact on" Hillsdale County, will "probably come from the damage to natural gas and petroleum pipelines. If an earthquake occurs in the winter, the county could be severely impacted by fuel shortages. Damage would probably be negligible in well-designed and constructed buildings. However, poorly designed and constructed buildings could suffer considerable damage under the right circumstances".

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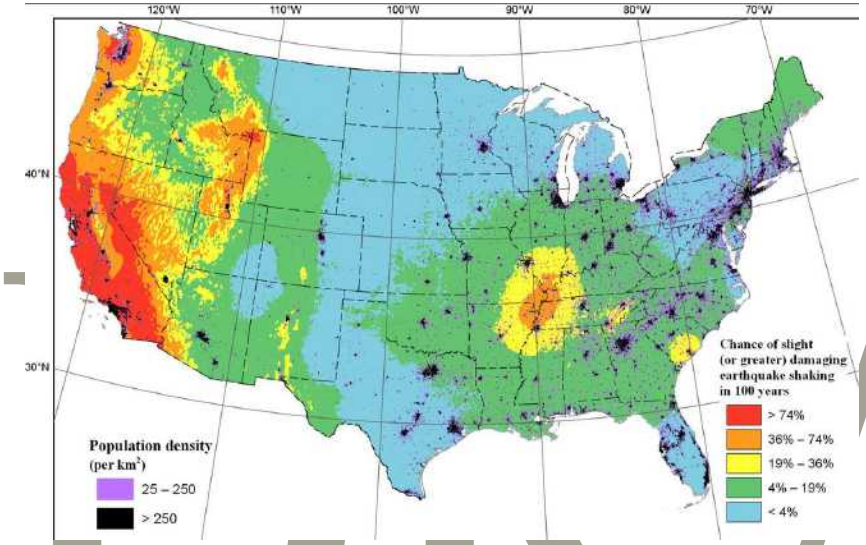

Map showing the chance of damaging earthquake shaking in 100 years from the 2018 NSHM. The shaking is equivalent to Modified Mercalli Intensity VI and is based on the average 1-second horizontal spectral response acceleration. Ground motions are computed for topographic-based V_{S30} values (Wald and Allen, 2007). Population density (from LandScan with 1 km x 1 km resolution [Dobson et al., 2000]) is superimposed on the map.

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3. Subsidence

"Subsidence, as the 2019 Michigan Hazard Analysis indicates" is the lowering or collapse of the land surface due to loss of subsurface support. It can be caused by a variety of natural or human-induced activities. Natural subsidence occurs when the ground collapses into underground cavities produced by the solution [(e.g., erosion)] of limestone or other soluble materials by groundwater. Human-induced subsidence is caused principally by groundwater withdrawal, drainage of organic soils, and underground mining. Generally, subsidence poses a greater risk to property than to life. In southern Lower Michigan, the primary causes of subsidence are salt mining, gypsum mining, and coal mining. None of these three causes is significant in Hillsdale County.

Mitigation Efforts: These programs and initiatives are designed to prepare for, respond to, and recover from earthquakes and subsidence.

Federal Response Plan (FRP) coordinates federal assistance to a catastrophic earthquake or other similar disaster and outlines the responsibilities of 27 federal agencies with a role in disaster recovery and/or recovery.

Executive order (EO) 12699, seismic safety and federally assisted or regulated new building construction.

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4. Scrap Tire Fires

Management "of scrap tires has become a major economic and environmental issue. Scrap tire disposal sites are breeding grounds for mosquitoes. From an emergency management perspective, the most serious problem that scrap tire disposal sites pose is that they can be a tremendous fire hazard if not properly designed and managed." The Michigan Department of Environment, Great Lakes, and Energy (EGLE) announced that it has awarded $1,277,351 in grants to fund 72 community scrap tire drop-off events and other tire cleanups across the state. Additionally, five grant projects will fund the removal of old tire piles at private properties. Hillsdale County Conservation District was awarded $50,000 in October of 2019.

There are no registered scrap tire collection sites or haulers in Hillsdale County, according to the Michigan Department of Environmental Quality (MDEQ now EGLE). A map produced by Tetra Tech EM Inc. for the MDEQ indicates that one illegal tire disposal site storing 2,000-9,999 tires is located north of Jonesville. However, the MDEQ also states that a total of 2700 scrap tires were stockpiled in the county in 2009, according to the 2019 Michigan Hazard Analysis. Because there are scrap tires located in Hillsdale County, there is always a possibility of a fire, but it appears quite low.

https://www.michigan.gov/documents/deq/DEQ-WMRPD-PART-169-SCRAP-TIRE-2019-CLEAN-UP-GRANTS_643567_7.pdf In 2019 Jefferson Township was awarded $20,000 for 9,006 tires collected (returning $8000).

https://www.michigan.gov/documents/egle/EGLE-MMD-PART-169-SCRAP-TIRE-2020-CLEANUP-GRANTS_667595_7.pdf In 2020 Hillsdale Conservation District was awarded $50,000 for 25,008 tires collected.

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Policies for regulated disposal and management of scrap tires, and enforcement of regulations related to them (separation of stored scrap tires from other materials; limits on the size of each pile; minimum distances between piles and property lines; covering, chemically treating, or shredding tires to limit mosquito breeding; providing for fire vehicle access to scrap tire piles; training employees in emergency response operations; installation of earthen berms around storage areas; prevention of pools of standing water in the area; control of nearby vegetation; an emergency plan posted on the property; storing only the permitted volume of tires authorized for that site).

Proper siting of tire storage and processing facilities (land use planning that recognizes scrap tire sites as a real hazard and environmental threat).

5. Structural Fires

“In terms of average annual loss of life and property, structural fires — often referred to as the ‘universal hazard’ because they occur in virtually every community — are by far the biggest hazard facing most communities in Michigan and across the country.” Over 1.7 million fires occurred in the State of Michigan during the period of 1975-2003, resulting in an average of over 63 thousand fires a year, with an annual average loss of $360.7 million. Hillsdale County was in the bottom half of Michigan counties for the number of fires per 1,000 people in 2018.

Unfortunately, death can be an outcome of structural fires, and "Michigan's fire death rate of 14.4 persons per million people puts it in the middle of all states in the nation in 2014." According to the office of the State Fire Marshal, an average of 141 persons a year died in Michigan fires during the period of 2000-2014. Michigan's fire death rate is ranked third in the Midwest, behind Missouri and Indiana as of 2007. Michigan reported 681 civilian home fire fatalities from 2004 – 2019. The county had 109 structure fires 2019 and 152 structure fires in 2020 with a small percentage resulting in fatalities.

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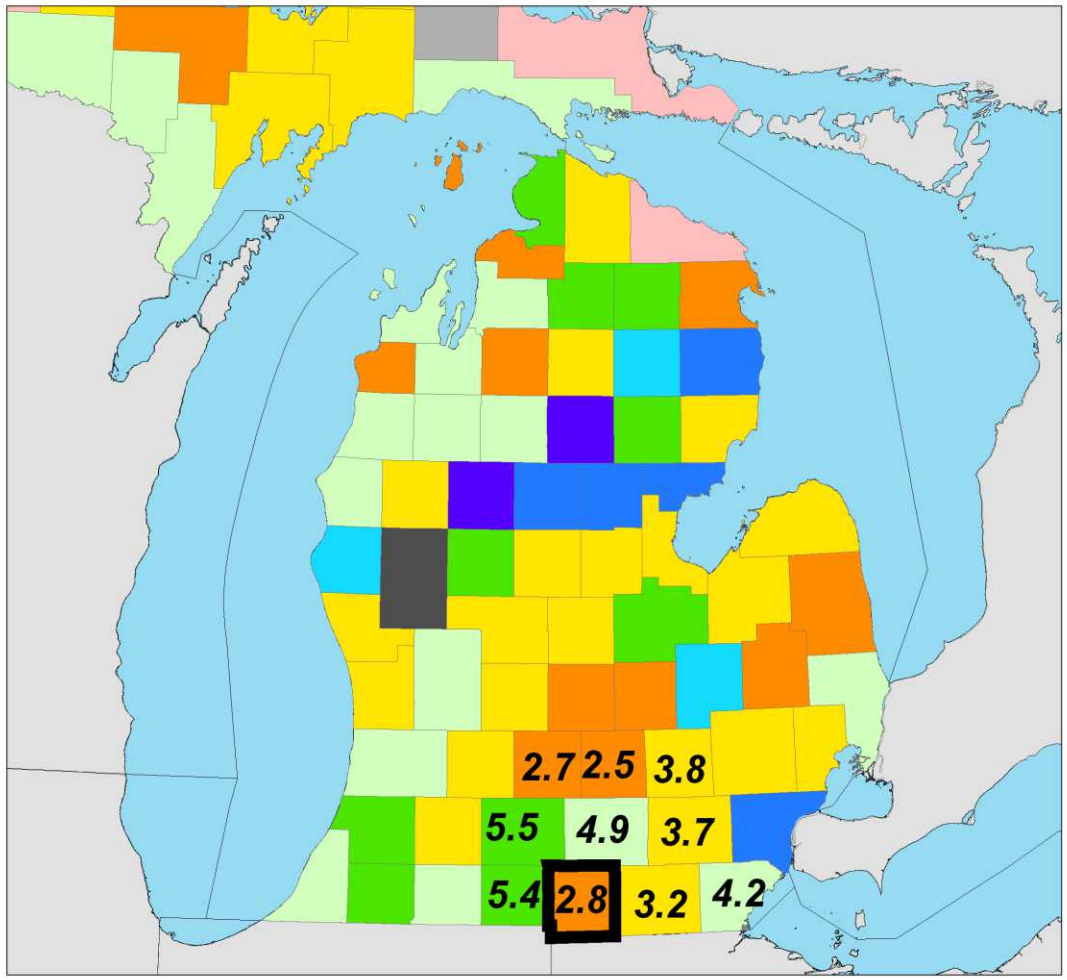
2019 - 2020 Hillsdale County Fire Statistics	
Incidents	
2019	2020
2851	3233

Fires can occur in industrial and public assembly/mercantile structures as well as residences. The table illustrates the fire departments dispatched by Central Dispatch for 2019 and 2020.

"Fires in congregate facilities such as hotels, entertainment venues, schools and hospitals," according to the Michigan Hazard Analysis, "pose even greater risk due to the larger number of persons involved. Hillsdale County has a few large gatherings a year "Hillsdale College Graduation, Hillsdale County Fair and 4th of July celebration".

Top 3 causes of a fire are smoking, cooking and electrical. Only 36% of homes have working smoke alarms. All major industrial facilities have fire prevention systems in Hillsdale County.



2019 Michigan Structural Fires

Fires Per 1,000 Population in 1998

- <1.00
- 1.00 - 1.99
- 2.00 - 2.99
- 3.00 - 3.99
- 4.00 - 4.99
- 5.00 - 5.99
- 6.00 - 6.99
- 7.00 - 7.99
- 8.00 - 8.99
- 9.00 - 9.99
- >10.00

Sources:
Michigan State Police, Fire Marshal Divison; The National Atlas for the USA; and Center for Geographic Information, State of Michigan

6. Wildfires

"Michigan," according to the Michigan Hazard Analysis, "has the fifth largest timberland acreage, with 4.2 million acres of softwoods and 13.1 million acres of hardwoods. That vast forest cover is a boon for both industry and recreation. However, it also makes many areas of Michigan highly vulnerable to wildfires. Because Michigan's landscape has changed substantially over the last several decades, due to wild land development, the potential danger from wildfires has become more severe. Increased development in and around rural areas (a 60% increase in the number of rural homes since the 1980s) has increased the potential for loss of life and property from wildfires." Much of the recent development in Hillsdale County is also exurban in nature.

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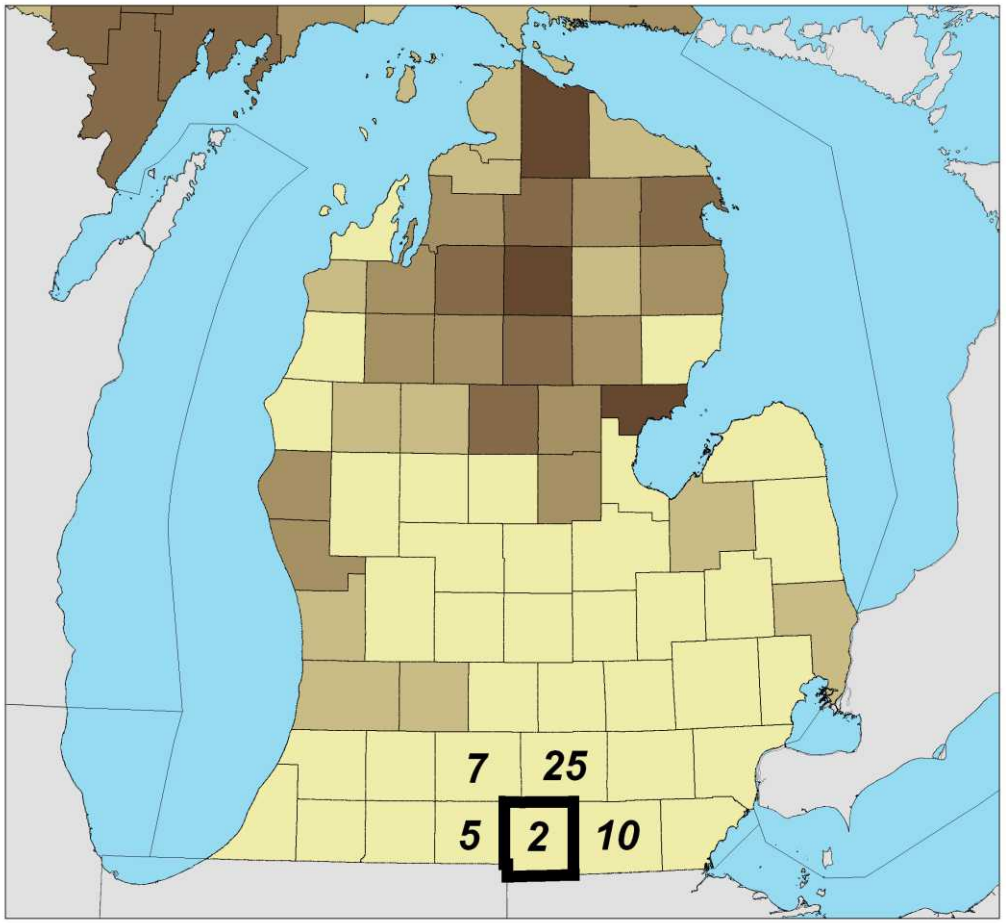
There were two fires affecting 20 acres on Michigan Department of Natural Resources (MDNR) controlled land in Hillsdale County between 1981 and 2000. The 2 fires in 20 years mean 2/20 which means about 1 every 10 years or approximately 10% chance per year a probability.

According to the MDNR, 365 fires in 2003 resulted in the burning of 3,549 acres. The number of fires occurring between January and May 2004 was 179 (affecting 1,350 acres), illustrating that wildfires can happen anytime, not just the dry summer months.

March 20, 2018 - 60 acres of property were lost in a wildfire which was under a conservation reserve program.

The Hillsdale County wildfire risk score of 19.19% is very low. The distribution of the wildfire hazard potential (WHP) for Hillsdale County is very low. Note that in our area, an average 2.3 Fahrenheit degree increase in summer temperature is expected by the two Regional Climate Models (RCMs) selected by our team, which could affect wildfire hazard in the coming decades.

Source: Scoring by Augurisk, based on average Wildfire Hazard Potential values (Dillon et al., 2014) and expected increase in summer temperature in the county. Mearns, L.O., et al., 2017: The NA-CORDEX dataset, version 1.0. NCAR Climate Data Gateway, Boulder CO, accessed [December 2019]; Dillon, G.K.; J. Menakis; and F. Fay. 2015. Wildland Fire Potential: A Tool for Assessing Wildfire Risk and Fuels Management Needs. pp 60-76 In Keane, R. E.; Jolly, M.; Parsons, R.; and Riley, K. Proceedings of the large wildland fires conference; May 19-23, 2014; Missoula, MT. Proc. RMRS-P-73. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.



Michigan Wildfires
(MDNR jurisdiction only)

Number of Wildfires

- 0 - 76
- 77 - 194
- 1945 - 325
- 326 - 519
- 520 - 908

7. Fluvial "Riverine" Flooding

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

8. Pluvial Flooding

Includes ponding problems, drainage system inadequacies (capacity, power supply, and structural failure), and basement backflow.

Flooding Events

The term fluvial here means floods associated with rivers and drainage systems that flow into those rivers. The term pluvial generally refers to floods associated with precipitation—mostly rainfall, but often including snow and ice as they melt—which collects in low-lying areas to form ponds or other temporary pools of water, faster than those waters can drain into the ground or into storm water sewer systems.

Limited flooding has occurred in Hillsdale County, causing little damage. The headwaters for five different watersheds are located in the county. There are no "repetitive loss properties" located in Hillsdale Counties. The National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI) recorded the following occurrences of flooding in the county from 1950 through 2020:

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TABLE IV-7, Flood Events, Hillsdale County (1950-2020)		
Date	**Description**	**MCD's***
05-09-1996	3:30:00 PM EST. Rain totals of nearly 3 inches resulted from thunderstorms moving across the county, causing flooding of streets and some basements as well as the overflow of the small streams.	Hillsdale
06/17/1996	4:00:00 PM EST. Property Damage: $150,000. Flash flooding from rains measured at over three inches caused road washouts and damage to culverts, bridges, and homes. A bridge along Ridge Drive was washed away. Many houses suffered water damage near Berry Lake.	Hillsdale
09/09/1997	11:00:00 PM EST. The Hillsdale County Sheriff's Department reported several rural roads in Allen Township were washed out.	Allen
09/09/1997	11:00:00 PM EST. The Hillsdale County Sheriff's Department reported parts of Michigan Highway 99 were flooded in and around the city of Hillsdale.	Hillsdale
05/21/2010	4:44 PM EST A upper level impulse, abundant moisture and a south-southwesterly flow combined to allow for the development of thunderstorms. While several produced small hail and locally gusty winds, the main effect was torrential rainfall, on the order of 1 to 3 inches per hour. This resulted in flash flooding in several locations across western Defiance county. Emergency management officials reported numerous roads flooded across the western part of the county, including near the intersection of US 12 and Sand Lake Road. One to three inches of rain fell across portions of this area in roughly two hours.	Litchfield

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09/01/2013	6:30 AM EST A strong warm front surged north into Lower Michigan during the early morning hours of the 9th. Steep lapse rates and abundant lift with the front along allowed for several rounds of showers and a few thunderstorms to persist across portions of far southern Lower Michigan. Reports of four to over five inches of rain were received across portions of Hillsdale County, especially in the Litchfield area where several roads were flooded and impassable. Numerous roads were flooded in and around Litchfield and Hillsdale with ditches filled and several yards under water. A CoCoRAHs observer reported 5.35 inches of rain from the event.	Litchfield

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According to FEMA the following Hillsdale County communities have been mapped and participate in the National Flood Insurance Program:

- City of Hillsdale
- Township of Hillsdale
- City of Litchfield
- Township of Litchfield
- Township of Reading

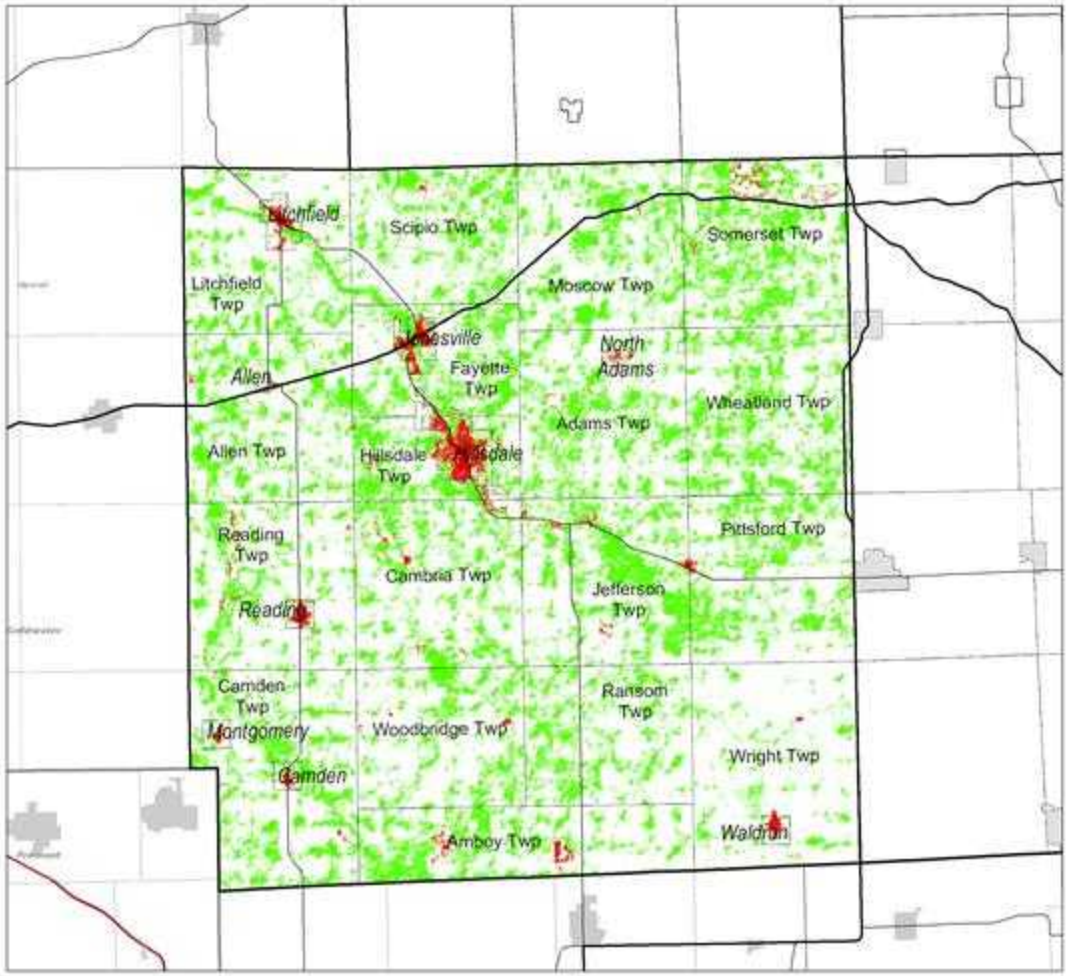
Federal Emergency Management Agency

Community Status Book Report

MICHIGAN

Communities Participating in the National Flood Program

CID	Community Name	County	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Reg-Emer Date	Tribal
260068#	Hillsdale, City of	Hillsdale	6-28-1974	1-6-1988	2-19-2014	1-6-1988	No
261413#	Hillsdale, Township of	Hillsdale		2-19-2014	2-19-2017	5-8-2015	No
261415#	Litchfield, Township of	Hillsdale		2-19-2014	2-19-2014	12-12-2014	No
260409#	Litchfield, City of	Hillsdale	7-11-1975	2-4-1987	2-19-2014	2-4-1987	No
260410#	Reading, Township of	Hillsdale	10-28-1977	2-19-2014	2-19-2014(M)	2-19-2014	No



Hillsdale County Forested & Urbanized Lands

Forested Lands

Urbanized Areas

Source:
Center for Geographic Information,
State of Michigan

9. Dam Failures

"A dam failure," according to the Michigan Hazard Analysis, "can result in loss of life and extensive property or natural resource damage for miles downstream from the dam. Dam failures occur not only during flood events, which may cause overtopping of a dam, but also be a result of poor operation, lack of maintenance and repair, and vandalism. Such failures can be catastrophic because they occur unexpectedly, with no time for evacuation.

