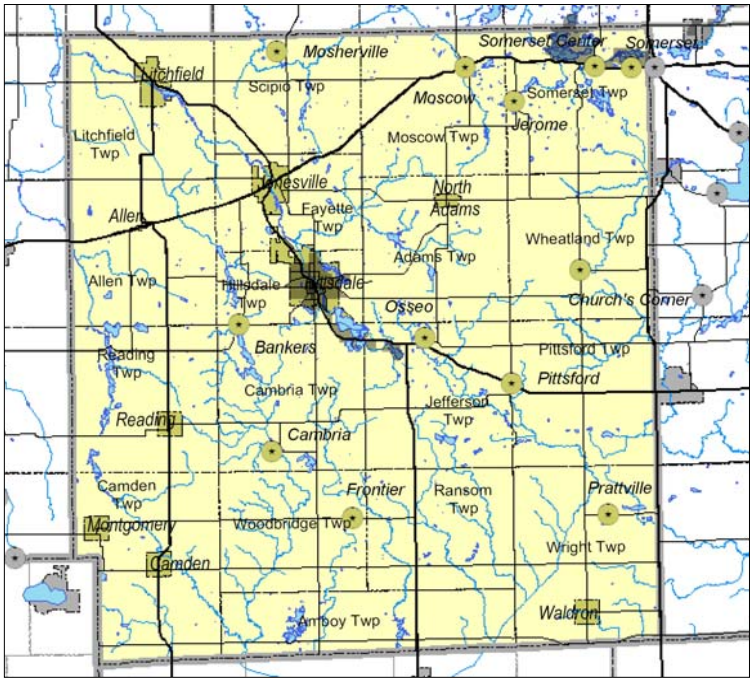

Hillsdale County, Michigan

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
September 2010

Hillsdale County Hazard Mitigation Plan

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Introduction

Purpose

In recent years with Hurricane Katrina, 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 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 has been provided for the preparation of this plan. They also provide incentives 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, technical, 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 law enforcement agencies, in particular the Hillsdale County Sheriff Department.

Hazard Mitigation Plans have a pre-disaster focus in order to develop strategies and implement 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.

Hillsdale County Hazard Mitigation Plan

Our community faces a wide range of potential hazards. They include 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 × Sabotage/Terrorism/WMD × Public Health Emergencies × Drought × Extreme Temperatures × Hail × Lightning × Severe Wind Events × 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 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. It is also important that local elected officials, planners, and citizens have an opportunity to comment and provide input to the plan. The planning process allows for community collaboration in order to maximize the effectiveness and efficiency of mitigation efforts, thus avoiding expenditures on low risk hazards.

Hillsdale County Hazard Mitigation Plan

The Hazard Mitigation Plan contains the following:

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

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.

Plan Preparation and Local Unit Involvement and Participation

Staff Involvement

The Hillsdale County Hazard Mitigation Plan was prepared by the staff of the Region 2 Planning Commission in cooperation with the Hillsdale County Emergency Management Coordinator. The original draft was completed in 2008. The 2010 final plan was updated by different staff members.

Hillsdale Community Planning Committee - Plan Preparation Oversight

Oversight for the preparation of the Hillsdale County Mitigation Plan was provided by the Hillsdale County Emergency Management Coordinator, the Hillsdale County Board of Commissions and local units of government in Hillsdale County.

These participants met individually on several occasions to discuss the plan during its preparation. The Hillsdale County Board of Commissioners was provided a presentation on the draft Hillsdale County Hazard Mitigation Plan on August 26, 2008. The presentation included a review of potential hazards facing the County, a proposed prioritization of hazards, goals and objectives, and hazard mitigation strategies. The Hillsdale County Planning Commission reviewed the plan at a public meeting on November 15, 2010. The committee supported the plan and provided information on other emergency preparedness plans in the county that should be referenced in the hazard mitigation plan. The Hillsdale Chapter of the Michigan Township Association met on October 1, 2008 and November 3, 2010 to review the proposed plan. The plan was presented and the association had several revisions for incorporation in the plan. The Hillsdale County Road Commission reviewed and approved the plan at their public meeting on April 1, 2009. In addition, the Hillsdale County Emergency Management Director, Douglas Sanford, has reviewed the plan and offered direction in its preparation where necessary.