The Michigan Department of Natural Resources and Environmental Quality (MDNRE) states that when a dam is given a "Hazard Potential Rating" (High, Significant, or Low), this rating does not indicate the dam's failure potential. If the dam should fail, this rating identifies how much damage would occur down-stream of the failure. In addition to this rating, dams are given a condition assessment during the dam safety inspection process. This assessment is what indicates the dam's failure potential. There are five assessment levels: Satisfactory, Fair, Poor, Unsatisfactory, and Not Rated. Each of these assessment levels indicates the presence or absence of deficiencies with the dam.

According to MDNRE's database, as of 2017, there are six dams with significant hazard potential ratings and 40 dams with low hazard potential ratings. Considering the condition of the existing dams, there is a range between significant and low likelihood that Hillsdale County will experience a dam failure in the upcoming years. In recent year's one dam, south of the City of Jonesville, failed with no serious consequences. This dam has not been restored and it appears there are no plans to do so. In August of 2020 part of the Bear Lake dam wall failed, inspection reports indicate it only holds back a few inches of water with little to no impact downstream. This dam has been repaired by the County Drain office.

In addition to the flooding potential caused by a dam failure, there is concern that at least one of the existing dams, an old mill-pond dam on the St. Joseph River behind the County Fairgrounds in the City of Hillsdale, could spread contamination contained in sediment downstream should it fail. The City of Hillsdale is working with the MDNRE and licensed contractors to determine the extent of the possible contamination and develop a plan to mitigate any effects. The City is working towards possibly removing the dam which no longer serves a purpose. If it should fail, properties located along the river downstream would be temporarily inundated with water potentially flooding basements in the area.

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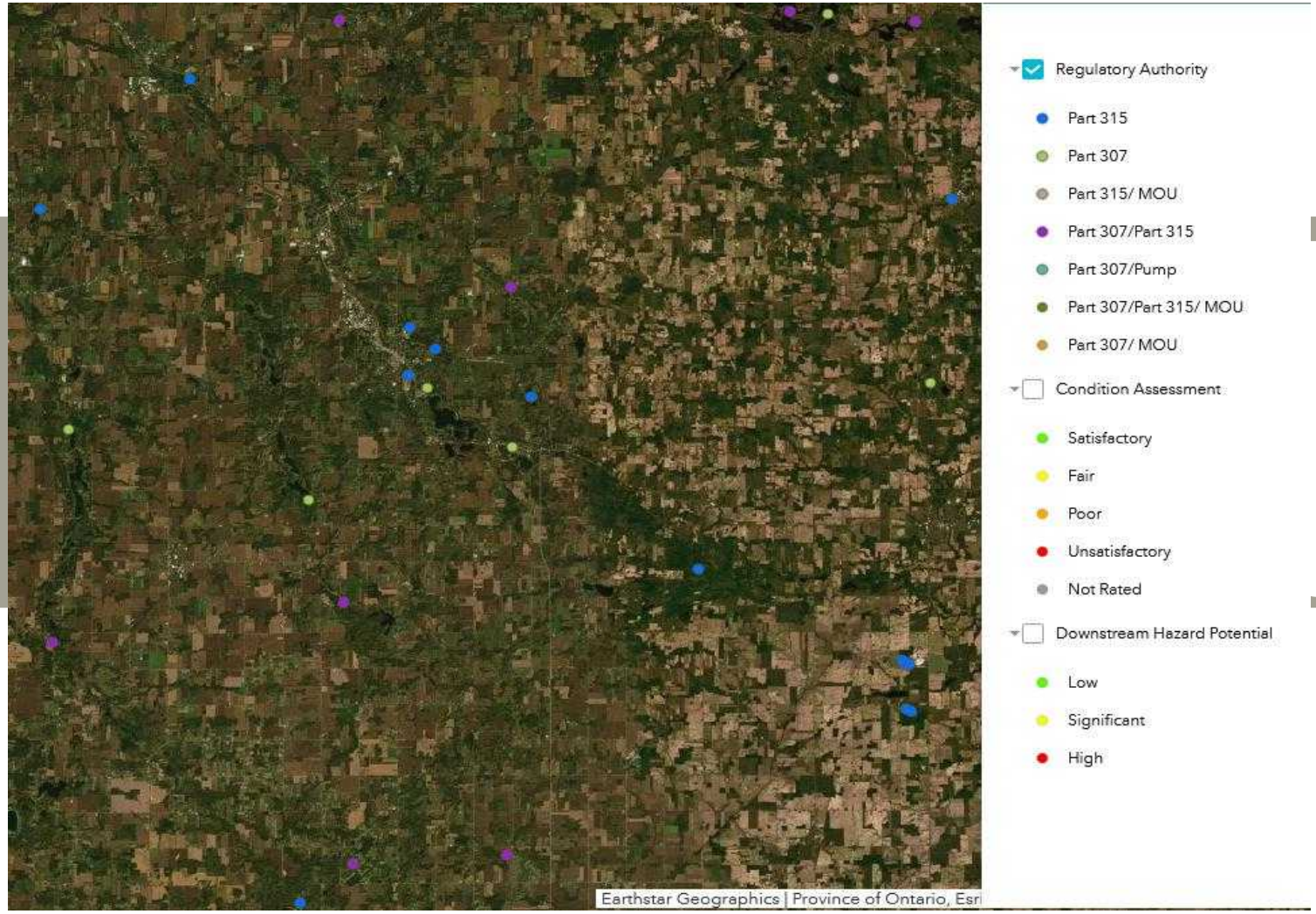
Regulatory Authority
Part 315
Part 307
Part 315/ MOU
Part 307/Part 315
Part 307/Pump
Part 307/Part 315/ MOU
Part 307/ MOU
Condition Assessment
Satisfactory
Fair
Poor
Unsatisfactory
Not Rated
Downstream Hazard Potential
Low
Significant
High
Earthstar Geographics | Province of Ontario, Esri

Dam ID	Dam Name	Latitude	Longitude	Downstream Hazard Potential	Owner Name	Last Inspection Date	River	Condition
1634	Hemlock Carpenter and Long Lake Dam	41.8933333	-84.7983333	Low	Hillsdale County Drain Commissioner	October 2, 2019	Hog Creek	Fair
1640	Lewis Emery County Park Pond #6 Dam	41.926037	-84.611557	Low	Hillsdale County Road Commission	October 14, 2016	Tributary to St Joseph River	Fair
83	Big Mosherville Dam	42.058853	-84.660172	Low	Hillsdale County Drain Commissioner	November 24, 2019	South Branch Kalamazoo River	Poor
89	Hillsdale Millpond Dam	41.9151529	-84.6252161	Significant	City of Hillsdale	October 14, 2016	Saint Joseph River	Poor
886	Baw Beese Lake Dam	41.91	-84.6158333	Low	Hillsdale County Drain Commissioner	October 2, 2019	St. Joseph River	Satisfactory
956	Crystal Lake Dam	42.0616667	-84.4113889	Low	Hillsdale County Drain Commissioner	September 30, 2019	Trib to Grand River	Satisfactory
413	Merry Lake Dam	41.72	-84.575	Significant	Hillsdale County Drain Commissioner	October 24, 2019	Silver Creek	Satisfactory
416	Lake Diane Dam	41.7166667	-84.6533333	Significant	Hillsdale County Drain Commissioner	October 24, 2019	Tributary to Clark Fork Creek	Satisfactory
452	Weatherwood Dam	41.906522	-84.562348	Low	Michindoh Ministries	December 20, 2016	River	Satisfactory
553	Cambria Mill Pond Dam	41.8233333	-84.6583333	Low	Cambria Township	October 24, 2019	River	Satisfactory
662	Manitou Properties Dam 1	41.7786368	-84.3689661	Low	Manitou Waters Association	June 1, 2015	Tributary to Lime Creek	Satisfactory
663	Manitou Properties Dam 2	41.7794623	-84.3720934	Low	Manitou Waters Association	June 1, 2015	Tributary to Lime Creek	Satisfactory
1635	Hillsdale College Dam	41.9343209	-84.6241433	Low	Hillsdale College	October 29, 2009	River	Satisfactory
79	Lake Le-Ann South Dam	42.062782	-84.430557	Low	Lake Le-Ann Property Owners Assoc.	October 2, 2019	Grand River	Satisfactory
80	Lake Le-Ann North Dam	42.073128	-84.426773	Significant	Hillsdale County Drain Commissioner	October 2, 2019	Grand River	Satisfactory
84	Ribeck Mead and Turner Dam	41.8066667	-84.8066667	Low	Hillsdale County Drain Commissioner	October 24, 2019	W Fork W Br St Joseph River	Satisfactory
86	Lake Somerset Dam	42.0583333	-84.3666667	Significant	Hillsdale County Drain Commissioner	October 2, 2019	Goose Creek	Satisfactory
1992	Long Lake Level Control Structure	45.1333333	-83.975	Low	Long Lake Improvement	September 13, 2018	Long Lake Outlet	Satisfactory
2517	Bear Lake Dam	41.8647222	-84.6758333	Low	Hillsdale County Drain Commissioner	October 24, 2019	E Fork W Br St Joseph River	Satisfactory
2518	Pleasant Lake Dam	41.8858333	-84.5722222	Low	Hillsdale County Drain Commissioner	October 2, 2019	Trib W Br St Joseph River	Satisfactory

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10. Energy Emergencies

"An adequate energy supply," according to the Michigan Hazard Analysis, "is critical to Michigan's (and the county's) economic and social well-being. The American economy and lifestyle are dependent on a non-interrupted, reliable, and relatively inexpensive supply of energy that includes gasoline to fuel our vehicles, and electricity, natural gas, fuel oil, and propane to operate our homes, businesses and public buildings. To date, Americans have always dealt with short term energy disruptions caused by severe weather damage (i.e., downed power lines and poles), broken natural gas and fuel pipelines, and shortages caused by the inability of the energy market to adequately respond to consumer demand and meet required production." However, the 1973-74 Oil Embargo, the natural gas shortage of 1976-77, the 1979 major price increases in oil resulting from the Iranian Revolution, during the Gulf War in 1991 (after Iraq invaded Kuwait and destroyed many of its oil fields) and in the aftermath of the September 11, 2001 terrorist attacks in the U. S. forced the country to face the reality that it is highly vulnerable to energy disruptions"

There are three types of energy emergencies:

1. the physical destruction to energy production or distribution facilities caused by severe storms, tornadoes, floods, earthquakes, or sabotage,

2. a sharp sudden escalation in energy prices, usually resulting from a curtailment of oil supplies,

3. a sudden surge in energy demand caused by a national security emergency involving mobilization of U.S. defense forces."

One emergency Presidential Declaration (3189) was enacted for the period of August 14 to 17, 2003 because of electric power failure that caused the largest blackout in North American history.

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Hillsdale County has experienced numerous severe electrical power outages, caused mostly by severe weather such as windstorms or ice and sleet storms and occasionally by equipment failure that are referred to in the Michigan Hazard Analysis. Fortunately, most of those occurred in months where severe cold temperatures were not a problem. If they had occurred during the cold winter months, there certainly would have been a potential for loss of life — especially among the elderly and other more vulnerable members of society. Hillsdale County has experienced many winter storm and high wind events in the past. Because of this, there is a high probability that electrical outages will occur again in the near future.

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11. Significant Infrastructure Failures

"Michigan's citizens are dependent on the public and private utility infrastructure to provide essential life supporting services such as electric power, heating and air conditioning, water, sewage disposal and treatment, storm drainage, communications, and transportation. When one or more of these independent, yet interrelated systems fail due to disaster or other cause —even for a short period of time— it can have devastating consequences." The following listing describes the various types of infrastructure systems (all of which can fail):

- Water Distribution
- Wastewater Collection/Treatment
- Surface Drainage
- Telecommunications

Hillsdale County has been spared the difficulties related to disastrous infrastructure failures. Such failures are possible, however.

12. Passenger Transportation Accidents

A passenger transportation accident is defined as a crash or accident involving an air, land or water-based commercial passenger carrier. While the safety record of passenger commercial transportation is very good for aircraft, buses, and trains; crashes are possible. There is a potential for harm or fatalities. Air crashes may occur in flight, with equipment malfunction or sabotage, on landings and take-offs, and while vehicles are moving on the ground.

The Hillsdale Municipal Airport is the only public use airport in Hillsdale County. The general utility facility is under public ownership. Small personally owned planes and a few smaller business jets are the primary users. Patriot Aviation, the current contracted service provider at the airport, indicates the largest jets that occasionally use the facility can carry approximately 15 persons and baggage.

Several local public transit and school bus routes traverse Hillsdale County, but no other modes of passenger transportation directly serve county residents.

Hillsdale County has had no serious high fatality crashes involving commercial carriers.

"When responding to any of these types of commercial transportation accidents, emergency personnel may be confronted with a number of problems, including:

- suppressing jet fuel or gasoline fires
- rescuing and providing emergency first aid for survivors
- establishing mortuary facilities for victims
- detecting the presence of explosive, radioactive or otherwise hazardous materials involved
- providing crash site security, crowd and traffic control, and protection of evidence for investigators

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13. Hazardous Material Incidents: Fixed Site and Transportation

Fixed Site

A fixed site hazardous material incident, according to the Michigan Hazard Analysis, is an "uncontrolled release of hazardous materials from a fixed site capable of posing a risk to life, health, safety, property or the environment." This definition includes industrial accidents.

"The Superfund Amendments and Reauthorization Act (SARA) Title III program," according to the Michigan Department of Environmental Quality (MDEQ), "is committed to efficiently and effectively overseeing data collection and quality assurance of environmental information transmitted to the MDEQ. This includes providing support to the Michigan Emergency Planning and Community Right-to-Know Commission (SERC) on coordination of hazardous materials enforcement, response, and planning in the State of Michigan."

According to the Michigan Hazard Analysis, Hillsdale County had 25 SARA Title III sites as of September 2018.

Significant Industrial Accidents in Hillsdale County 1892-2009

December 11, 1998 – Osseo (Pittsford Township) – Fireworks Plant Explosion - On December 11, 1998 an explosion at the Independence Professional Fireworks Company manufacturing plant near Osseo, in Hillsdale County, killed seven employees and leveled one building at the site. The blast, which occurred in a fireworks shell assembly room, sent debris flying in all directions for about 300 yards and could be heard for at least 20 miles. Fifteen other workers escaped serious injury in the explosion. Subsequent investigations by the Federal Bureau of Alcohol, Tobacco and Firearms, the Michigan State Police Fire Marshal Division, and the Michigan Occupational Safety and Health Administration (MIOSHA) were unable to determine a definitive cause of the explosion. This explosion was the worst industrial accident in Michigan in 20 years.

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March 29, 1999 – Osseo (Pittsford Township) – Fireworks Plant Explosion - Another devastating explosion occurred at the same plant that had suffered a disastrous explosion the previous year, killing five more employees and destroying another building at the site. This second explosion, which included among its victims the company co-owner, was later determined by investigators to be accidental. The devastation brought by the two explosions, which resulted in a total of 12 deaths, forced the company to permanently shut down the business. Federal and state regulators have since issued numerous citations to the company for safety violations at the plant, with fines totaling several hundred thousand dollars.

There is no record of recent industrial accidents of any significance in Hillsdale County.

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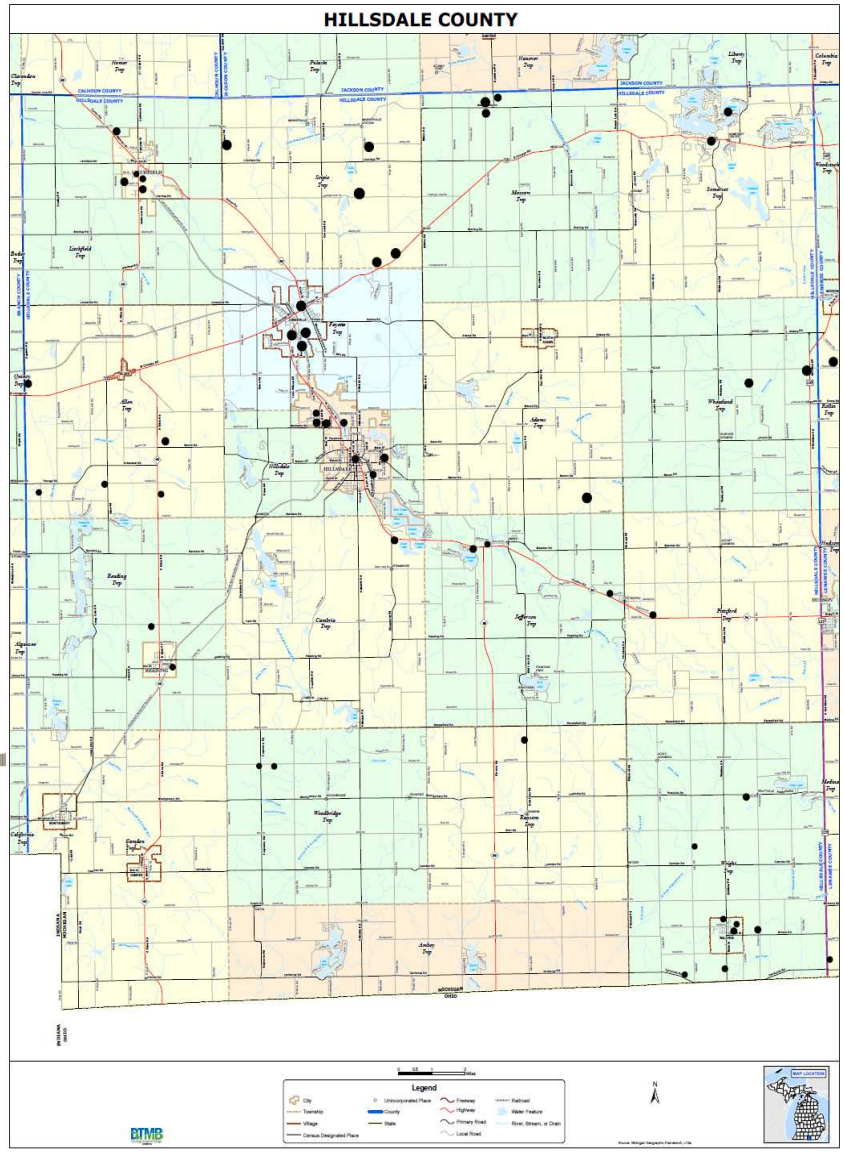
Transportation

A transportation hazardous material incident, according to the Michigan Hazard Analysis, is an "uncontrolled release of hazardous materials during transport capable of posing a risk to life, health, safety, property or the environment."

Several state U.S. highways traverse Hillsdale County (e.g., M-34; M-49; M-99; US-12 and US-127). These travel through mostly rural and sparsely populated areas of the county but, as shown on the map below, do lead through the Cities of Litchfield, Reading, Jonesville and Hillsdale along with the Villages of Allen, Camden, and Pittsford. Highways, in addition to major local roads and streets – are the most likely thoroughfares utilized for the transport of hazardous materials. However, it is important to note that parts of many hazardous material transport routes will occur on minor local roads and streets. Local railroads are also occasionally utilized for the transport of hazardous materials. The rail lines located in the county are now owned by the Hillsdale County Railway. As shown on the map below, these travel through the Cities of Hillsdale, Jonesville, Litchfield and Reading and the Villages of Allen and Montgomery. There are several abandoned sets of tracks.

There is no record of serious hazardous material transportation incidents in Hillsdale County.