Cities and villages, townships, emergency management personnel, drain commissioner, educational institutes, health departments, and several other assorted organizations were sent surveys (See Appendix XX) to ensure everyone had an opportunity to comment. After all comments were considered, two public meetings were held to present the final plan to those interested. These meetings were held on Monday, December 13, 2010 at 2 PM and on Wednesday, December 15, 2010 at 6 PM.

Local Units of Government in Hillsdale County

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

On each occasion, when the Hazard Mitigation Plan was discussed at a public meeting, citizens have the opportunity to comment on the preparation of the plan.

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 September 2010

Local Unit	Units of Governments with Zoning Ordinances	Member Community Planning Committee	Interest in Hazard Mitigation Program	Hazard Mitigation Plan Adoption
Adams Township	YES			
Allen Township	NO			
Amboy Township	NO	YES	YES	
Cambria Township	NO			
Camden Township	NO			
Fayette Township	YES			
Hillsdale Township	YES			
Jefferson Township	NO			
Litchfield Township	YES			
Moscow Township	NO			
Pittsford Township	YES	YES	YES	
Ransom Township	NO			
Reading Township	YES			
Scipio Township	NO			
Somerset Township	YES			
Wheatland Township	YES	YES	YES	
Woodbridge Township	NO			
Wright Township	NO	YES	YES	
Village of Allen	YES			
Village of Camden	YES			
Village of Jonesville	YES	YES	YES	
Village of Montgomery	YES			
Village of North Adams	YES			
Village of Waldron	YES			
City of Hillsdale	YES			
City of Litchfield	YES			
City of Reading	YES			

Coordination with the Hillsdale County Comprehensive Plan

The preparation of the Hillsdale County Hazard Mitigation Plan was coordinated with the Hillsdale County Comprehensive Plan. The general goals contained in the Hillsdale County Comprehensive Plan are included in this Plan. The Hillsdale County Planning Commission will be requested to incorporate the Hazard Mitigation Plan into the community master planning process with the next scheduled update. The current plan was adopted December 12, 2002 and there is not currently an effort underway to update it.

At the Planning Commission meeting of November 15, 2010, members agreed to consider the Hazard Mitigation Plan as part of the upcoming update of the county's Master Plan.