Hillsdale County Sara Title III Sites



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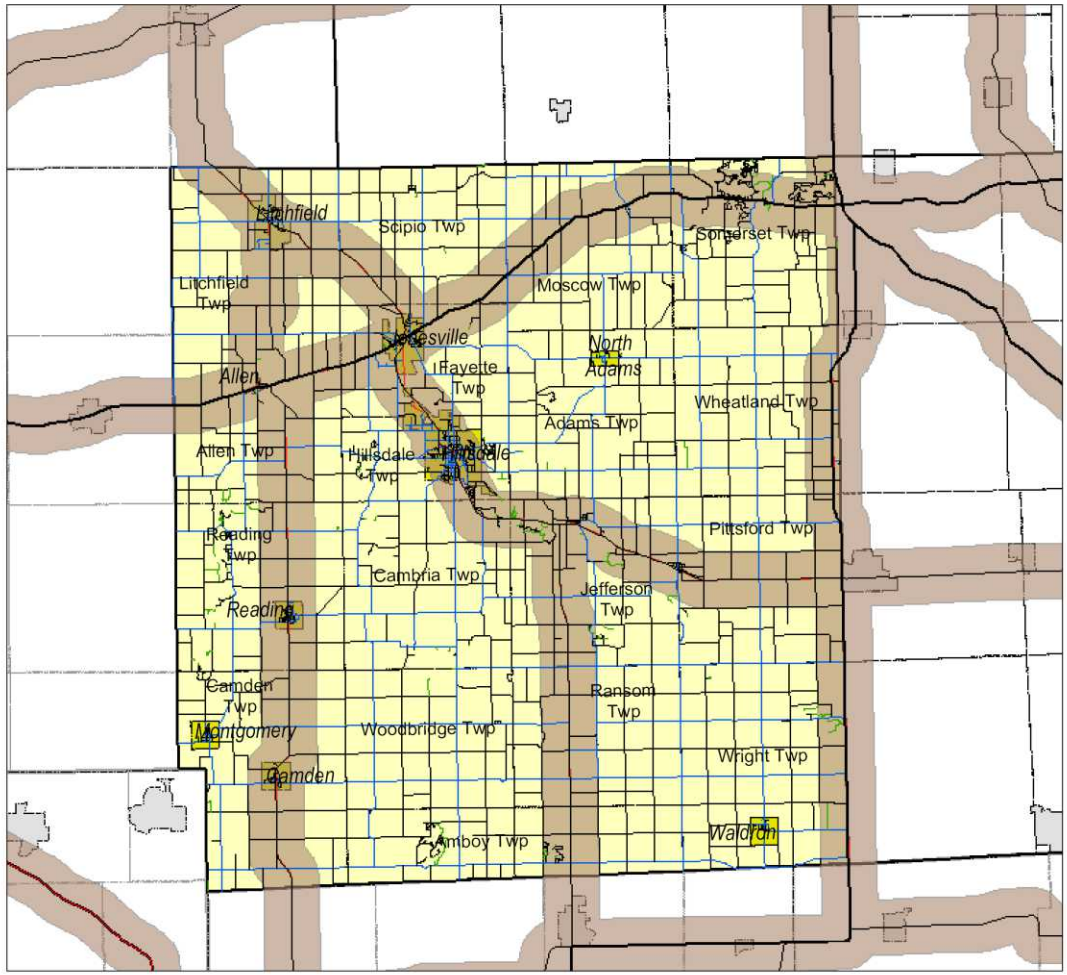
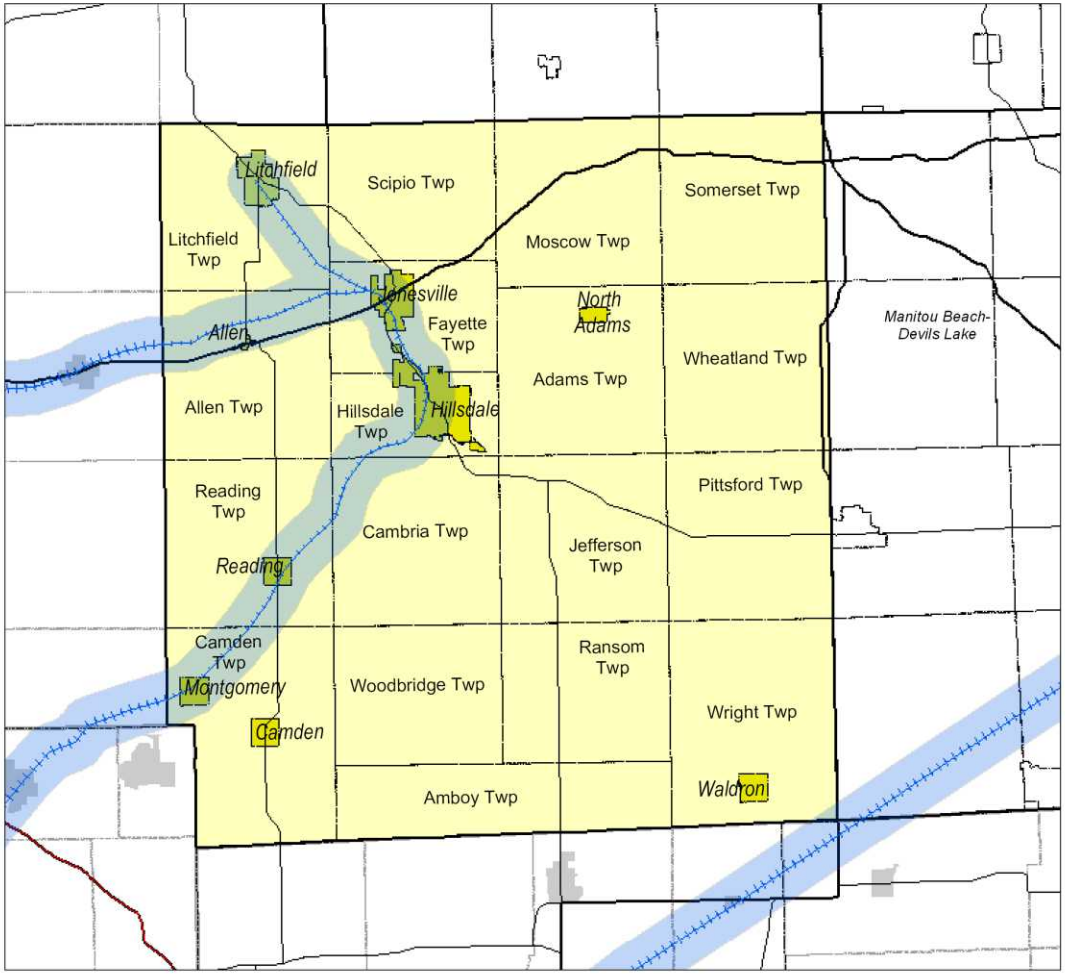


Hillsdale County HIghways, Roads, & Streets

State Highways
1-Mile Radius Buffer
Major Roads & Streets
Minor Roads & Streets
Private Roads & Streets

Source:
The National Atlas &
Center for Geographic
Information, State of Michigan



Hillsdale County Railroads

Railroads

2-Mile Buffer

Source:
The National Atlas &
Center for Geographic
Information, State of Michigan

14. Nuclear Power Plant Accidents

Even though "the construction and operation of nuclear power plants are closely monitored and regulated by the Nuclear Regulatory Commission (NRC)," according to the Michigan Hazard Analysis, "accidents at these plants are considered a possibility and appropriate on-site and off-site emergency planning is conducted." The following list —summarized from the Analysis— records significant nuclear power plant accidents (including an accident in Michigan):

1986 — Chernobyl, Ukraine
1979 — Three Mile Island, Harrisburg, Pennsylvania
1966 — Enrico Fermi-1, Monroe County, Michigan

A primary emergency planning zone (EPZ) is established within a 10-mile radius of each nuclear power plant. "Within this zone," according to the Michigan Hazard Analysis, "plans are developed to protect the public through in-place sheltering and evacuation, in the event of an accident." A secondary emergency management zone is established within "a 50-mile radius around most plants, exist for planning considerations which prevent the introduction of radioactive contamination into the food chain."

There are no nuclear power plants in Hillsdale County, nor is the county within the 10- or 50-mile EPZ for any plant.

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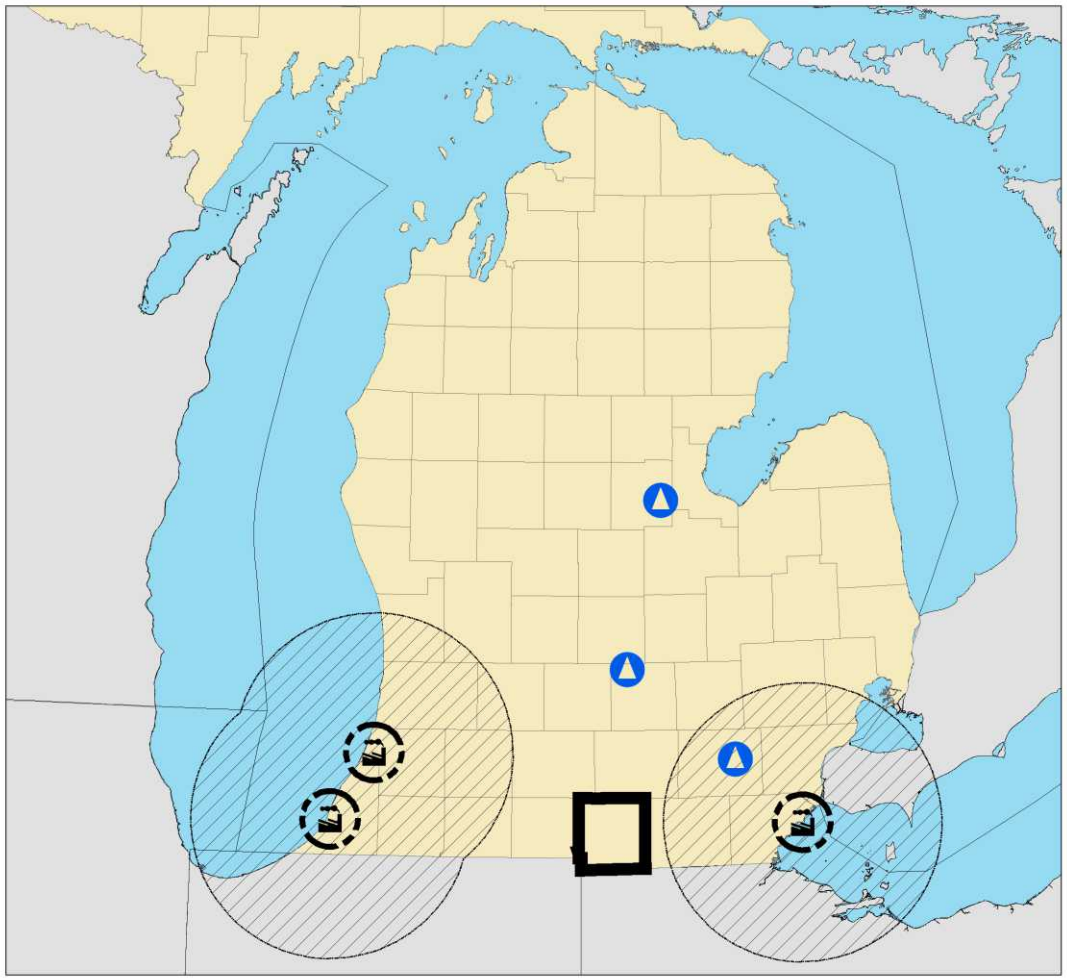

Michigan's Nuclear Power Facilities

PowerPlants
10 MI buffer
50 MI buffer
Reactors

Sources:
Michigan State Police, Emergency Management Divison; The National Atlas for the USA; and Center for Geographic Information, State of MI

15. Oil and Natural Gas Well Accidents

"Oil and natural gas are produced from fields scattered across 63 counties in the Lower Peninsula," according the Michigan Hazard Analysis, including Hillsdale County, which hosts 1,328 oil and gas wells. Although the industry "has a fine safety record, the threat of accidental releases, fires and explosions still exists." In addition to these hazards, many of Michigan's oil and gas wells contain extremely poisonous hydrogen sulfide (H_2S):

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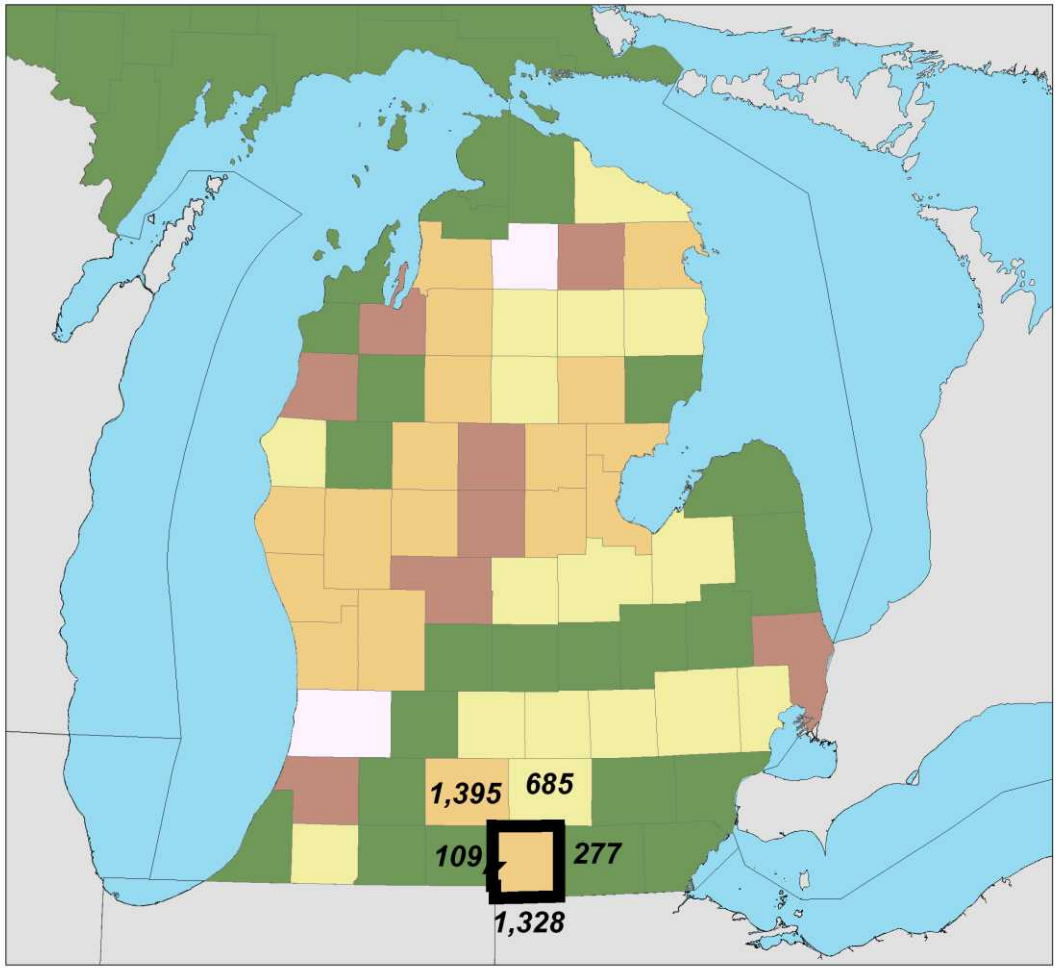
The following table summarizes the physiological responses likely to occur with exposure to H_2S:

Physiological Response to H_2S Exposure

Parts per Million	Physiological Response
10 ppm	Beginning eye irritation.
50-100 ppm	Slight conjunctivitis & respiratory tract irritation with 1 hour of exposure.
100 ppm	Coughing, eye irritation, loss of sense of smell after 2-15 minutes. Altered respiration, pain in the eyes and drowsiness after 15-30 minutes followed by throat irritation after 1 hour. Several hours of exposure results in gradual increase in severity of these symptoms and death may occur within the next 48 hours.
200-300 ppm	Marked conjunctivitis & respiratory tract irritation after 1 hour of exposure.
500-700 ppm	Loss of conciseness & possibly death in 30 minutes to 1 hour.
700-1,000 ppm	Rapid unconsciousness, cessation of respiration & death.
1,000-2,000 ppm	Immediate unconsciousness, with early cessation of respiration and death in a few minutes. Death may occur even if the individual is removed to fresh air at once.

Source: Michigan Hazard Analysis

There have been no oil or natural gas incidents in Hillsdale County, although the potential exists.



Hillsdale County Oil and Gas Wells

- 0 - 277
- 278 - 734
- 735 - 1,442
- 1,443 - 2,792
- 2,793 - 5,190

Sources:
Michigan State Police, Emergency Management Divison; The National Atlas for the USA; and Center for Geographic Information, State of MI

16. Oil and Natural Gas Pipeline Accidents

"Though often overlooked," according to the Michigan Hazard Analysis, "petroleum and natural gas pipelines pose a real threat in many Michigan communities" including Hillsdale County. Petroleum and natural gas pipelines can leak or fracture and cause property damage, environmental contamination, injuries, and even loss of life. The vast majority of pipeline accidents that occur in Michigan are caused by third party damage to the pipeline, often due to construction or some other activity that involves trenching or digging operations. While it is true that the petroleum and natural gas industries have had a fine safety record, and that pipelines are by far the safest form of transportation for these products, the threat of fires, exposure, ruptures, and spills nevertheless exists. In addition to these hazards, there is the danger of hydrogen sulfide (H_2S) release." The table in the previous section summarizes the physiological responses likely to occur with exposure to H_2S.

Pipelines extend into Litchfield, Scipo, Moscow and Somerset townships in Hillsdale County. No disastrous pipeline accidents are recorded in the county in the Michigan Hazard Analysis. The probability of future incidents is extremely low, but because there are pipelines in Hillsdale County, the possibility is there.

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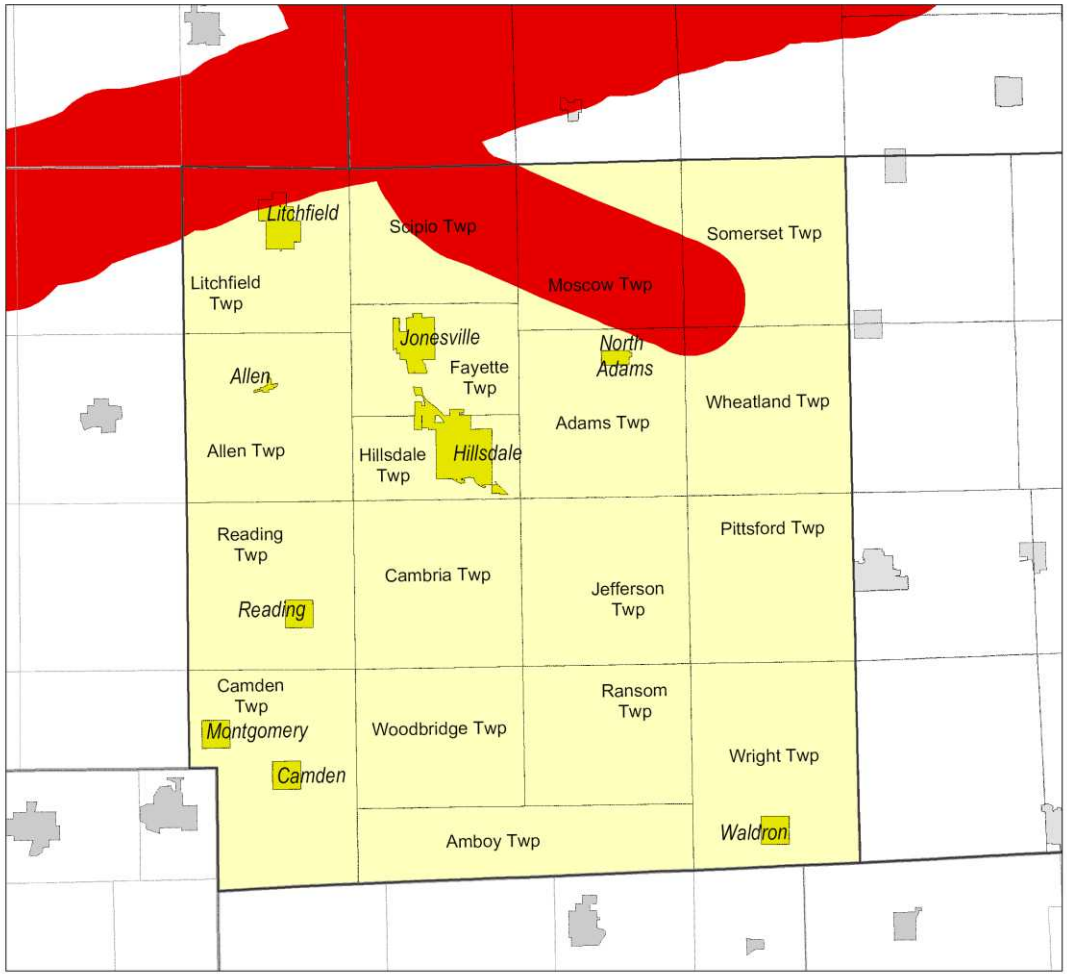

Hillsdale County Oil & Gas Pipelines

4-mile Wide Pipeline Corridors

Source:
Center for Geographic Information, State of Michigan

Pipeline

17. Nuclear Attacks

"World events in recent years," according to the Michigan Hazard Analysis, "have greatly changed the nature of the nuclear attack threat against the United States. However, while the threat of attack is diminished, it is still a possibility due to the large number of nuclear weapons still in existence in present-day Russia and throughout the rest of the world." North Korea has been attempting to gain the capability to launch missiles into the United States. Based upon the Nuclear Attack Planning Base 1990 (NAPB-90), the Federal Emergency Management Agency categorizes seven potential types of nuclear targets:

- commercial power plants,
- chemical facilities,
- counterforce military installations,
- other military bases,
- military support industries,
- refineries, and
- political targets.

Fortunately, no confirmed nuclear targets are located in Hillsdale County. However, lack of potential targets does not eliminate the threat since the accuracy of the instrument(s) used is not guaranteed.

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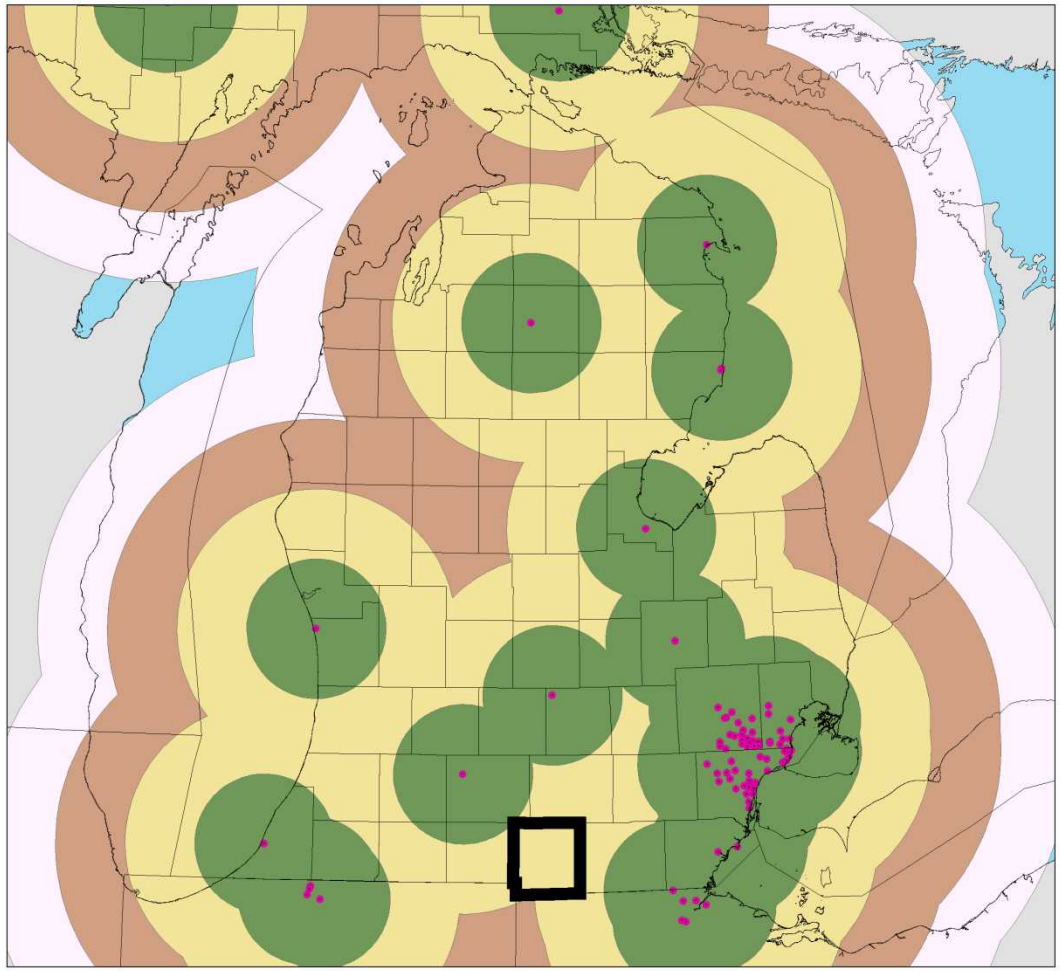

Michigan's Potential Nuclear Targets

- Potential Nuclear Targets
- 0 - 25 miles
- 25 - 50 miles
- 50 - 75 miles
- 75 - 100 miles

Sources:
Michigan State Police, Emergency Management Divison; The National Atlas for the USA; and Center for Geographic Information, State of MI

18. Sabotage/Terrorism/Weapons of Mass Destruction (WMD)

"In today's world, sabotage/terrorism can take on many forms, although civilian bombings, assassination and extortion are probably the methods with which we are most familiar. Unfortunately, with advances in transportation and technology, sabotage/terrorism has now crossed the oceans into the United States. Equally alarming is the rapid increase in the scope and magnitude of sabotage/terrorism methods and threats, which now, in addition to bombings, include:

- nuclear, chemical and biological weapons
- information warfare / cyber attacks
- ethnic/religious/gender intimidation (hate crimes)
- state and local militia groups that advocate the overthrow of the U.S. Government
- eco-extremism, designed to destroy or disrupt specific research or resource related activities
- pre-meditated attacks upon schools, workplaces, transportation systems or other places of public assembly
- organized criminal enterprises and activities

There are no known organizations within Hillsdale County involved in any type of sabotage, terrorism, or the proliferation of weapons of mass destruction. However one may develop.

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19. Public Health Emergencies

"Public health emergencies can take many forms," according to the Michigan Hazard Analysis:

- disease epidemics
- large-scale incidents of food or water contamination
- extended periods without adequate water and sewer services
- harmful exposure to chemical, radiological or biological agents
- large-scale infestations of disease-carrying insects or rodents

"Public health emergencies can occur as primary events by themselves, or they may be secondary events to another disaster . . . [and] have the potential to adversely impact a large number of people," according to the Michigan Hazard Analysis. "Perhaps the greatest emerging public health threat would be the intentional release of [a] radiological, chemical or biological agent. Fortunately, to date, Michigan has not experienced such a release aimed at mass destruction. However, Michigan has experienced hoaxes and it is probably only a matter of time before an actual incident of that nature and magnitude does occur."

No public health emergencies had ever been declared in Hillsdale County until the Coronavirus Pandemic. However, at least 3 statewide emergencies may have affected local residents:

- **Chemical Contamination (Polybrominated Biphenyl) —** Thousands of cattle and other animals died in 1973 from poisoning after a chemical company accidentally sent bags of a fire retardant in conjunction with a shipment of a livestock feed supplement.
- **Foodborne Contamination (Hepatitis A) —** Almost 300 cases of Hepatitis A in at least four school districts in the spring of 1997 were caused by frozen strawberries.
- **Communicable Disease Epidemic (Influenza Pandemic) —** "Influenza is an example of a potential public health emergency of [a] very large proportion." Flu pandemics caused widespread deaths nationally in 1957-1958 and 1968-1969. People suffer from the flu in the county every year.

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Public Water Well testing for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) has been recently initiated in the County by the State of Michigan. At this writing, no amounts above the threshold have been reported however testing continues.

20. Drought

The "entire state is subject to the impacts of drought," according to the Michigan Hazard Analysis.

"Large urbanized areas," according to the Michigan Hazard Analysis "are more vulnerable to water shortages and business disruptions due to the sheer number of water users that are competing for the limited water resources. In those areas, water management strategies typically have to be implemented to deal with the water shortage problems. Public health and safety concerns are also numerous — everything from maintaining adequate water supply for firefighting to addressing the needs of the elderly, children, ill or impoverished individuals suffering from [heat-related] stress and illness."

"In rural agricultural areas," according to the Michigan Hazard Analysis, ". . . drought brings on a host of other problems to address. The agricultural areas of southern Lower Michigan are highly vulnerable to drought conditions that impact the quantity or quality of crops, livestock, and other agricultural activities. A prolonged drought can seriously impact local and regional income, which in turn has a rippling effect on the other components of the economy. Drought can also cause long-term problems that can affect the viability of some agricultural operations, and increase the threat of wildfire."

The majority of Hillsdale County is included in the 37.5 inch precipitation range with the remainder of the county in the 32.5 inch range. Hillsdale County is in the middle range for precipitation when compared with the western half of the nation (29.9 inches or less rainfall a year) and the southeastern U.S. (40.0 or more inches a year). Drought however, according to the Michigan Hazard Analysis, "is a normal part of the climate of Michigan . . . including areas with high and low average rainfall."

NCEI Climate Divisions

To assist with local planning efforts, the counties contained within these 10 climate divisions are hereby listed, and although historical data can at this time only be provided for the divisions as a whole, a summary of the most severe events from NCEI records have been included for each of the ten Climate Divisions. Following this is an overarching description of incidents and trends shown in historical drought records for Michigan.

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Division 9: Barry, Branch, Calhoun, Clinton, Eaton, Hillsdale, Ingham, Ionia, Jackson, Shiawassee, and St. Joseph Counties. The most extreme drought was in April 1931, when the Palmer index hit a record low of -6.60. Lengthy drought incidents took place in 1913-1914 (10 months), 1922-1923 (10 months), 1930-1931 (18 months), 1934-1935 (13 months), 1962-1965 (31 months), 1976-1977 (8 months), and 2002-2003 (8 months), 1998-1999 (10 months), 1999-2000 (8 months), and 2002-2003 (8 months). The Marshal Aquifer, which covers much of the northeast of the county, may provide some relief to those areas in the event of a drought.

June 1921-January 1922 Statewide Michigan endured 8 months of severe drought conditions, with its low point measuring -3.08 on the Palmer Index, in July 1921. Climate divisions 1, 2, 3, 5, 8, and 9 suffered the most, with divisions 1 and 5 reaching extreme drought levels (D3). Climate divisions 6, 7, and 10 had a less deleterious pattern, and climate division 4 was entirely spared.

March-August 1925 Statewide All parts of Michigan were struck with drought problems in mid-1925. Statewide, 6 months of drought, reaching the severe D2 level, were measured, but the duration of the event was much longer in the Upper Peninsula and Northern Lower Peninsula. Climate divisions 1 through 5 suffered the most, with the low point occurring in climate division 4, which reached a Palmer Index level of -4.32 in January 1926. Climate divisions 6 through 10 saw lesser impacts, although their droughts still reached the moderate D1 level

The all-time low statewide Palmer Index value of -7.73 occurred in February 1931—the same month that 5 of Michigan's climate divisions simultaneously hit their own record lows. Even if only the extreme drought levels (D3) are considered, these conditions were unusually long-lasting. Between 1930 and 1931, all nine of

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Michigan's most heavily affected climate divisions experienced this most unusual level of drought for at least 6 straight months (in the Western Upper Peninsula) to as many as 15 continuous months (in climate divisions 8 and 9). Unfortunately, those areas that experienced the more prolonged conditions of extreme drought were also the most heavily agricultural areas of the state, in the southern Lower Peninsula.

October 1944-March 1945 Southern Lower Peninsula At the statewide level, 6 months of drought occurred, and reached the severe (D2) level, with a low point of -3.60 in January 1945. The drought mainly impacted climate divisions 5 through 10 at this level, with other areas not having a problem. Within the southern Lower Peninsula, most areas reached the extreme D3 drought level, and in March 1945, southeastern Michigan even reached the exceptional D4 level (Palmer Index -5.02).

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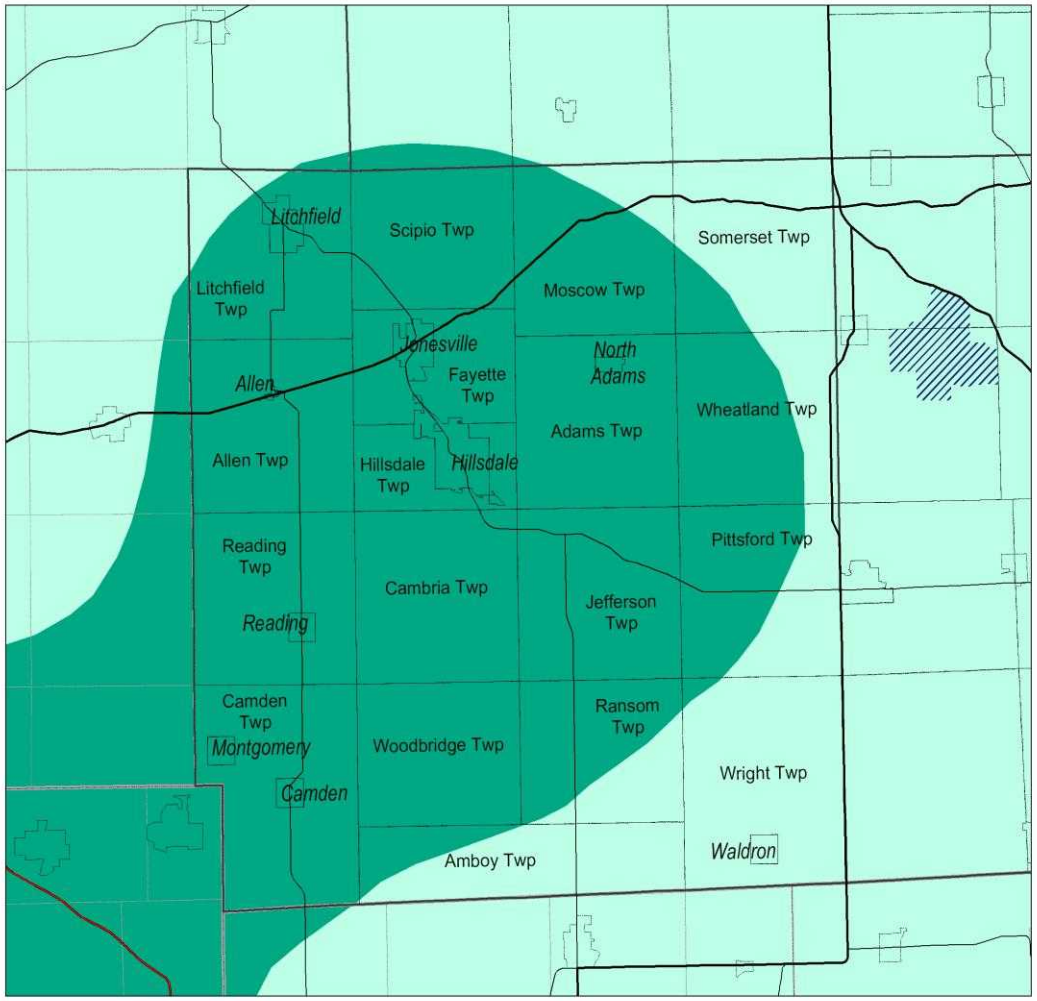
November 1962-December 1964 Statewide This was the most serious statewide drought event since the 1930s, and there has been a general trend of lessening drought problems within Michigan during the second half of the 20th Century when compared with the first half. In this event, the mildest impacts were in the northeastern Lower Peninsula and the worst impacts were in the entire southern part of the Lower Peninsula. However, no region of the state escaped without at least 8 continuous months of drought. The statewide drought levels lasted for 26 consecutive months, from November 1962 to December 1964. Climate divisions 8, 9, and 10 saw even longer drought durations, nearly three years long! The overall drought index statewide reached exceptional D4 levels in November 1963 and stayed there for 5 months, with the lowest point reached in February 1964 at a Palmer Index value of -5.97. Within the three southernmost climate divisions, southwestern Michigan stayed within the extreme D3 classification level with a low Palmer value of -4.22 in February 1964. The central and eastern portions of the southern Lower Peninsula reached exceptional D4 drought levels, with climate divisions 9 and 10 both reaching their low points in February 1964, with values of -6.15 and -6.40, respectively.

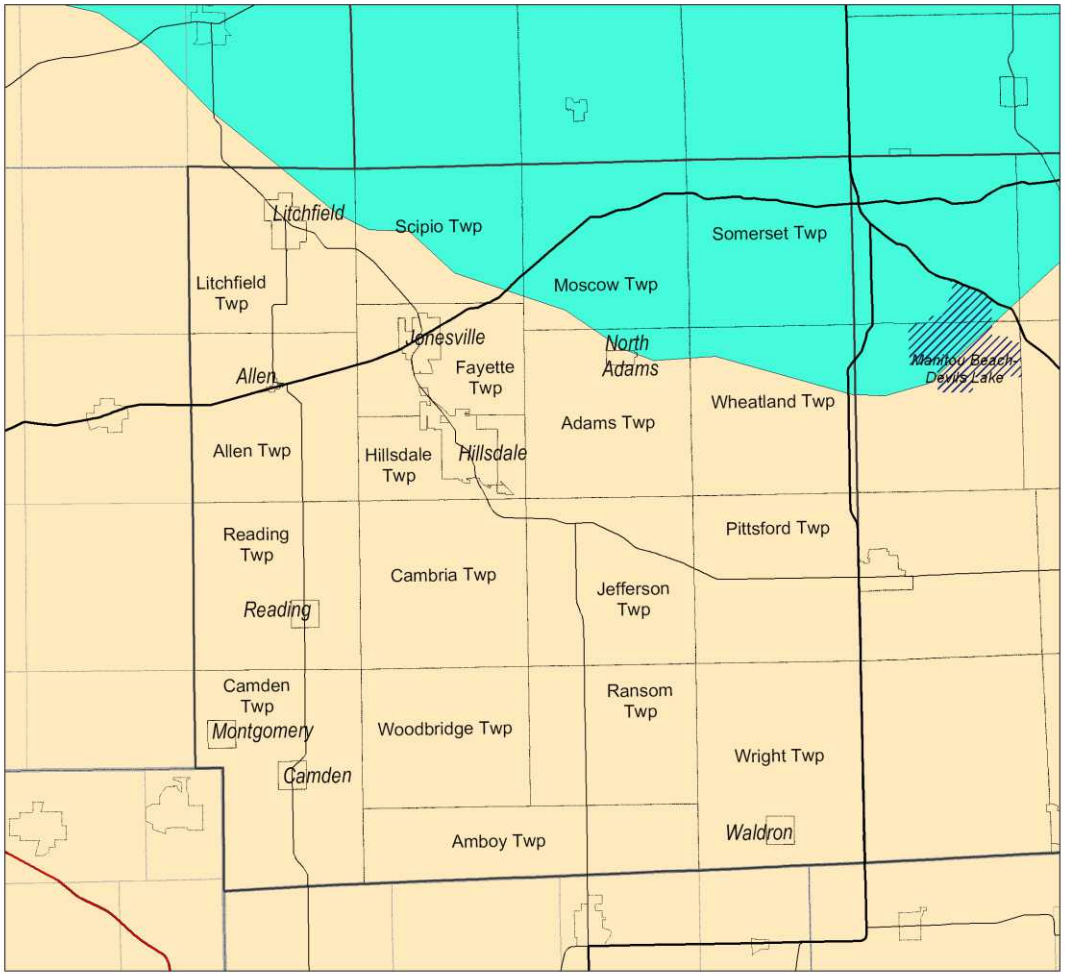


Hillsdale County Annual Precipitation

Average Inches of Precipitation

- </= 30
- 32.5
- 35
- 37.5
- >/= 40

Sources:
The National Atlas of the USA and Center for Geographic Information, State of Michigan



Hillsdale County Acquifers

Marshall aquifer

Source:
Center for Geographic Information, State of Michigan

21. Extreme Temperatures

"Prolonged periods of extreme temperatures," according to the Michigan Hazard Analysis, "whether extreme summer heat or extreme winter cold, can pose severe and often life-threatening problems for" the residents of Hillsdale County. "Although they are radically different in terms of initiating conditions, the two hazards share a commonality in that they both primarily affect the most vulnerable segments of the population – the elderly, children, impoverished individuals, and people in poor health." Extreme summer heat can result in heatstroke, heat exhaustion, heat syncope, and heat cramps. Extreme winter cold can result in hypothermia and frostbite.

A 27-year (i.e., 1981-2010) compilation of temperature data from a weather station reporting to the Michigan State Climatologists Office located in the vicinity of Hillsdale indicates a daily average temperature range of 15ºF – 82ºF. Over the 27-year period, a maximum temperature greater than 90ºF was only reached on eight days annually and less than 32ºF on 49 days annually; a minimum temperature less than 32ºF was reached on 149 days annually during that period and less than 0ºF on 11 days annually. A low of -20ºF was recorded in February of 1967 and a high of 98ºF was recorded in June of 1953.

The NCDC recorded a temperature of 9ºF (-35 to -30ºF wind chill) during December 1995 in 37 counties. The cold wave resulted in three deaths.

Several other significant heat waves listed in the Michigan Hazard Analysis:

- July 1936 — temperatures exceeded 100ºF for several days, causing 570 deaths statewide
- Summer 1988 — 39 days with 90ºF or more temperatures
- July 1995 — 28 heat-related fatalities in the state
- July 1999 — city residents were treated for heat-related problems statewide
- June-August 2001 — heat stress index readings soared well above 100ºF on many days

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22. Hail

"Hail," according to the Michigan Hazard Analysis, "is a product of the strong thunderstorms that frequently move across the state. As one of these thunderstorms passes over, hail usually falls near the center of the storm, along with the heaviest rain. Most hailstones range in size from a ¼" to a golf ball, but hailstones larger than baseballs have occurred with the most severe thunderstorms. Hail is formed when strong updrafts within the storm carry water droplets above the freezing level, where they remain suspended and continue to grow larger until their weight can no longer be supported by the winds. They finally fall to the ground, battering crops, denting autos, and injuring wildlife and people. Large hail is a characteristic of severe thunderstorms, and it may precede the occurrence of a tornado. The National Weather Service began recording hail activity in Michigan in 1967. Statistics since that time indicate that over 70% of severe thunderstorms that produce hail have occurred during the months of May, June, July, and August, the prime growing season in Michigan.