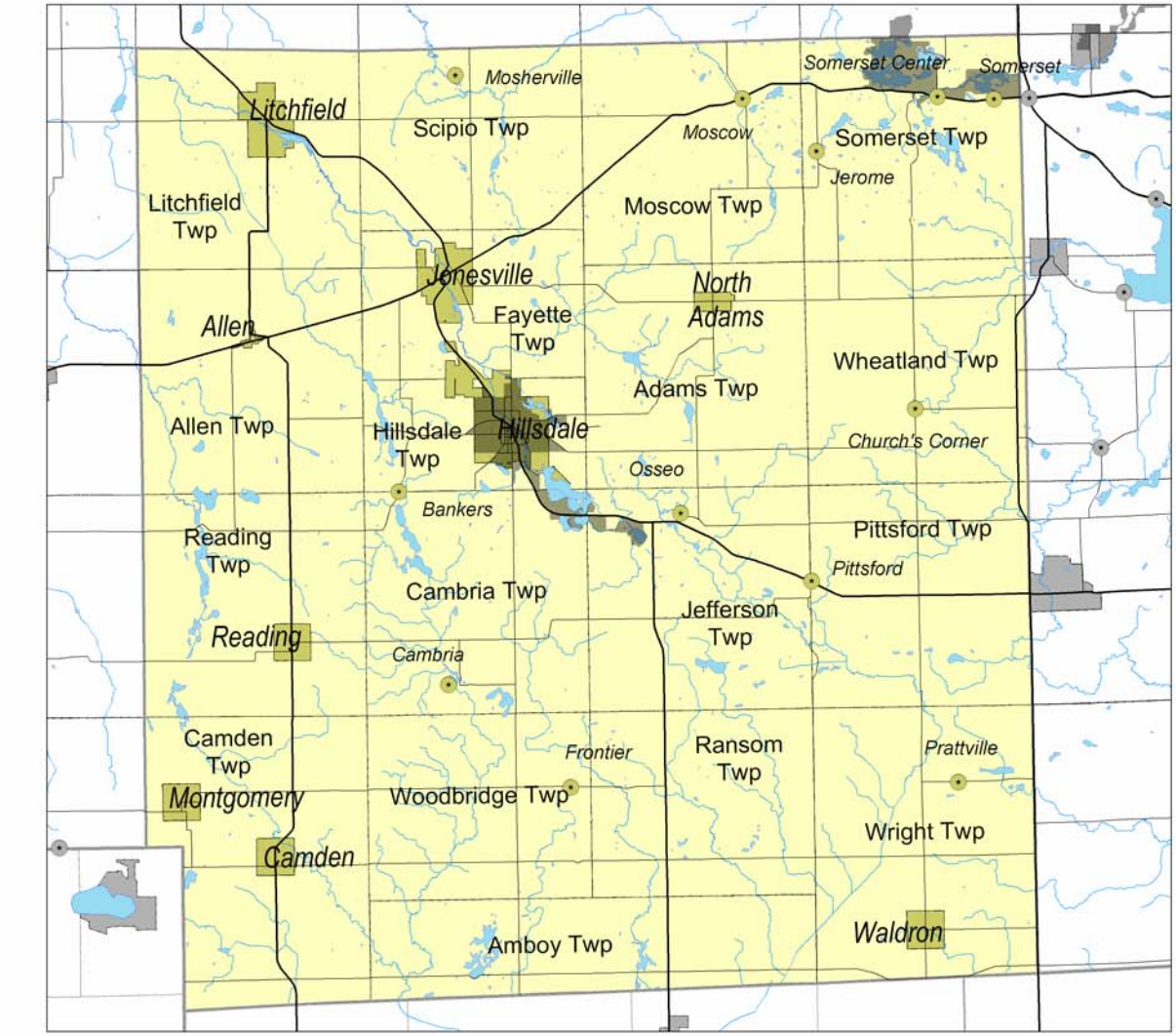
Community Profile

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 6 commissioners serving on the governing body. The entire county is also part of Michigan House District 16, Michigan Senate District 58, and Michigan District 7 of the U.S. House of Representatives.



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

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	Camden		**4**	58	16	**7**
Litchfield		**3**	58	16	7	Fayette		**7**	58	16	**7**
Reading		3	58	16	7	Hillsdale		2	58	16	7
Villages						Jefferson		5	58	16	7
Allen		3	58	16	7	Litchfield		3	58	16	7
Camden		4	58	16	7	Moscow		7	58	16	7
Jonesville		7	58	16	7	Pittsford		6	58	16	7
Montgomery		4	58	16	7	Ransom		5	58	16	7
North Adams		2	58	16	7	Reading		3	58	16	7
Waldron		**4**	58	16	7	Scipio		7	58	16	7
Townships						Somerset		6	58	16	7
Adams		2	58	16	7	Wheatland		6	58	16	7
Allen		3	58	16	7	Woodbridge		4	58	16	7
Amboy	Yes	4	58	16	7	Wright		4	58	16	7
Cambria		5	58	16	7						

Community Characteristics

Hillsdale County was home to 46,527 people in the year 2000, according to the U.S. Census. The official estimate for the county in 2005 was 47,470 people, indicating slow but steady population growth. 2010 Census information will be added to this report once it is compiled and made public, quite likely for the next update. 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 also interesting to note that approximately 2/3 of the population lived in a township rather than a city or village in 2000. The following statistics about special groups of people also help to describe the population of Hillsdale County.

Population Density

The average density of population in the county was 56 ppsm (people per square mile) in 2000. However, population density varied across the county from a high of 386-1,553 ppsm in the cities and villages to a low of 28-156 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.