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TABLE IV-21, Hail Events, Hillsdale County (1950-2018)

Date	Description	MCD's
05/25/1973	2045 CST. Beginning LAT/LON: 41°56'N / 84°48'W. Magnitude: 1.00 inches. No additional details reported.	Allen
05/11/1974	1430 CST. Beginning LAT/LON: 41°55'N / 84°37'W. Magnitude: 1.75 inches. No additional details reported.	City of Hillsdale
05/11/1974	1440 CST. Beginning LAT/LON: 42°03'N / 84°30'W. Magnitude: 1.75 inches. No additional details reported.	Moscow
06/15/1974	0820 CST. Beginning LAT/LON: 42°03'N / 84°45'W. Magnitude: 1.25 inches. No additional details reported.	Litchfield
06/15/1974	0830 CST. Beginning LAT/LON: 41°55'N / 84°37'W. Magnitude: 0.75 inches. No additional details reported.	City of Hillsdale

	TABLE IV-21, Hail Events, Hillsdale County (1950-2018) cont.	
Date	**Description**	**MCD's**
06/02/1980	1900 CST. Beginning LAT/LON: 41°43'N / 84°25'W. Magnitude: 0.75 inches. No additional details reported.	Waldron
07/12/1980	1900 CST. Beginning LAT/LON: 41°47'N / 84°48'W. Magnitude: 1.50 inches. No additional details reported.	Montgomery
09/22/1980	1550 CST. Beginning LAT/LON: 41°55'N / 84°37'W. Magnitude: 1.75 inches. No additional details reported.	City of Hillsdale
05/02/1983	0830 CST. Beginning LAT/LON: 41°53'N / 84°46'W. Magnitude: 1.50 inches. No additional details reported.	Reading
05/02/1983	0940 CST. Beginning LAT/LON: 41°53'N / 84°34'W. Magnitude: 1.50 inches. No additional details reported.	Osseo
06/13/1984	0950 CST. Beginning LAT/LON: 41°59'N / 84°40'W. Magnitude: 0.75 inches. No additional details reported.	Jonesville
08/26/1986	1639 CST. Beginning LAT/LON: 41°45'N / 84°46'W. Magnitude: 2.00 inches. No additional details reported.	Camden
04/23/1988	2035 CST. Beginning LAT/LON: 41°55'N / 84°48'W. Magnitude: 1.75 inches. No additional details reported.	Allen
04/23/1992	1445 CST. Beginning LAT/LON: 41°53'N / 84°34'W. Magnitude: 1.00 inches. No additional details reported.	Osseo
04/12/1994	2118 EST. Magnitude: 0.75 inches. Marble-sized hail was reported along with a 50 mph winds gust.	Montgomery
06/13/1994	1905 EST. Magnitude: 0.75 inches. No additional details reported.	City of Hillsdale
09/25/1994	1902 EST. Ending Location: 23 SW JXN. Magnitude: 0.75 inches. No additional details reported.	Litchfield

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	TABLE IV-21, Hail Events, Hillsdale County (1950-2018) cont.	
Date	**Description**	**MCD's**
09/25/1994	1922 EST. Beginning Location: Unknown. Ending Location: 14 SSE Jackson. Magnitude: 1.00 inches. Hail covered ground along U.S. 12 in Somerset.	Somerset
04/12/1996	02:45:00 PM EST. Beginning LAT/LON: 41°50'N / 84°45'W. Ending LAT/LON: 41°51'N / 84°22'W. Magnitude: 2.00 inches. $2.0 Million in Property Damage. Hail of 1-3/4 to 2 inches diameter was reported along the path of a severe thunderstorm from Reading to near Hudson on the Lenawee County line. Widespread hail damage occurred with windows on west side of buildings broken and vinyl or aluminum siding left with holes and cracks. Highway M-34 was covered with hail between Pittsford and Hudson. Numerous recreational vehicles parked at a dealership were badly damaged.	Reading
07/06/1997	03:32:00 PM EST. Beginning LAT/LON: 42°03'N / 84°45'W. Ending LAT/LON: 42°03'N / 84°45'W. Magnitude: 0.75 inches. No additional details reported.	Litchfield
05/31/1998	05:11:00 AM EST. Beginning LAT/LON: 42°03'N / 84°45'W. Ending LAT/LON: 42°03'N / 84°45'W. Magnitude: 0.75 inches. No additional details reported.	Litchfield
06/26/1998	05:20:00 AM EST. Beginning LAT/LON: 41°45'N / 84°46'W. Ending LAT/LON: 41°45'N / 84°46'W. Magnitude: 0.88 inches. No additional details reported.	Camden
07/28/1999	07:20:00 PM EST. Beginning LAT/LON: 41°54'N / 84°30'W. Ending LAT/LON: 41°53'N / 84°32'W. Magnitude: 1.00 inches. Tree limbs were also blown down.	Pittsford
07/29/1999	09:42:00 PM EST. Beginning LAT/LON: 41°45'N / 84°46'W. Ending LAT/LON: 41°49'N / 84°40'W. Magnitude: 0.75 inches. No additional details reported.	Camden
04/20/2000	01:48:00 PM EST. Beginning LAT/LON: 41°47'N / 84°48'W. Ending LAT/LON: 41°47'N / 84°48'W. Magnitude: 0.75 inches. Synoptic and Mesoscale conditions for April 20, 2000. . . A significant mid-latitude cyclone developed over the Midwest on the 19th and 20th. A strong mid-level jet at 75 knots combined with a 40 knot low-level jet triggered rapid severe storm development across central and northern Illinois during the morning hours of the 20th. Storms quickly organized into a squall line with several embedded bows which then tracked across northern Indiana and northwest Ohio. Reports of damaging winds and large hail were common with the storms during the afternoon of the 20th.	Montgomery

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	TABLE IV-21, Hail Events, Hillsdale County (1950-2018) cont.	
Date	**Description**	**MCD's**
04/20/2000	02:09:00 PM EST. Beginning LAT/LON: 42°03'N / 84°22'W. Ending LAT/LON: 42°03'N / 84°22'W. Magnitude: 0.75 inches. Synoptic and Mesoscale conditions for April 20, 2000. . . A significant mid-latitude cyclone developed over the Midwest on the 19th and 20th. A strong mid-level jet at 75 knots combined with a 40 knot low-level jet triggered rapid severe storm development across central and northern Illinois during the morning hours of the 20th. Storms quickly organized into a squall line with several embedded bows which then tracked across northern Indiana and northwest Ohio. Reports of damaging winds and large hail were common with the storms during the afternoon of the 20th.	Somerset
05/09/2000	06:45:00 PM EST. Beginning LAT/LON: 41°55'N / 84°37'W. Ending LAT/LON: 41°55'N / 84°37'W. Magnitude: 0.75 inches. Synoptic and mesoscale conditions during the afternoon of the 9th... A significant mid-level shortwave trough extended through the Mississippi valley during the afternoon with a deepening surface low over northeast Illinois. Much of northern Indiana and southern Michigan were in the warm sector with surface based CAPE of 2500 J/kg and increasing deep layer shear in advance of a 70 knot mid-level jet max ahead of the mid-level shortwave. A prefrontal squall line quickly developed late in the afternoon along the Illinois/Indiana state line. Additional isolated supercells developed in advance of this line and were mainly responsible for the swath of large hail from Wabash to Steuben counties. The squall line gradually organized into a large bow echo with the apex of the bow tracking from southwest Whitley county eastward through northern Allen and into western Defiance county in Ohio where the greatest widespread wind damage was observed.	City of Hillsdale
07/28/2000	02:46:00 PM EST. Beginning LAT/LON: 42°02'N / 84°28'W. Ending LAT/LON: 42°02'N / 84°28'W. Magnitude: 1.75 inches. No additional details reported.	Jerome
06/14/2002	02:23:00 PM EST. Beginning LAT/LON: 41°47'N / 84°36'W. Ending LAT/LON: 41°47'N / 84°36'W. Magnitude: 0.75 inches. No additional details reported.	Frontier
04/04/2003	07:00:00 PM EST. Beginning LAT/LON: 41°49'N / 84°45'W. Ending LAT/LON: 41°49'N / 84°45'W. Magnitude: 0.75 inches. No additional details reported.	Reading

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	TABLE IV-21, Hail Events, Hillsdale County (1950-2018) cont.	
Date	**Description**	**MCD's**
04/04/2003	07:20:00 PM EST. Beginning LAT/LON: 41°53'N / 84°32'W. Ending LAT/LON: 41°53'N / 84°32'W. Magnitude: 0.75 inches. No additional details reported.	North Adams
05/09/2003	10:50:00 PM EST. Beginning LAT/LON: 41°50'N / 84°45'W. Ending LAT/LON: 41°50'N / 84°45'W. Magnitude: 0.75 inches. No additional details reported.	Reading
05/09/2003	10:58:00 PM EST. Beginning LAT/LON: 42°04'N / 84°32'W. Ending LAT/LON: 42°04'N / 84°32'W. Magnitude: 1.75 inches. No additional details reported.	North Adams
07/20/2003	02:19:00 PM EST. Beginning LAT/LON: 41°57'N / 84°46'W. Ending LAT/LON: 41°57'N / 84°46'W. Magnitude: 1.50 inches. No additional details reported.	Allen
07/20/2003	02:52:00 PM EST. Beginning LAT/LON: 41°42'N / 84°42'W. Ending LAT/LON: 41°42'N / 84°42'W. Magnitude: 0.75 inches. No additional details reported.	Camden
08/01/2003	02:58:00 PM EST. Beginning LAT/LON: 41°53'N / 84°39'W. Ending LAT/LON: 41°53'N / 84°39'W. Magnitude: 0.88 inches. No additional details reported.	City of Hillsdale
08/01/2003	03:36:00 PM EST. Beginning LAT/LON: 42°01'N / 84°32'W. Ending LAT/LON: 42°01'N / 84°32'W. Magnitude: 1.75 inches. No additional details reported.	North Adams
08/01/2003	04:39:00 PM EST. Beginning LAT/LON: 41°55'N / 84°37'W. Ending LAT/LON: 41°55'N / 84°37'W. Magnitude: 0.75 inches. No additional details reported.	City of Hillsdale
05/06/2004	09:20:00 PM EST. Beginning LAT/LON: 41°58'N / 84°32'W. Ending LAT/LON: 41°58'N / 84°32'W. Magnitude: 2.00 inches. No additional details reported.	North Adams
05/13/2005	04:35:00 PM EST. Beginning LAT/LON: 42°03'N / 84°33'W. Ending LAT/LON: 42°03'N / 84°33'W. Magnitude: 0.75 inches. No additional details reported.	Litchfield
09/22/2005	06:05:00 PM EST. Beginning LAT/LON: 41°47'N / 84°48'W. Ending LAT/LON: 41°43'N / 84°43'W. Magnitude: 0.88 inches. No additional details reported.	Montgomery
04/22/2006	06:30:00 PM EST. Beginning LAT/LON: 42°03'N / 84°45'W. Ending LAT/LON: 42°03'N / 84°45'W. Magnitude: 0.75 inches. No additional details reported.	Litchfield

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	TABLE IV-21, Hail Events, Hillsdale County (1950-2018) cont.	
Date	**Description**	**MCD's**
06/21/2006	06:20:00 PM EST. Beginning LAT/LON: 41°53'N / 84°34'W. Ending LAT/LON: 41°53'N / 84°34'W. Magnitude: 1.00 inches. Numerous reports of hail up to quarter size reported throughout the county.	Osseo
05/01/2007	12:54:00 PM EST. Beginning LAT/LON: 41°45'N / 84°45'W. 41°53'N / 84°32'W Magnitude: 0.88 inches. A stationary boundary was located across far southern Lower Michigan during the mid afternoon hours. As instability increased, numerous storms began to develop with many producing hail.	Camden
05/01/2007	15:02:00 PM EST. Beginning LAT/LON: 41°53'N / 84°32'W. Magnitude: 1.00 inches. A stationary boundary was located across far southern Lower Michigan during the mid afternoon hours. As instability increased, numerous storms began to develop with many producing hail.	Osseo
05/01/2007	15:45:00 PM EST. Beginning LAT/LON: 41°50'N / 84°45'W. Magnitude: 1.00 inches. A stationary boundary was located across far southern Lower Michigan during the mid afternoon hours. As instability increased, numerous storms began to develop with many producing hail.	Reading
5/22/2011	14:55 PM EST. Beginning LAT/LON 41°78 / -84°80. Magnitude: .88 inches. An unstable air mass along with moderate shear ahead of a upper level system, allowed for rapid thunderstorm development. A few reports of wind damage and hail were received.	Montgomery
6/10/2011	12:35 PM EST. Beginning LAT/LON 42°05 / -84°38. Magnitude: .75 inches. A frontal boundary worked north into northern Indiana during the afternoon. A moderately unstable atmosphere was located south of the front with favorable freezing levels and shear. An upper level system moved through the area interacting with this boundary, providing the forcing for thunderstorm development. Some of these became severe with hail, wind damage and some reports of flooding.	Somerset
9/3/2011	17:20 PM EST. Beginning LAT/LON: 41°99 / -84°83. Magnitude: 1.00 inches. An outflow boundary extended from southeastern Lower Michigan to northern Illinois. Mixed layer CAPE in excess of 2500 j/kg and moderate shear allowed for stronger thunderstorms to develop. As they became organized and established cold pools, the storms transitioned from hail producers	Allen

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	to mainly producing wind damage. A trained spotter reported quarter size hail at the corner of Jonesville and Squires Road.	
	TABLE IV-21, Hail Events, Hillsdale County (1950-2018) cont.	
Date	**Description**	**MCD's**
6/18/2014	13:28 PM EST. Beginning LAT/LON: 41°85 / -84°37. Magnitude: .75 inches. Strong mesoscale convective vortex (MCV) moved out of northern Illinois into northern Indiana, with a line of thunderstorms trailing the feature. An outflow boundary moved south out of Lower Michigan into the area. These features entered an unstable atmosphere, with upwards of 4000 j/kg of CAPE across southern Lower Michigan. Numerous storms developed across the area and moved east. Sporadic wind damage was reported with the largely outflow dominant north-south line of storms as it moved across the area. The public reported dime size hail along US 127.	Prattville
8/22/2015	22:45 PM EST. Beginning LAT/LON: 41°89 / -84°54. Magnitude: 1.00 inches. Low pressure moved across northern Wisconsin with a cold front sweeping into the region. An unstable atmosphere was in place with steep low level lapse rates and a strong elevated mixed layer.	Osseo
2/28/2017	23:15 PM EST. Beginning LAT/LON: 41°75 / -84°76. Magnitude: 1.50 inches. A warm front moved into far southern Lower Michigan, enhancing low level shear and an already unstable environment to allow for a line of thunderstorms to develop and become severe as it tracked across far southern Lower Michigan and far northern Indiana. Sporadic wind damage reports were noted, along with occasional circulations along the line producing brief tornadoes in Berrien, Cass and St. Joseph counties. Additional severe weather occurred with a second line of storms during the early morning hours of March 1st.	Camden

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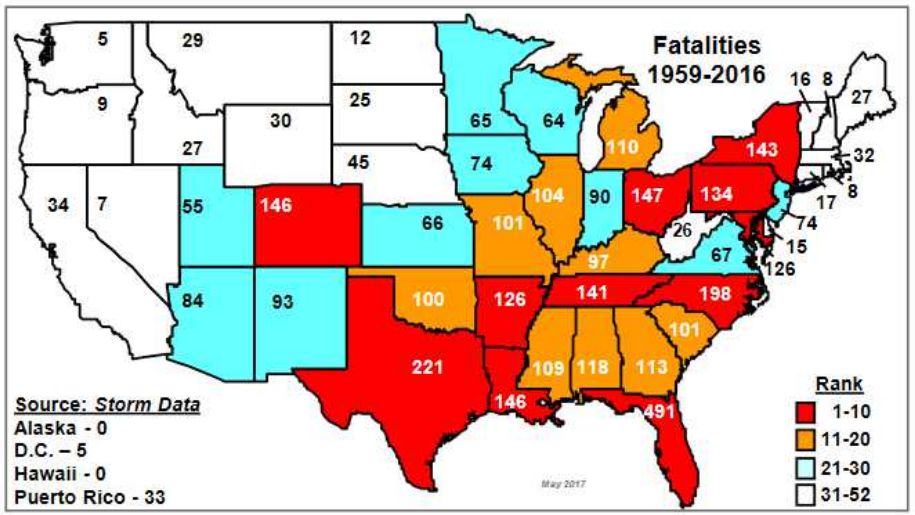
Note: Many of the programs and initiatives in place to mitigate, prepare for, respond to, and recover from other severe thunderstorms hazards (straight-line winds, lightning and tornadoes) have the dual purpose of also protecting against hail. As a result, there is some overlap in the narrative programs and initiatives descriptions for each respective hazard. This redundancy allows each hazard section to stand alone, eliminating the need to refer to other hazard sections for basic information.

23. Lightning

Lightning, caused by thunderstorms, according to the Michigan Hazard Analysis, "is a random and unpredictable product of a tremendous energy. [The] perception [of lightning as a minor hazard] lingers despite the fact that lightning damages many structures and kills and injures more people in the United States per year, on average, than tornadoes or hurricanes."

"In terms of property losses from lightning," according to the Michigan Hazard Analysis, "statistics vary widely according to source. However, suffice it to say that annual lightning-related property damages are conservatively estimated at several billion dollars per year, and those losses are expected to continue to grow as the use of computers and other lightning-sensitive electronic components [become] more prevalent.



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Unfortunately, lightning has [also] taken a tremendous toll on Michigan's citizens in terms of injury and loss of life. Since 1959 . . . Michigan has incurred 108 lightning deaths, 693 lightning injuries, and 792 lightning casualties (deaths and injuries combined) – consistently ranking it near the top of the nation in all three categories."

Lightning related Deaths & Injuries in Michigan 1959 - July 2004

	Deaths	Injuries	Casualties
Open fields & rec areas	38.4%	39.7%	39.5%
Unspecified locations	18.2%	36.1%	33.8%
Under a tree	26.3%	15.0%	16.4%
Comm equip & heavy equipment/machinery	6.1%	5.5%	5.6%
Water related (boating, fishing, swimming, etc.)	11.1%	3.8%	4.7%
	99	693	792

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A total of two lightning events were reported in the county, and 244 statewide, between 1993 and 2004 to the NCDC. Unfortunately, one death was attributed to lightning in the county and 13 deaths and 124 injuries statewide. The lightning also accounted for $50 thousand in property damages in the county and $20 million statewide.

TABLE IV-22, Lightning Events, Hillsdale County (1950-2018)		
Date	**Description**	**MCD's**
04/27/1994	0100 EST. Property Damage: $50,000. Lightning struck a home causing extensive damage from smoke.	City of Hillsdale
07/21/2001	04:00:00 PM EST. Fatalities: 1. Man went outside to check possible lightning damage to barn. While standing outside of barn was hit by lightning and died shortly after at Hillsdale Community Health Center.	City of Hillsdale

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24. Severe Wind Events and Tornados

"Severe winds spawned by thunderstorms or other storm events," according to the Michigan Hazard Analysis, "have had devastating effects on Michigan." Severe wind events are characterized by wind velocities of 58 miles per hour or greater with gusts sometimes exceeding 74 miles per hour.

A total of 154 severe and/or "thunderstorm" wind events were reported in Hillsdale County between 1950 and 2010 according to the NCDC. Recorded wind speeds for 40 of the events ranged from 42 knots to 60 knots. A wind speed of 50 knots was recorded for 75% of the record wind speeds. Severe winds accounted for $5.4 million of property damages. No deaths, but two injuries were attributed to severe winds."

A Governor's Disaster Declaration requiring a State of Emergency within Michigan to accommodate the evacuees from the southern United States was passed on September 4, 2005. A Presidential Declaration was enacted (Emergency 3225) on September 7, 2005 for the entire state because of the same emergency; including Hillsdale County.

TABLE IV-23, Severe Wind Events, Hillsdale County (1950-2018)		
Date	**Description**	**Magnitude**
11/18/1994	12:00 EST. Downed power lines resulted in scattered power outages and numerous small forest and grass fires. Gusts of 40 to 50 mph were widespread throughout the state. Over $1 Million in Property Damage occurred.	62 Knots
04/06/1997	04:00 PM EST. An intense early spring low pressure system moving across the Great Lakes brought gale force westerly winds to all of Lower Michigan behind a strong cold front. The cold front moved onshore in western Lower Michigan around 5 PM EDT Sunday, April 6th. Winds increased to sustained speeds of 35 to 45 mph out of the west shortly after frontal passage. Frequent wind gusts of 50 to 70 mph were common through midnight, Sunday night. Winds continued to gust to gale force through 5 PM EDT Monday, April 7th.	
09/29/1997	12:00 PM EST. Gusts reached 46 mph at Jackson County Airport. The winds caused some trees and power lines to come down, which resulted in 35,000 power outages across the region. Felled trees blocked a few isolated roads across the area for a brief time including Vicary Road in Hillsdale.	42 Knots
03/09/2002	12:37 PM EST. Winds just above the surface ranged from 70 to 80 mph. The combination of these 2 factors was tapped by a narrow line of showers immediately ahead of the cold front. Widespread reports of trees, tree limbs and power lines being blown down were received as surface winds of 50 to 70 mph were experienced by many areas.	
11/12/2003	05:00 PM EST. Winds gusted to 65 MPH behind a strong cold front that moved across the region during the late afternoon and evening. Numerous power outages occurred with trees and power lines down.	56 Knots
03/05/2004	12:00 PM EST. An intense area of low pressure moving across Michigan produced sustained winds of 40 MPH with measured gusts to 60 MPH across all of Northern Indiana, Northwest Ohio and Southwest Lower Michigan from late morning through early evening. Widespread reports of trees and power lines down were received from law enforcement across the region.	52 Knots

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Date	Description	Magnitude
10/30/2004	05:10 PM EST. Property Damage: $6,000. Winds across portions of far southern Lower Michigan were sustained in the 25 to 35 mph range with some areas reporting gusts between 45 to as high as 55 mph. Reports of small branches down and a few downed power lines were received. Some of the measured wind gusts included 53 mph at Coldwater, and 51 in Hillsdale.	42 Knots
02/11/2009	22:00 PM EST. County officials reported scattered to numerous trees, tree limbs and power lines down across the county. Deep low pressure tracked across the Great Lakes, dragging along a strong cold front. Behind the front sustained winds were frequently in the 35 to 45 mph range with gusts of between 55 and as high as 70 mph in some areas. This caused scattered to numerous trees and power line damage along with some structure damage.	50 Knots
12/09/2009	11:00 AM EST. Very windy conditions were seen across the area on December 9th as a deep area of low pressure tracked into northern Lower Michigan. Wind gusts between 45 and 60 mph were common during the late morning and afternoon hours. There were reports of power lines and trees down across the region due to the strong winds, which resulted in isolated power outages.	50 Knots
11/24/14	13:37 PM EST. The strongest winds were seen generally east of I-69 where sustained winds of 35 to 40 mph persisted for several hours with gusts in the 45 to nearly 60 mph range at times. West of the interstate, winds were slightly lower, sustained in the 30 to 35 mph range with gusts to 45 mph. Emergency management officials reported widespread tree damage across the county from the high winds, with scattered power outages as some trees fell onto power lines. A particularly dangerous situation arose in Jonesville, when a live high-voltage line fell onto a neutral line, causing power to be provided in areas it did not belong. One small fire was ignited and quickly extinguished. Several businesses reported a smell of smoke or something hot. A clothing store reported boiling water coming out of cold water faucets. No injuries or damage were reported.	45 to 60 Knots

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TABLE IV-23a, Thunderstorm Wind Events, Hillsdale County (2004-2018)

MCD	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
OSSEO	05/21/2004	12:40 PM	Thunderstorm Wind	60 Knots	0	0	0	0
City of Hillsdale	06/14/2004	01:25 PM	Thunderstorm Wind	50 Knots	0	0	0	0
City of Hillsdale	07/06/2004	11:07 PM	Thunderstorm Wind	50 Knots	0	0	0	0
City of Hillsdale	07/06/2004	11:15 PM	Thunderstorm Wind	50 Knots	0	0	0	0
City of Hillsdale	07/21/2004	08:10 PM	Thunderstorm Wind	50 Knots	0	0	0	0
OSSEO	05/13/2005	04:40 PM	Thunderstorm Wind	55 Knots	0	0	0	0
OSSEO	06/09/2005	02:30 PM	Thunderstorm Wind	50 Knots	0	0	5K	0
City of Hillsdale	06/26/2005	05:45 PM	Thunderstorm Wind	50 Knots	0	0	20K	0
MOSCOW	06/26/2005	05:58 PM	Thunderstorm Wind	50 Knots	0	0	0	0
City of Hillsdale	06/30/2005	05:45 PM	Thunderstorm Wind	50 Knots	0	0	15K	0
PITTSFORD	06/30/2005	06:25 PM	Thunderstorm Wind	50 Knots	0	0	10K	0
LITCHFIELD	06/30/2005	09:45 AM	Thunderstorm Wind	50 Knots	0	0	10K	0
City of Hillsdale	06/30/2005	10:00 AM	Thunderstorm Wind	50 Knots	0	0	10K	0
City of Hillsdale	07/21/2005	06:15 PM	Thunderstorm Wind	50 Knots	0	0	1K	0

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MCD	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
JONESVILLE	07/25/2005	09:30 PM	Thunderstorm Wind	50 Knots	0	0	0	0
CAMDEN	07/25/2005	09:50 PM	Thunderstorm Wind	50 Knots	0	0	0	0
OSSEO	11/06/2005	03:58 AM	Thunderstorm Wind	50 Knots	0	0	0	0
ALLEN	05/30/2006	03:03 PM	Thunderstorm Wind	55 Knots	0	0	0	0
City of Hillsdale	05/30/2006	03:19 PM	Thunderstorm Wind	55 Knots	0	0	0	0
City of Hillsdale	06/21/2006	05:35 PM	Thunderstorm Wind	50 Knots	0	0	5K	0
City of Hillsdale	07/17/2006	11:54 PM	Thunderstorm Wind	52 Knots	0	0	0	0
City of Hillsdale	05/15/2007	14:15 PM	Thunderstorm Wind	55 Knots	0	0	0	0
City of Hillsdale	05/15/2007	17:33 PM	Thunderstorm Wind	55 Knots	0	0	0	0
City of Hillsdale	06/27/2007	15:50 PM	Thunderstorm Wind	55 Knots	0	0	10K	0
LITCHFIELD	06/27/2007	15:58 PM	Thunderstorm Wind	55 Knots	0	0	10K	0
City of Hillsdale	08/07/2007	17:11 PM	Thunderstorm Wind	55 Knots	0	0	0	0
City of Hillsdale	08/23/2007	18:22 PM	Thunderstorm Wind	55 Knots	0	0	10K	0
City of Hillsdale	08/24/2007	16:20 PM	Thunderstorm Wind	55 Knots	0	0	0	0
WALDRON	06/15/2008	17:22 PM	Thunderstorm Wind	55 Knots	0	0	10K	0
City of Hillsdale	06/26/2008	14:06 PM	Thunderstorm Wind	50 Knots	0	0	0	0
JONESVILLE	07/02/2008	17:50 PM	Thunderstorm Wind	55 Knots	0	0	0	0
CAMBRIA	07/02/2008	18:00 PM	Thunderstorm Wind	55 Knots	0	0	0	0

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MCD	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
SOMERSET CENTER	07/02/2008	18:00 PM	Thunderstorm Wind	55 Knots	0	0	0	0
READING	07/02/2008	18:01 PM	Thunderstorm Wind	60 Knots	0	0	0	0
ALLEN	06/08/2009	19:55 PM	Thunderstorm Wind	50 Knots	0	0	0	0
City of Hillsdale	6/18/2010	19:59	Thunderstorm Wind	55 Knots	0	0	0	0
City of Hillsdale	6/18/2010	20:43	Thunderstorm Wind	55 Knots	0	0	0	0
LITCHFIELD	6/23/2010	20:29	Thunderstorm Wind	60 Knots	0	0	0	0
City of Hillsdale	7/28/2010	14:05	Thunderstorm Wind	55 Knots	0	0	0	0
City of Hillsdale	6/21/2011	19:35	Thunderstorm Wind	55 Knots	0	0	0	0
City of Hillsdale	7/11/2011	10:45	Thunderstorm Wind	60 Knots	0	0	0	0
ALLEN	9/3/2011	17:25	Thunderstorm Wind	55 Knots	0	0	0	0
LITCHFIELD	9/3/2011	17:27	Thunderstorm Wind	55 Knots	0	0	0	0
LITCHFIELD	9/3/2011	17:30	Thunderstorm Wind	55 Knots	0	0	0	0
LITCHFIELD	9/3/2011	17:35	Thunderstorm Wind	55 Knots	0	0	0	0
MOSCOW	9/3/2011	17:50	Thunderstorm Wind	55 Knots	0	0	0	0
ALLEN	6/21/2012	14:38	Thunderstorm Wind	55 Knots	0	0	0	0
ALLEN	6/21/2012	14:40	Thunderstorm Wind	55 Knots	0	0	0	0
CAMBRIA	7/1/2012	16:10	Thunderstorm Wind	60 Knots	0	0	0	0
NORTH ADAMS	7/5/2012	13:45	Thunderstorm Wind	55 Knots	0	0	0	0

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MCD	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
FOUNTAIN PARK	7/5/2012	15:18	Thunderstorm Wind	50 Knots	0	0	0	0
City of Hillsdale	7/5/2012	15:25	Thunderstorm Wind	55 Knots	0	0	0	0
City of Hillsdale	6/25/2013	18:40	Thunderstorm Wind	55 Knots	0	0	0	0
City of Hillsdale	7/1/2014	1:10	Thunderstorm Wind	60 Knots	0	0	0	0
SOMERSET CENTER	7/1/2014	1:13	Thunderstorm Wind	60 Knots	0	0	0	0
JONESVILLE	7/1/2014	1:15	Thunderstorm Wind	60 Knots	0	0	0	0
SOMERSET CENTER	7/1/2014	1:20	Thunderstorm Wind	60 Knots	0	0	0	0
MOSCOW	8/19/2014	16:00	Thunderstorm Wind	55 Knots	0	0	0	0
ALLEN	9/5/2014	17:50	Thunderstorm Wind	50 Knots	0	0	0	0
LITCHFIELD	9/5/2014	17:50	Thunderstorm Wind	50 Knots	0	0	0	0
BANKERS	9/20/2014	17:31	Thunderstorm Wind	55 Knots	0	0	0	0
BANKERS	9/20/2014	17:39	Thunderstorm Wind	55 Knots	0	0	0	0
MOSCOW	4/9/2015	17:21	Thunderstorm Wind	78 Knots	0	0	75K	0
STEAMBURG	6/8/2015	16:05	Thunderstorm Wind	55 Knots	0	0	0	0
HILLSDALE AIRPORT	6/8/2015	16:05	Thunderstorm Wind	56 Knots	0	0	0	0
NORTH ADAMS	6/8/2015	16:08	Thunderstorm Wind	55 Knots	0	0	0	0
CAMDEN	7/18/2015	19:24	Thunderstorm Wind	50 Knots	0	0	0	0

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MCD	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
STEAMBURG	8/2/2015	23:01	Thunderstorm Wind	55 Knots	0	0	0	0
JONESVILLE	7/13/2016	19:50	Thunderstorm Wind	55 Knots	0	0	0	0
JONESVILLE	11/18/2016	18:55	Thunderstorm Wind	60 Knots	0	0	0	0
City of Hillsdale	7/7/2017	4:00	Thunderstorm Wind	55 Knots	0	0	0	0
MOSCOW	5/2/2018	20:32	Thunderstorm Wind	56 Knots	0	0	0	0
WHEATLAND	5/2/2018	20:48	Thunderstorm Wind	55 Knots	0	0	0	0
BETZER	8/6/2018	20:34	Thunderstorm Wind	55 Knots	0	0	0	0
AUSTIN	9/20/2018	17:37	Thunderstorm Wind	55 Knots	0	0	0	0
				TOTALS:	0	2	507K	0

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TABLE IV-23b, Tornado Events, Hillsdale County (1950-2018)		
Date	**Description**	**MCD's**
06/24/1958	19:00 PM CST. Beginning LAT/LON: 41°45'N / 84°46'W. Ending LAT/LON: 41°45'N / 84°41'W. Magnitude: F1. Length: 3.60 Miles. Width: 30 Yards. Property Damage: $2,500.	Camden
08/22/1964	13:25 PM CST. Beginning LAT/LON: 41°46'N / 84°26'W. Ending LAT/LON: 41°53'N / 84°18'W. Magnitude: F2. Length: 10.30 Miles. Width: 100 Yards. Property Damage: $25,000.	Waldron
04/11/1965	18:20 PM CST. Beginning LAT/LON: 41°53'N / 84°50'W. Ending LAT/LON: 41°57'N / 84°22'W. Magnitude: F4. Length: 24.20 Miles. Width: 1760 Yards. Property Damage: $25 Million. Fatalities: 3. Injuries: 47.	Somerset
04/23/1968	11:50 PM CST. Beginning LAT/LON: 41°47'N / 84°36'W. Ending LAT/LON: 41°53'N / 84°28'W. Magnitude: F1. Length: 9.30 Miles. Width: 200 Yards. Property Damage: $250,000. Injuries: 1.	Hillsdale
07/23/1968	18:30 PM CST. Beginning LAT/LON: 41°55'N / 84°39'W. Ending LAT/LON: 41°55'N / 84°31'W. Magnitude: F1. Length: 6.40 Miles. Width: 67 Yards. Property Damage: $25,000.	Hillsdale
07/04/1969	16:00 PM CST. Beginning LAT/LON: 41°59'N / 84°42'W. Ending LAT/LON: 41°52'N / 84°22'W. Magnitude: F2. Length: 18.70 Miles. Width: 100 Yards. Property Damage: $250,000.	Jonesville
06/12/1973	16:30 PM CST. Beginning LAT/LON: 41°56'N / 84°38'W. Ending LAT/LON: Not Known. Magnitude: F0.	Hillsdale
04/03/1974	18:44 PM CST. Beginning LAT/LON: 41°55'N / 84°39'W. Ending LAT/LON: 42°05'N / 84°24'W. Magnitude: F2. Length: 17.00 Miles. Width: 440 Yards. Property Damage: $2.5 Million. Fatalities: 2. Injuries: 31.	Hillsdale
04/03/1974	19:15 PM CST. Beginning LAT/LON: 41°45'N / 84°25'W. Ending LAT/LON: 41°50'N / 84°23'W. Magnitude: F2. Length: 5.40 Miles. Width: 167 Yards. Property Damage: $25,000. Injuries: 2.	Waldron

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TABLE IV-23b, Tornado Events, Hillsdale County (1950-2018)		
Date	**Description**	**MCD's**
04/03/1974	19:15 PM CST. Beginning LAT/LON: 41°43'N / 84°25'W. Ending LAT/LON: 41°47'N / 84°20'W. Magnitude: F2. Length: 5.60 Miles. Width: 33 Yards. Injuries: 5.	Waldron
05/21/1975	16:30 PM CST. Beginning LAT/LON: 41°59'N / 84°48'W. Ending LAT/LON: 42°02'N / 84°40'W. Magnitude: F0. Length: 7.20 Miles. Width: 33 Yards. Property Damage: $2,500.	Allen
03/12/1976	16:05 PM CST. Beginning LAT/LON: 41°48'N / 84°24'W. Ending LAT/LON: 41°49'N / 84°22'W. Magnitude: F2. Property Damage: $250,000.	Pittsford
03/12/1976	16:40 PM CST. Beginning LAT/LON: 42°03'N / 84°35'W. Ending LAT/LON: 42°04'N / 84°30'W. Magnitude: F2. Length: 3.60 Miles. Width: 133 Yards. Property Damage: $250,000.	Moscow
07/18/1977	11:00 AM CST. Beginning LAT/LON: 41°59'N / 84°36'W. Ending LAT/LON: 41°58'N / 84°30'W. Magnitude: F2. Length: 4.70 Miles. Width: 33 Yards. Property Damage: $25,000.	Adams
06/07/1979	16:25 PM CST. Beginning LAT/LON: 42°00'N / 84°32'W. Ending LAT/LON: Not Known. Magnitude: F0. Length: 0.50 Miles. Width: 20 Yards.	Moscow
09/25/1984	15:20 PM CST. Beginning LAT/LON: 41°56'N / 84°25'W. Ending LAT/LON: Unknown. Magnitude: F2. Length: 2.10 Miles. Width: 90 yards. Property Damage: $250,000.	Wheatland
05/15/1988	17:04 PM EST. Beginning LAT/LON: 41°43'N / 84°25'W. Ending LAT/LON: Unknown. Magnitude: F0. Length: 0.2 Miles. Width: 10 yards.	Waldron
03/27/1991	19:37 PM EST. Beginning LAT/LON: 41°43'N / 84°36'W. Ending LAT/LON: 41°47'N / 84°31'W. Magnitude: F3. Length: 5.00 Miles. Width: 400 Yards. Property Damage: $25,000.	Amboy

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	TABLE IV-23b, Tornado Events, Hillsdale County (1950-2018)	
Date	**Description**	**MCD's**
07/10/2003	20:24 PM EST. Beginning LAT/LON: 41°43'N / 84°43'W. Ending LAT/LON: 41°42'N / 84°43'W. Magnitude: F0. Length: 0.10 Miles. Width: 50 Yards. Property Damage: $1,000. Law enforcement and emergency management reported a brief F0 tornado touched down 4 miles southeast of Camden and quickly lifted. A storage shed and some trees were damaged.	Camden
08/01/2003	15:40 PM EST. Beginning LAT/LON: 42°01'N / 84°30'W. Ending LAT/LON: 42°01'N / 84°30'W. Magnitude: F0. Length: 0.10 Miles. Width: 10 Yards. A brief touchdown was observed by fire personnel near Sterling and Walworth roads. No damage or injuries were reported.	Hillsdale
04/09/2015	17:22 PM EST. Beginning LAT/LON: 42° 0634N / -84°4987W. Ending LAT/LON: 42°0669N / -84°4879w. Magnitude: EF0. Length: 0.60 Miles. Width: 70 Yards. A weak, disorganized circulation touched down southwest of the intersection of Bibbins and Mosherville and moved northeast. As it progressed NE it strengthened after crossing Bibbins Road and approaching a residence on Mosherville. The main circulation passed to the NW of the home, causing tree damage. The remnant winds took a direct hit on a barn that was resting higher than surrounding buildings, essentially destroying it. A center pivot was flipped, but it is likely from the remaining forward momentum of the wind and storm. Maximum winds were estimated to be 80 and 85 mph.	

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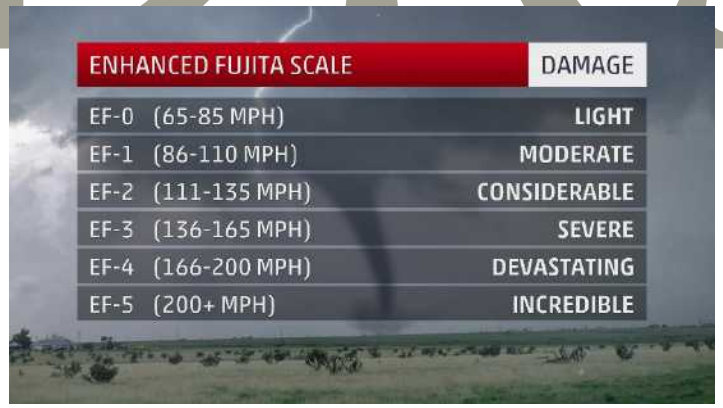
"Tornadoes in Michigan," according to the 2019 Michigan Hazard Analysis, "are most frequent in the spring and early summer when warm, moist air from the Gulf of Mexico collides with cold air from the polar regions to generate severe thunderstorms. These thunderstorms often produce the violently rotating columns of wind that are called tornadoes. Most of a tornado's destructive force is exerted by the powerful winds that knock down walls and lift roofs from buildings in the storm's path. The violently rotating winds then carry debris aloft that can be blown through the air as dangerous missiles.

Tornadoes Affecting Michigan and Hillsdale County

"National Weather Service data," according to the 2019 Michigan Hazard Analysis, "indicates that there were 23 tornadoes resulting in eight deaths in Hillsdale County during the period between 1950 and July 2001. All of the tornado events occurring in Hillsdale County occurred during the months of March through October. The intensity of the tornadoes ranged from EF0 – EF4, with 9% at EF4, 4% at EF3, 39% at EF2, 17% at EF1, 30% at EF0. EF3 tornadoes are classified as "severe" with wind speeds of 136 to 165 mph resulting in severe damage.

A total of two tornadoes (F3 and F4 Fujita Scale) touched down in Hillsdale County resulting in six deaths and 94 injuries on Palm Sunday, 1965. A tornado affecting the Hillsdale area resulted in two deaths and 31 injuries in 1974. EF4 tornados are classified as "devastating". EF4 tornados can level even well-constructed houses. Cars are thrown, thus generating large missiles.

Note: Since thunderstorms bring the potential for dangerous hail, lightning, straight-line winds, and tornadoes, it is necessary to further examine each of those hazards in the other sections of this plan. **Useful historical information on hail, severe winds, lightning, and tornadoes for your county can be found through the National Climatic Data Center's Storm Data website at** http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms. Data for each county in the state are listed there, and there are historical records of significant events for dozens of hazards. This is one of the most convenient information sources for the analysis of hazards, and was used extensively in this plan.



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25. Snowstorms

Blizzards are the most dramatic and perilous of all snowstorms, characterized by low temperatures and strong winds (35+ miles per hour) bearing enormous amounts of snow. Most of the snow accompanying a blizzard is in the form of fine, powdery particles that are wind-blown in such great quantities that, at times, visibility is reduced to only a few feet. Blizzards have the potential to result in property damage and loss of life. Just the cost of clearing the snow can be enormous, including the loss and disruption of essential services in affected communities."

Several recent significant snowstorms of statewide significance, as reported in the Michigan Hazard Analysis, are worth mentioning:

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TABLE IV-24, Snow Events, Hillsdale County (1950-2018)		
Date	**Description**	**MCD's**
January 26-31, 1977	A Presidential Emergency (3030) was declared for 15 counties, including Hillsdale because of a massive snowstorm and blizzard. The Governor also declared a statewide disaster.	Hillsdale County
January 26-27, 1978	A Presidential Disaster (Emergency 3057) was declared statewide due to a blizzard and snowstorm hitting the entire state. The Governor also declared a statewide disaster.	Hillsdale County
02/25/1994	11:00 AM EST. Location: South Third of Lower Michigan. An intense snow burst caused five to eight inches of snow to fall across most of the southern third of lower Michigan. The heaviest snowfalls, seven to eight inches, fell over a 50-mile wide area across southern lower Michigan. On the north side of the area were the cities of Grand Rapids, Lansing and Flint. Detroit, Jackson and Kalamazoo were on the southern edge of the heaviest snowfall area. Snowfall rates of one to two inches an hour, for a period to two to three hours, were common. Northeast to east winds at 15 to 25 mph with frequent gusts to 35 mph combined with temperatures around 20F resulted in wind chill values of	Hillsdale County

	10 to 20 degrees below zero. The combination of strong winds and heavy snow caused near blizzard conditions for a period of about six hours.	
12/06/1994	18:00PM EST. Location: Southern Lower Michigan. Snow amounts of 2 to 4 inches occurred over extreme southern lower Michigan, where some of the precipitation fell as freezing rain. Numerous traffic accidents were reported across the area, along with scattered power outages.	Hillsdale County
03/19/1996	08:30:00 PM EST. Four to 8 inches of snow fell in a band that covered eastern Branch, Hillsdale, Jackson, and southeast Ingham Counties. Winds up to 45 mph caused drifts up to 2 feet, forcing the closing of many roads and schools. Power outages also affected nearly 5,000 customers.	Hillsdale County
11/11//1997	09:00:00 PM EST. A cold front moved across western Lower Michigan during the early morning hours of November 12th, resulting in a lake-enhanced snow event which began late evening, Tuesday, November 11th. In general, 1 to 5 inches of snow fell across western and southern Lower Michigan, with 3 to 5 inch amounts confined to Lake, Ottawa, Kent, Allegan, Barry, Eaton, Ingham, and Kalamazoo Counties. The snow-covered and icy roads caught many overnight and early morning motorists by surprise. The snow initially melted on road surfaces overnight, then froze early Wednesday morning as temperatures fell below freezing. This resulted in extremely icy conditions and an unusually high number of minor accidents, which included many slide-offs into ditches. Accidents with injuries were reported in Battle Creek, St. Joseph and Cass Counties, Hillsdale County (a rollover accident), and Branch, Mecosta, Osceola, and Newaygo Counties.	Lower Michigan including Hillsdale County
11/151997	07:00:00 AM EST. Low pressure tracked across southern Lower Michigan on Saturday, November 15th, and produced a band of light snow. Snow accumulated 3 to 4 inches across Branch, Jackson, and Hillsdale Counties during the 14 hour period.	Hillsdale County

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12/101997	01:00:00 AM EST. A winter storm which tracked across the Ohio Valley region from southwest Indiana into northern Ohio produced an area of heavy, wet snow across the southern third of Michigan's Lower Peninsula. The weight of the wet snow caused power outages in Berrien, Branch, Hillsdale, Ingham, and Jackson Counties. Up to 18,000 customers lost power at the height of the storm due to arcing wires and downed branches.	Hillsdale County
01/221998	07:00:00 PM EST. The storm spread a large swath of moderate to occasionally heavy snow across most of western, central, and southern portions of Michigan's Lower Peninsula from Thursday evening through mid-morning Friday, January 22nd-23rd. Snowfall reports included 6.5 inches in Dansville and 6.0 inches in Stockbridge, both in eastern Ingham County, 5.5 inches in Jackson, 5.2 inches in Allegan, 5.0 inches in Lansing, Hastings, and Reed City, 4-5 inches reported in the Grand Rapids-Muskegon-Holland metropolitan area, and around 4 inches in Kalamazoo, Battle Creek, St. Joseph and Hillsdale.	Hillsdale County
12/11/2000	08:00:00 AM EST. Heavy snow developed quickly during the morning and mixed with some sleet at times due to the tremendous warm air advection out ahead of the intensifying system. Heavy snow continued into the early morning hours of the 12th with thunder snow reported at several locations in northwest Indiana and southwest Michigan. Strong gradient winds developed creating near blizzard conditions over northwest Indiana and southwest Michigan and caused some damage to trees and power lines. A Presidential Disaster (Emergency 3160) was declared from 39 counties, including Hillsdale.	Hillsdale County
02/22/2003	04:00:00 PM EST. Rain changed to snow in the late afternoon and quickly accumulated 6 to 7 inches mainly in the southern half of the county. The snow ended after midnight.	Hillsdale County
01/27/2004	09:00:00 PM EST. A combination of snow from an area of low pressure moving across Ohio and lake enhancement from northwest flow behind this storm	Hillsdale County

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	caused heavy snow across the area with general accumulations of 8 to 10 inches and over 12 inches in some locations.	
12/22/2004	11:50:00 AM EST. Low pressure moved out of the western Gulf of Mexico and tracked towards eastern Ohio. Abundant moisture accompanying the system allowed for a large area of snow to blanket much southern Lower Michigan. Amounts across far southern Lower Michigan were generally from 2 to 5 inches, with Kinderhook in Hillsdale county receiving 6 inches of total snowfall.	Hillsdale County
12/01/2007	17:00:00 PM EST. A brief burst of light to moderate snow, mixed at times with sleet during the evening hours switched over to freezing rain. Spotters reported around 2 tenths of an inch of ice covering roads, trees and power lines. Some power outages were noted with several accidents. Winds of 15 to 25 mph assisted with power line damage.	Hillsdale County
12/15/2007	10:15:00 AM EST. Ten to twelve inches of snow fell along with blowing and drifting snow, creating difficult travel conditions for the entire county.	Hillsdale County
03/04/2008	14:00:00 PM EST. Spotters reported six to eight inches of snow across the county. Across much of Hillsdale County, a narrow band of five to eight inches of snow blanketed the area.	Hillsdale County
02/09/2010	04:00:00 AM EST. A steady light to moderate snow fell February 9th into early February 10th with snowfall totals ranging between 7 and 10 inches across the county. Winds of 15 to 25 mph allowed for some blowing and drifting of the snow. The accumulating snow and wind led to slide-offs and accidents, along with school closings.	Hillsdale County

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Monthly snowfalls are recorded from a weather station located in the vicinity of Hillsdale for the 30-year period of 1951 and 1980, according to the Michigan State Climatologist's Office. The average seasonal snowfall (September-May) during this time period was 57.26 inches, with a low of 1.25 inches in September, October, and a high of 13.68 inches in December.

A total of 32 snow storm events were reported in Hillsdale County between 1950 and 2010 according to the NCDC. No damages, deaths, or injuries in Hillsdale County were attributed to these winter storm events. Because these storms cover massive land areas, only storms that provided detail to Hillsdale County events are listed above. Hillsdale County was impacted by several major snow and winter storms over the last 60 years. Details as to how Hillsdale County was specifically affected are not available.

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26. Ice and Sleet Storms

"Ice storms," according to the Michigan Hazard Analysis, "are sometimes incorrectly referred to as sleet storms. Ice storms are the result of cold rain that freezes on contact with the surface, coating the ground, trees, buildings, overhead wires and other exposed objects with ice, sometimes causing extensive damage. When electric lines are downed, households may be without power for several days, resulting in significant economic loss and disruption of essential services in affected communities."

The following table cites specific ice events that affected Hillsdale County:

TABLE IV-25, Ice and Sleet Events, Hillsdale County (1950-2018)		
Date	**Description**	**MCD's**
March 2 to 7, 1976	Ice Storm with accompanying high winds and tornadoes struck Hillsdale and 28 other counties in central Lower Michigan. The storms, considered to be one of the worst to hit the state, caused over $56 million in damage and widespread power outages. A Presidential Major Disaster was granted.	Hillsdale County
01/01/1985	Ice Storm affecting Hillsdale and 12 other counties in southern Lower Michigan. Up to one inch of freezing rain downed tree limbs, trees, and power lines, blocked roads, and caused widespread power outages. More that 430 thousand electric customers were without power for up to 10 days. An estimated $50 million in public and private damages, three deaths, and eight injuries are attributed to this event. A Governor's Disaster Declaration was issued.	Hillsdale County
03/14/1997	01:30:00 AM EST. The worst hit areas included the counties of Jackson, Kalamazoo, Calhoun, Branch, and Hillsdale. Ice accumulations in these areas were near 1 inch. Power was out, up to 24 hours, in Kalamazoo County (29,000 customers) and Jackson County (38,000 customers). Statewide, over 250,000 customers were without power at the height of the storm. Trees and power lines were downed throughout the County Warning Area. Automobile accidents occurred almost continuously throughout the storm.	Hillsdale County
2/2/2011	Freezing rain developed around noon on February 20th and continued through the rest of the day into the early morning hours of February 21st. Ice accretions of 0.40 to 0.60 were common across the county. This created significant icing on power lines and trees which led to widespread power outages across the county. There were also reports of slide-offs and accidents.	Hillsdale County

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A total of 11 ice storm events were reported in Hillsdale County between 1950 and 2010 to the NCDC, which is maintained by the National Oceanic and Atmospheric Administration. The most significant event was a heavy snow-storm that mixed with freezing rain causing more than $5 million in property damage over most of Michigan (including Hillsdale County) in January of 1994. No deaths or injuries were attributed to these winter storm events.

27. Invasive Species

According to the Michigan Hazard Analysis, an invasive species is "a species that has been introduced by human action to a location where it did not previously occur naturally, becomes capable of establishing a breeding population in the new location without further intervention by humans, and becomes a pest, threatening the local biodiversity." Michigan has experienced invasive insects, microbes, water species, and animal diseases. Historically, Michigan has had approximately one new invasive species introduced every 2 to 5 years. No human deaths or injuries have been reported because of an invasive species, the property damage to agriculture can be high.

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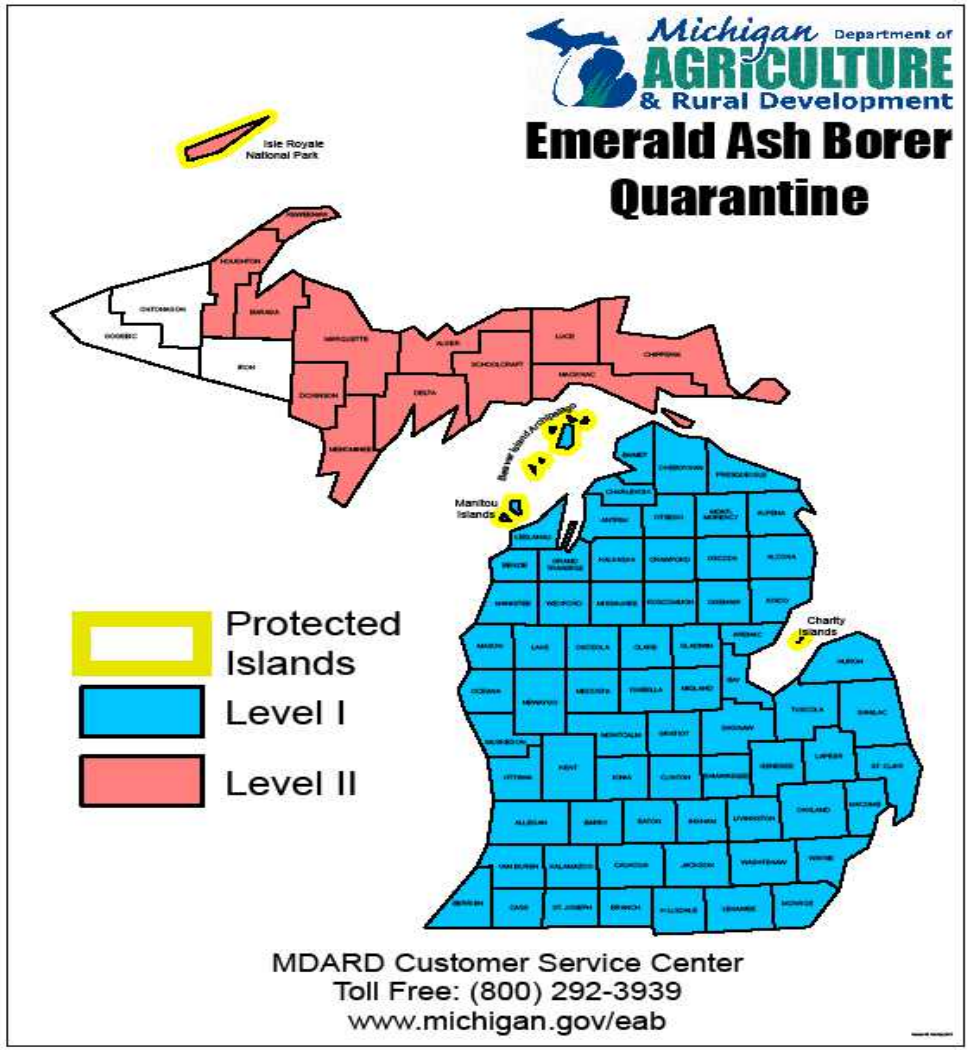
Michigan Department of
AGRICULTURE
& Rural Development
Emerald Ash Borer
Quarantine
Isle Royale
National Park
Manitou
Islands
Charity
Islands
Protected
Islands
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Level II
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Toll Free: (800) 292-3939
www.michigan.gov/eab

Priority, Risk, and Vulnerability Assessment

The previous chapter of this plan identified a wide range of potential hazards facing Hillsdale County. However, each of these hazards do not pose the same degree of risk to the community. The purpose of this chapter is to identify those hazards which are likely to have the greatest impact on Hillsdale County in terms of property damage and public safety.

Hazards will be reviewed in terms of their likelihood of occurrence, percentage of the population affected, the severity of the hazard, and the potential for negative impacts on the local economy. A review of these hazards in terms of their risk, and the vulnerability they pose to the community will help guide the community in its development of mitigation strategies and actions. This type of analysis is critical. Hillsdale County, like other communities in Michigan, currently faces severe governmental revenue shortages. It is imperative that funds be allocated among projects and programs to deliver the greatest benefit to the community.

The hazard mitigation planning process must include a means of community participation and involvement to identify hazards which pose the greatest threat to the community.

Hazards which pose the greatest threat to the community were identified through a ranking process using the following six characteristics:

- likelihood of occurrence,
- percent of population affected,
- potential for causing casualties,
- negative economic affects,
- public awareness of the hazard, and
- the potential for corollary affects.

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Each of the potential hazards identified was ranked for each of the six characteristics of hazards. This ranking ranged from 0 to 10, with 0 being a rating of no significance and 10 being a rating of high significance. In addition, the characteristics were weighted to reflect perceptions of community values based upon discussions with the Director of Hillsdale County Emergency Management, the Hillsdale County Board of Commissioners, and representatives of Hillsdale County townships.

The **likelihood of occurrence** received 30% of the total weighting. The **percentage of population affected** and the **potential for causing casualties** each received 20% of the weighting. The **potential for negative economic effects** received 15%. **Public awareness** of the hazard received 5%, and the **occurrence of any corollary events** received 10%.

The ranking of each hazard for each of the six characteristics, and the application of weighting of the characteristics, resulted in a total rate score for each hazard. The higher the score, the more important the need to develop mitigation strategies and projects to reduce the severity of the event. The results of this analysis are found in the following table. The total ranking for each individual hazard was established by multiplying the individual ranking by the weight assigned to each characteristic. The sums of each of these individual ratings resulted in the total ranking for each hazard.

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Hazard Ranking and Vulnerability													
Potential for													
	Likelihood of Occur-rence		Percent of Population Affected		Causing Casualties		Negative Economic Effects		Public Awareness of Hazard		Corollary Effects		Total
Hazard	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rate**
Fire Hazard													
Wild Fires	7	2.10	2	0.40	1	0.20	1	0.15	9	0.45	2	0.20	3.50
Structural Fires	10	3.00	3	0.60	5	1.00	2	0.30	0	0.00	0	0.00	4.90
Scrap Tire Fires	3	0.90	1	0.20	1	0.20	0	0.00	10	0.50	1	0.10	1.90
Hazardous Materials Incident													
Oil & Gas Wells	4	1.20	1	0.20	1	0.20	0	0.00	8	0.40	0	0.00	2.00
Fixed Site Hazmat	1	0.30	1	0.20	2	0.40	2	0.30	9	0.45	1	0.10	1.75
Pipeline Accidents	1	0.30	1	0.20	1	0.20	1	0.15	9	0.45	1	0.10	1.40
Hazmat Transportation	1	0.30	1	0.20	1	0.20	1	0.15	5	0.25	1	0.10	1.20
Nuclear Power Plant	0	0.00	0	0.00	0	0.00	0	0.00	10	0.50	0	0.00	0.50
Homeland Security													
Public Health Emergencies	1	0.30	5	1.00	5	1.00	5	0.75	10	0.10	5	0.50	4.05
Terrorism/Sabotage/WMD	1	0.30	1	0.20	1	0.20	0	0.00	10	0.50	5	0.50	1.20
Nuclear Attacks	1	0.30	5	1.00	5	1.00	5	0.75	10	0.50	5	0.50	4.05

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Hazard Ranking and Vulnerability													
Potential for													
Hazard	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rate**
Extreme Weather													
Drought	2	0.60	10	2.00	1	0.20	1	0.15	9	0.45	2	0.20	3.60
Extreme Temperature	10	3.00	3	0.60	1	0.20	0	0.00	10	0.50	0	0.00	4.30
Thunderstorms													
Tornadoes	8	2.10	3	0.60	5	1.00	5	0.75	0	0.00	2	0.20	4.95
Lightning	10	3.00	3	0.60	3	0.60	1	0.15	0	0.00	2	0.20	4.55
Severe Winds	10	3.00	3	0.60	1	0.20	1	0.15	0	0.00	2	0.20	4.15
Hail	10	3.00	3	0.60	1	0.20	1	0.15	0	0.00	2	0.20	4.15
Severe Winter Weather													
Snow Storms	10	3.00	10	2.00	1	0.20	0	0.00	0	0.00	2	0.20	5.40
Ice and Sleet Storms	10	3.00	10	2.00	1	0.20	0	0.00	0	0.00	2	0.20	5.40
Energy and Infrastructure													
Energy Emergencies	10	3.00	10	2.00	2	0.40	3	0.45	0	0.00	2	0.20	6.05
Significant Infrastructure	2	0.60	8	1.60	2	0.40	8	1.20	8	0.40	2	0.20	4.40
Transportation Accidents	0	0.00	0	0.00	8	1.60	0	0.00	0	0.00	1	0.10	1.70
Percent of Points		**30%**		**20%**		**20%**		**15%**		**5%**		**10%**	**100%**

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The evaluation of risk and vulnerability conducted by staff led to a preliminary prioritization of hazards facing Hillsdale County to be: 1) Wildfires, 2) Oil and Gas Wells, 3) Public Health Emergencies, 4) Tornadoes, 5) Structural Fires, 6) Significant Infrastructure Failures, 7) Energy Emergencies, 8) Lightning, 9) Ice Storms and 10) Snow Storms. These preliminary priority hazards were presented to and reviewed by the Director of Hillsdale County Emergency Management, the Hillsdale County Board of Commissioners, and representatives of Hillsdale County townships. This review by local officials resulted in a modification of these priorities.

Local officials noted the presence of oil and gas wells in Hillsdale County and expressed the need to include oil and gas wells as a priority hazard, instead of "significant infrastructure failures". In addition, local officials voiced local concern for wildfires and replaced lightning with wildfire hazards, noting that lightning was the cause of many wildfires. Finally, local officials directed that "public health emergencies" be added as a priority hazard, expressing concern, in particular, for livestock disease, but also for other infectious diseases which could infect residents.

The eight hazards identified by local officials in priority order are cited in the "Top Hazards" sidebar.

Top Hazards
#1 Wildfires
#2 Oil and Gas Wells
#3 Public Health Emergencies
#4 Tornadoes
#5 Structural Fires
#6 Significant Infrastructure Failures
#7 Energy Emergencies
#8 Lightning
#9 Ice Storms
#10 Snow Storms

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Goals and Objectives

The establishment of goals and objectives is a critical component of any hazard mitigation plan. Goals provide general direction for the community and serve as the basis for the formation of policy and decision making. Goals help to explain what the community intends to achieve as a result of the planning process. Goals are long-term and generally represent broad visions for the community.

Objectives are benchmarks which may be used to determine whether goals are met. The development of these goals and objectives was based in part upon the goals included in the Hillsdale County Comprehensive Plan adopted on December 12, 2002 and in discussions with local officials.

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Goals and objectives for the Hillsdale County Hazard Mitigation Plan are as follows:

1. **Encourage all units of government to work together to develop policy, plans, and zoning ordinances consistent with one another so that all the people and uses of the land can co-exist in a manner that protects the environment, the people who live in the county, and businesses and industries that conduct operations within Hillsdale County.**
    - A. Maintain a meaningful communication program with all the townships, villages and cities in Hillsdale County.
    - B. Continually provide opportunities for public input on growth and development issues facing local and county government.
    - C. Expand county public facilities and services as necessary for protection and maintenance of the public health, safety, and welfare, provided improvements are consistent with the Hillsdale County Comprehensive Plan future land use pattern.
    - D. Implement a program that fosters intergovernmental coordination in growth management and planning decisions.
    - E. Identify communities that may be in need of improved public services.
    - F. Prioritize a schedule of improvements that addresses timing, cost and possible funding sources.

G. Develop and maintain regular and meaningful communication programs with local units of government. This encourages regional agencies to discuss and plan for infrastructure and non-infrastructure based public facilities and services. Additionally, there should be opportunities for shared facilities and services incorporating alternative strategies for contracted services versus individual local unit of government-operated services.

2. Encourage well-planned intensive development in existing urban areas or existing growth corridors that have public services available.

A. Encourage local units of government to expand public facilities and services such as public water and sewer or paved roads, particularly where the public health, safety, or welfare are at risk.

B. Promote residential development in and around existing urbanized areas where community facilities and services can be both effective and efficient.

C. Develop and implement land use policies that foster a safe efficient transportation network.

D. Develop a priority review system for paving streets and roads that considers land use and appropriate decisions.

E. Support intensive uses and developments along major roadways that reduce the number of access points.

F. Expand alternative transportation facilities, including walkways and bicycle paths.

G. Encourage input into the local process so that the potential for traffic congestion and hazards can be minimized.

H. Encourage the development of infrastructure that will support high tech services.

I. Review of land uses and zoning changes at the county level will include consideration as to how the proposed development preserves the agricultural and rural character of the countryside.

J. Develop model zoning regulations that are designed to protect farming activities in agricultural areas from nuisances associated with incompatible adjacent uses.

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K. Where residential development must occur in agricultural areas, encourage that the land be divided and subsequent structures built on less productive farmland.

L. Recognizes the potential conflicts that can occur between agricultural and residential uses. Support farming operations and practices when those farm activities meet Michigan Department of Agriculture's (Right to Farm Act) Generally Accepted Agricultural Management Practices (GAMPS).

3. Encourage the preservation of the County's agricultural base, its open space, and natural resources by supporting growth in and around existing urbanized areas.

A. Provide a framework for preservation of open spaces by coordinating local land use plans and related documents.

B. Protect the open space and rural character of the county from encroaching sprawl.

C. Protect open spaces, including environmentally sensitive lands, woodlots, fields and farmlands, while at the same time providing landowners a reasonable use of the land.

D. Local units of government are encouraged to adopt programs and tools specifically designed to preserve open space.

E. Protection of groundwater resources, natural features, and other environmental features must be a primary consideration when reviewing zoning development proposals.

F. Facilitate the education with regards to the county's reliance on its water resources and the potential negative effects that irresponsible land use can cause.

G. Assure that new intensive types of developments comply with applicable local, county, state and federal regulations.

H. Encourage the preservation of open space within planned intensive developments.

I. Protect and preserve agricultural areas within the county that have prime agricultural soils.

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J. Preserve major farms, Centennial Farms, and lands enrolled in PA 116 or other conservation programs or easements.

K. Consider the potential future negative impacts on the county as a whole, prior to extending or improving infrastructure services into and through rural and agricultural areas.

L. Promote adoption of township zoning standards that discourage haphazard residential sprawl into the rural agricultural areas.

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4. Support the establishment of a sound economic base through a combination of industrial and commercial establishments.

A. Commercial development should be supported in urbanized areas and where high intensity uses already exist, and sewer, water, and other infrastructure is available.

B. Encourage clustered commercial uses that minimize curb cuts and driveways.

C. Support new commercial development and redevelopment and residential uses.

D. Utilize office uses as transition areas between commercial development and residential uses.

E. Encourage development of a training infrastructure that will support a highly skilled work force.

F. Encourage industrial development in existing industrial parks where roads, water and sewer exist.

G. Encourage redevelopment of abandoned industrial sites.

H. Ordinance regulations should require adequate landscaping, open space, or other means to limit conflicts between uses.

I. Implement a plan that prevents the premature conversion of land to uses other than their long-termed planned use.

J. Provide opportunities for home-based occupations.

5. Promote Hillsdale County as a place with individual identity while maintaining a rural character; keeping the diversity of people and environment in balance and encouraging orderly community growth.

A. Develop and utilize recreation programming that covers all ages, all program areas, and all seasons, and include programs for special populations.

B. Develop cultural interest programs.

C. Develop plans that promote fitness and wellness, and implement them.

D. Develop a program plan to increase park usage, incorporating existing and future facilities.

E. Encourage, maintain, and update the county's five (5) year Parks and Recreation Plan including an inventory of existing facilities and services.

F. Identify deficiencies in its recreation facilities and services and encourage development where these programs are not available.

G. Provide for alternative affordable housing developments, particularly in the urbanized areas where adequate services needed to support those developments already exist.

H. Plan for residential developments that will minimally encroach or encourage sprawl into agricultural areas.

I. Encourage local units of government to seek alternative types of housing.

J. Assist communities in the adoption of flexible zoning techniques such as Planned Unit Developments (PUD) and Open Space Ordinances that promote clustered developments.

K. Assist townships, cities, and villages in their efforts to adopt ordinance regulations that incorporate the preservation of natural resource systems and open space.

L. Discourage residential development in areas where public services and/or natural conditions are inadequate to support the proposed density.

M. Develop model ordinances that townships can adopt whose purpose is to foster the establishment of residential developments that maintain rural character and preserve agricultural land.

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N. Develop a uniform system to assemble information from applicants for land development projects to ensure that utilities, infrastructure, and services are adequate to serve the proposed loses.

O. Encourage townships to adopt and implement ordinance provisions that are consistent with one another, while at the same time, maintaining and preserving agricultural land.

P. Assist townships that do not have land use plans or zoning ordinances to prepare and adopt these documents.

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Hazard Mitigation Plan and Mitigation Strategies

Research conducted on various natural, technological, and man-made hazards reveals that, relative to other areas of the United States, Hillsdale County is a relatively safe place to live. Loss of life and damage to property from the hazards reviewed is relatively minimal. The Hillsdale County community is not plagued with threats from recurrent hurricanes, riverine flooding common to other areas of the Midwest, earthquakes of the potential evident in the western United States, or the types of wildfires common in dry climates on the U.S. west coast. The community does, however, face significant threat to life and property associated with electrical power failures, severe winter snow and ice storms, tornadoes, structural fires, wildfires, threats from oil and gas wells, and public health emergencies.

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The purpose of this plan is to anticipate the potential consequences of these events upon the community and to take measures and implement strategies to minimize the impact of the severity of these hazards. The plan is intended to protect the health, safety, and economic interests of residents by reducing the impacts of these natural, technological, and man-made hazards through hazard mitigation planning, awareness, and implementation.

Action taken to eliminate or reduce the long-term risk to human life and property will not only help to minimize the impacts of disasters, but will enable a rapid recovery and restoration of community normalcy. As such, the Hazard Mitigation Plan is an essential element of emergency planning, in addition to the emergency services offered by Hillsdale County's law enforcement, fire protection, public health, and emergency medical services, and their activities and planning for preparedness, response, and recovery.

Local governmental units in Hillsdale County, in common with local units of government throughout the state, face increasingly difficult challenges in terms of revenues to fund local governmental operations, activities, and programs. Planning for natural disasters and implementing measures to mitigate those disasters, can, in the long run, save tax dollars.

FEMA has noted that every dollar spent on hazard mitigation results in a savings of six dollars. While the responsibilities of local government extend well beyond addressing the potential hazards local communities face, the wise use of expenditures to mitigate such hazards will benefit the community in terms of the funding need for all local governmental operations.

Simply put, limited dollars should be expended where they generate the greatest amount of effectiveness in terms of the delivery of public services. It should also be noted, that the collective efforts of local government in developing

hazard mitigation strategies and actions will result in savings nationally, and will contribute to the wellbeing of our nation.

The proposed plan and mitigation strategies were sent electronically to the clerk of each township, city and village and was presented to the Hillsdale Chapter of the Michigan Townships Association at their regular meetings of September 1, 2021. The draft plan was modified according to input received regarding the priorities of local hazards and the focus of mitigation plans from the local units of government however input was minimal as most were satisfied with the plan as written.

The result of this effort was presented to the Hillsdale County Board of Commissioners on September 14, 2021 again requesting input from citizens.

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Strategies that would apply to all hazards are:

1. **Implement and enhance public information and education programs aimed at Hillsdale County citizens regarding potential emergencies and how to prepare and respond**. As result of the preparation of this plan and the comprehensive view of hazards facing the community, it was determined that there is a need to develop an enhanced public information and education program to inform citizens about the potential hazards facing Hillsdale County. A knowledgeable citizen base can do much to minimize the potential for damage and threat to human life.
2. **Incorporate hazard mitigation planning into updates in local building codes and zoning plans as they are changed**. As a means of mitigating the hazards facing the county, there is a need to incorporate hazard mitigation planning into local regulations to insure improvement in the mitigation of all hazards to the degree possible. The protection of the public, health, safety and welfare is central to governmental planning. The incorporation of hazard mitigation planning as an elemental part of the community planning process will assure the hazard mitigation plan will be implemented over time.
3. **Update the hazard mitigation plan every five years, or as deemed necessary**. An update of the hazard mitigation plan every five years will offer an opportunity to reassess the hazards facing the community and adjust mitigation strategies as necessary. This review and adjustment will result in a maximization of the use of limited resources and a reduction of the impacts of the hazards.

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Much progress has been made on strategy number one, though still more work remains. Through websites, media campaigns, and community notification systems, citizens are better and more rapidly informed when events threaten their lives, homes and businesses. Limited progress has been made on strategy number two. Strategy number three is the purpose of this most recent update.

Mitigation Strategies for Specifically Identified Hazards

As noted in the "Hazard Risk and Vulnerability" chapter of this report, priorities have been established for the following hazards in decreasing order of importance:

1. Energy Emergencies
2. Snow Storms
3. Ice Storms
4. Tornadoes
5. Structural Fires
6. Wildfires
7. Oil and Gas Well Hazards
8. Public Health Emergencies

Each of these emergencies is addressed below. In addition, other emergencies, which have not been identified as a particular hazard to the community, but which, because of their severity, prevalence, or their impact on large numbers of community residents, are also addressed. In each case, strategies are proposed for implementation to minimize potential damages from these catastrophic events.

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Energy Emergencies

The top hazard facing Hillsdale County is the interruption of electrical energy to the community's industry, business, institutions, and private residences. Interruptions are frequently, but not always, caused by storm events. The following mitigation strategies are proposed:

1. Critical facilities, such as hospitals, schools, jails, nursing homes, emergency communication facilities, care facilities and similar institutions require the use of backup generators for electrical power in the event of a power failure. A prioritized listing of equipment needs and costs should be assembled by each of these entities so that the purchase, update or repair of equipment can be scheduled based on resources available to meet the need.
2. Where possible, to resist damage from severe winds and the accumulation of ice, electrical and telephone lines should be buried where the costs associated with the activity can be justified based upon the costs of service disruption, the likelihood of recurrence, or the public health and safety risk to the community. The cost of such action will be determined and lines will be buried where justified when funds allow.
3. Various utility service providers, such as electric utilities, telephone companies and cable television services, have programs to minimize tree damage to their lines. These maintenance programs and the development of a policy regarding the types of vegetation to be located within utility corridors to minimize potential service outage should be coordinated. The representatives of these utilities should meet to discuss the coordination of these activities to reduce costs and the development of a vegetation policy.
4. Redundancies in utility and communication systems, especially those associated with critical communications, public safety, and health care should be implemented where feasible to reduce or eliminate downtime.

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Ice and Snowstorm Emergencies

Hillsdale County has experienced ice and snow storm emergencies in the past. These emergencies are associated with large amounts of snowfall or ice storms in which the accumulation of ice results in slips and falls, transportation hazards due to impassable or slippery conditions, downed trees and tree limbs, and energy failures associated with fallen tree limbs and the sheer weight of ice on power lines and poles. Mitigation strategies for ice and snow storms are as follows.

1. There is a need for pre-planning for debris management staging and storage areas. In anticipation of downed trees and tree limbs, strategies must be in place to predetermine locations for the collection and processing of snow and tree limbs in urban areas. The establishment of such staging areas will facilitate the clearing of roads and handling of debris and snow. Specific plans for disposal of debris cannot be made until you know what it is and where it is located. The county Emergency Plan generically addresses the disposal of snow and debris in an expedient fashion, mostly by disposal in the right of way along and beside all county roads.
2. The American Red Cross has identified local schools, churches and other buildings throughout the county as shelters which could be designated as warming sites where vulnerable residents could go to escape the effects of loss of heat in their homes due to power outages. These locations will be announced to the public through numerous means as these sites are opened depending on need and the availability of the sites identified. Not all sites will be opened in every instance. When funding or grants become available, priority for funding of emergency generators, perhaps on a cost share basis, should be given to those sites willing to serve as shelters but which do not have emergency power available.

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Tornadoes

Hillsdale County has experienced deaths and substantial property damage from tornadoes. While no wide-spread tornado damage has been experienced over the past several years, tornado events are possible and could result in loss to human life and substantial property damage in the county. Mitigation strategies to address the potential effects from tornadoes are as follows:

1. Public early warning systems will be assessed to determine their function, adequacy, and coverage. Sirens will be installed where warranted, and those in operation will be prepared or replaced where necessary as local funds and grant funds permit. The County does not own or maintain any sirens. It is the responsibility of each local municipality, lake association, etc. to install and maintain their siren system(s) as they see fit. Particular attention, however, should be focused on mobile home parks and lake communities where a warning siren may be installed to provide an audible warning to residents who are frequently outdoors where sirens do the most good. Citizens are also encouraged to take steps to keep themselves informed of daily weather forecasts and hazards using NOAA weather radio, cell phone "apps" and other tools that are readily available at little or no cost.
2. There is a need to assure that anchoring required in building codes and the HUD manufacturing code for manufactured housing is provided and properly installed. The responsibility for this review rests with local units of government and building codes.
3. Shelter areas – certain areas should have tornado shelters that are accessible to nearby residents and the public. Local officials should meet with mobile home park owners to determine the feasibility of installing tornado shelters for park residents where none currently exist. Where there is a need for such shelters, funding alternatives should be determined and the operators should be encouraged to construct the shelter.
4. Hillsdale County's Emergency Management Office and Emergency Operations Center have been moved into a building co-located with Central Dispatch with back-up power installed. This building was designed and built to withstand all but the EF-4 and EF-5 tornadoes. This will not guarantee but make more probable the availability of these functions.

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Structural Fires

Structural fires pose a threat to human life and are a leading cause of property damage and destruction in Hillsdale County. In addition to these losses, the cost of fire protection services is perhaps the highest budgeted item for most local units of government. Mitigation strategies to both reduce the incidents of structural fires and reduce the cost of fire protection services are as follows:

1. There is a need to expand fire protection sprinkler systems, particularly in existing older buildings in downtown areas. Fire protection sprinkler systems are effective in extinguishing structure fires. Sprinkler systems are especially important in high rise buildings in downtown areas, where, due to the number of persons working in buildings, evacuation of large numbers of people is cumbersome.
2. Hillsdale County has a good system of fire protection provided by its local units of government. An effective mutual aid system exists. The biggest challenge to most of these departments is adequate personnel coverage during the day, Monday through Friday when their mostly volunteer firefighters are at work. Local units of government should review and consider the development of additional intergovernmental agreements for cooperation in responding to fire emergencies, including equipment purchases and training, to promote cooperation among and between units and reduce fire protection costs. The goal of such efforts should be enhancement of fire protection services at no increase in cost. The responsibility for the implementation of these measures rests with the collective fire departments in the county and their local governing bodies.
3. All citizens should be strongly encouraged to install and maintain smoke detectors to minimize the loss of lives and property from structural fires.

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Wildfire Emergencies

Wildfires are a concern of local officials. The county experiences numerous wildfires and grass fires every year. Many of these pose a threat to structures in or near their path. As residential development continues to grow in rural areas, any one of these fires could pose a serious threat to large numbers of dwellings and to the lives of their residents if they grow beyond local control. The following strategies are recommended to mitigate the potential impacts of wildfires:

1. The county, or its local units of government, should consider the creation and enforcement of local ordinances that require burn permits and the restriction of campfires and outdoor burning during dry times of the year. Note – few local ordinances exist due to the existence of these at the State level.
2. Local communities, along with the county, should require the clean-up of areas of abandoned or collapsed structures and removal of accumulated junk and debris within a reasonable time to minimize the potential for arson or spontaneous combustion. Townships who have attempted this, however, have been met with strong citizen resistance in some cases.
3. Promote the safe disposal of yard and household waste rather than through open burning by providing community mulching areas for yard waste and recycling sites for household waste.
4. Residents should be educated in the safe use, cleaning, and maintenance of fireplaces and chimneys and encouraged to use spark arresters at the top of their chimney.

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Oil and Natural Gas Well Accidents

Hillsdale County has a large number of oil and gas wells. Although the industry has a good safety record in Hillsdale County, the threat of accidental releases, fire, and explosions exists. Therefore, local officials have indicated an interest in identifying mitigation strategies. Strategies proposed for oil and gas hazard mitigation are as follows:

1. There is a need to develop a community awareness program in those townships and affected cities and villages to advise area residents of potential dangers and personal protection actions.
2. Buffer strips should be constructed to segregate wells, storage tanks, and other production facilities from roads and adjacent land uses consistent with the level of risk posed.
3. A program of public awareness of pipeline location and emergency procedures should be employed by the owners of these facilities in conjunction with the local unit of government.
4. Wells that are no longer active or usable should be filled and capped according to State of Michigan guidelines.

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Public Health Emergencies

There is a need to consider the threats of infectious diseases to residents. In particular, older residents are at risk, and over the 20-year planning horizon, Hillsdale County will continue to have a comparatively large percentage of older persons in its population.

The responsibility for addressing public health emergencies rests with the Branch/Hillsdale/St. Joseph Community Health Agency. The Health Agency has an emergency preparedness coordinator. This coordinator, in conjunction with the agency director, has the responsibility to assess community health emergencies and to implement appropriate measures to address these emergencies. The following mitigation strategies have been recommended and will be implemented with the assistance and participation of the Health Agency coordinator:

1. Residents are encouraged to receive immunizations against communicable diseases. The health department has programs to provide residents with immunizations against communicable diseases. Flu shots are issued at clinics held at the start of the flu season, usually in early October. Vaccines are available at these clinics. It is particularly important that immunization promotion be targeted to residents who are the most vulnerable to disease. Older residents and residents with conditions affecting immunity should be offered immunizations. It may be necessary to offer incentives to these vulnerable populations to boost the number of immunizations to a level which minimizes the spread of disease. Immunizations are also available at many local pharmacies, doctor's offices and at Hillsdale Hospital for a fee which may be covered by health insurance.

   These immunizations may not only result in a healthier population, they may also provide a reduction in the amount of sick time taken by employees for Hillsdale area businesses. Savings in productivity may substantially exceed the cost of the immunization program. The Branch/Hillsdale/St. Joseph Community Health Agency is encouraged to continue its immunization program and to seek grant resources where necessary to assist in program implementation.

2. A program is in place in the community to increase public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential health emergencies. Low-cost measures are available for individuals to protect themselves from infectious diseases. An on-going information

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campaign is necessary to enhance the current public information and awareness programs regarding the causes, symptoms, and protective actions to address disease.

3. There is a need to assess the potential for diseases affecting livestock, and in particular, diseases which may affect wildlife with the possibility of a crossover of these diseases into farm animals and human populations. The MSU Cooperative Extension service office and website offers updated information regarding the prevention of disease for farm animals and wildlife.

In addition, a program to cull the deer population in the City of Hillsdale has been implemented. This program is undertaken in cooperation with the Michigan Department of Natural Resources (MDNR). Herd management may be necessary on an ongoing basis to control population levels and maintain the health of deer herds to avoid the spread of disease. A continuation of the program is recommended subject to review and approval by MDNR.

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Plan Maintenance and Implementation

Implementation

The implementation of the Hillsdale County Hazard Mitigation Plan will depend upon the cooperative efforts of the Hillsdale County Planning Commission and the planning committees and commissions of all local units of government as well as many local departments and agencies.

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Plan Update

The Hillsdale County Hazard Mitigation Plan will be monitored, evaluated and updated throughout the five-year period until the next update. It will be maintained on the Emergency Management Page on the county website for any interested citizen to review and offer comments. At the time of update, the community will be advised through public meetings and on the county website of the need for comments and participation. In addition, local units of government will be encouraged to review potential hazards facing them and to develop mitigation strategies which can be applied. The strategies resulting from this effort should be provided to the Hillsdale County Emergency Management office for their use in the preparation of future updates to this document. The Emergency Management office will file all updates received from local units for inclusion in the next plan update.

Public Participation

Public participation is viewed to be an important component in the planning process, in the development of in the goals, objectives, and strategies contained within the plan, but also to facilitate the implementation of strategies.

The public has been and will continue to be offered the following opportunities for participation in the hazard mitigation planning process:

1. **Public hearings** – public hearings have been be held by each unit of government which considered adoption of or reviewed the Hillsdale County Hazard Mitigation Plan at one of their regularly scheduled meetings.
2. **Public discussion** – public discussion has been held in these forums specifically for the plan at the meetings mentioned above.
3. **Web based opportunities** – The provisional new plan has been posted on the County Website inviting citizen review and participation in the updating process.
4. **Community Outreach and Activities** – The following will be performed:
    a. **Presentations to local Civic and Service Clubs and other organizations** – These will be designed to inform and to encourage all local citizens to create and practice their own family plans in their homes and businesses.
    b. **Presentations to citizens at the annual County Fair and other local community based events** – These too will be designed to inform and to encourage all citizens to create and practice their own family plans.
    c. **News Media Outreach (Print and Broadcast)** – Emphasis will be on annual special “weeks” like Severe Weather Awareness, NOAA Weather Radio, Winter Weather Awareness , Heat Awareness and others to remind people to be aware of those potential hazards before they are likely to occur.
    d. **Cyber presence** – The County Emergency Management webpage off of the main County webpage will be maintained with updated emergency response information for citizens.

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e. **Education** – Emergency Management and Law Enforcement will work with county schools on their individual emergency response plans including the scheduling of and participation in all lock-down planning and drills and active assailant planning.

f. **Business and Industry** – Assist with the creating and updating of emergency response site plans for local business and industry including fire drills, severe weather sheltering, active assailant plans and other critical events.

g. **Hazard Mitigation Plan future updates** – Citizens will be reminded that their input is needed for future updates to the plan and will be informed as to how to present their recommendations for inclusion in the next update.

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