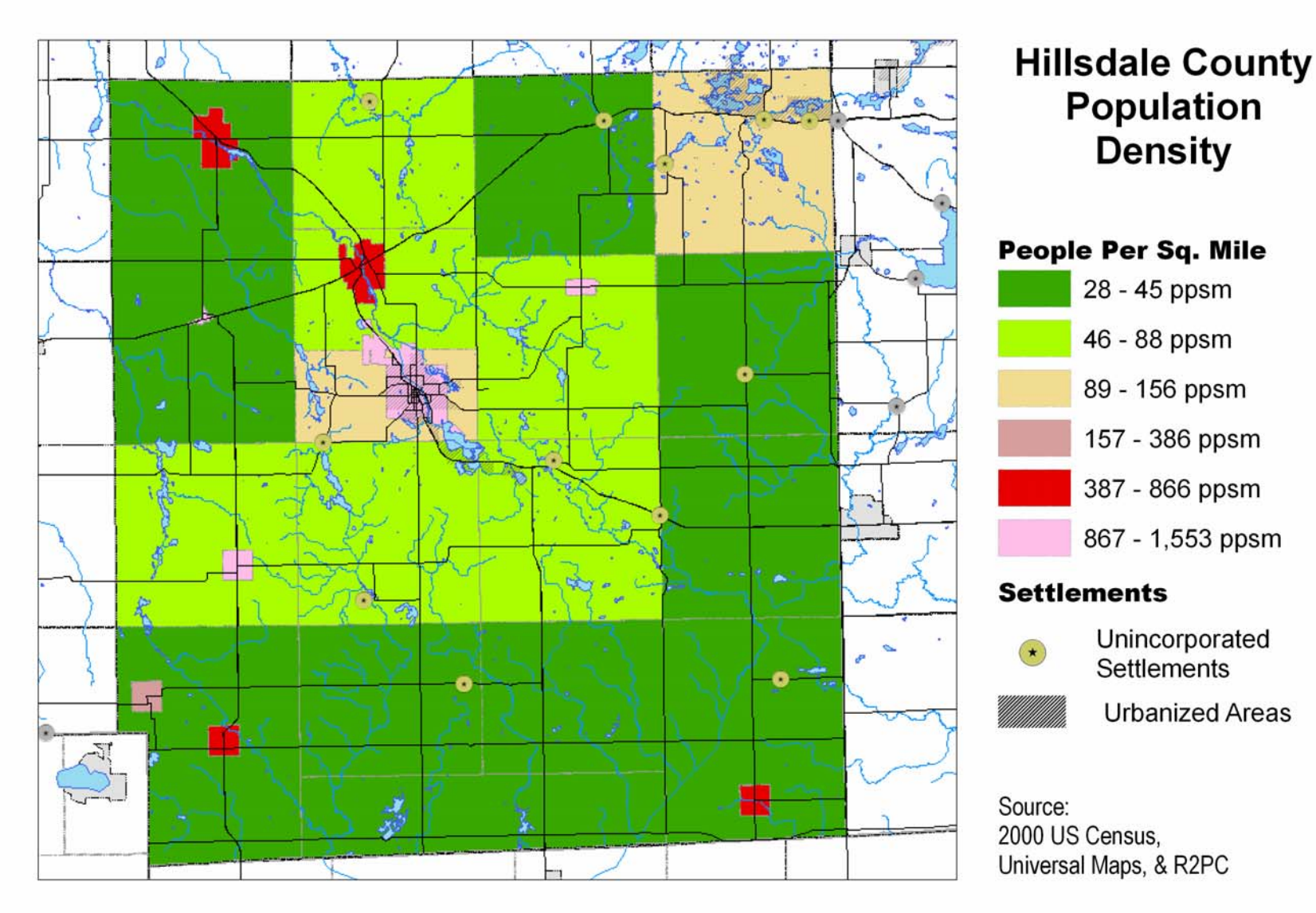
Populations with Special Needs

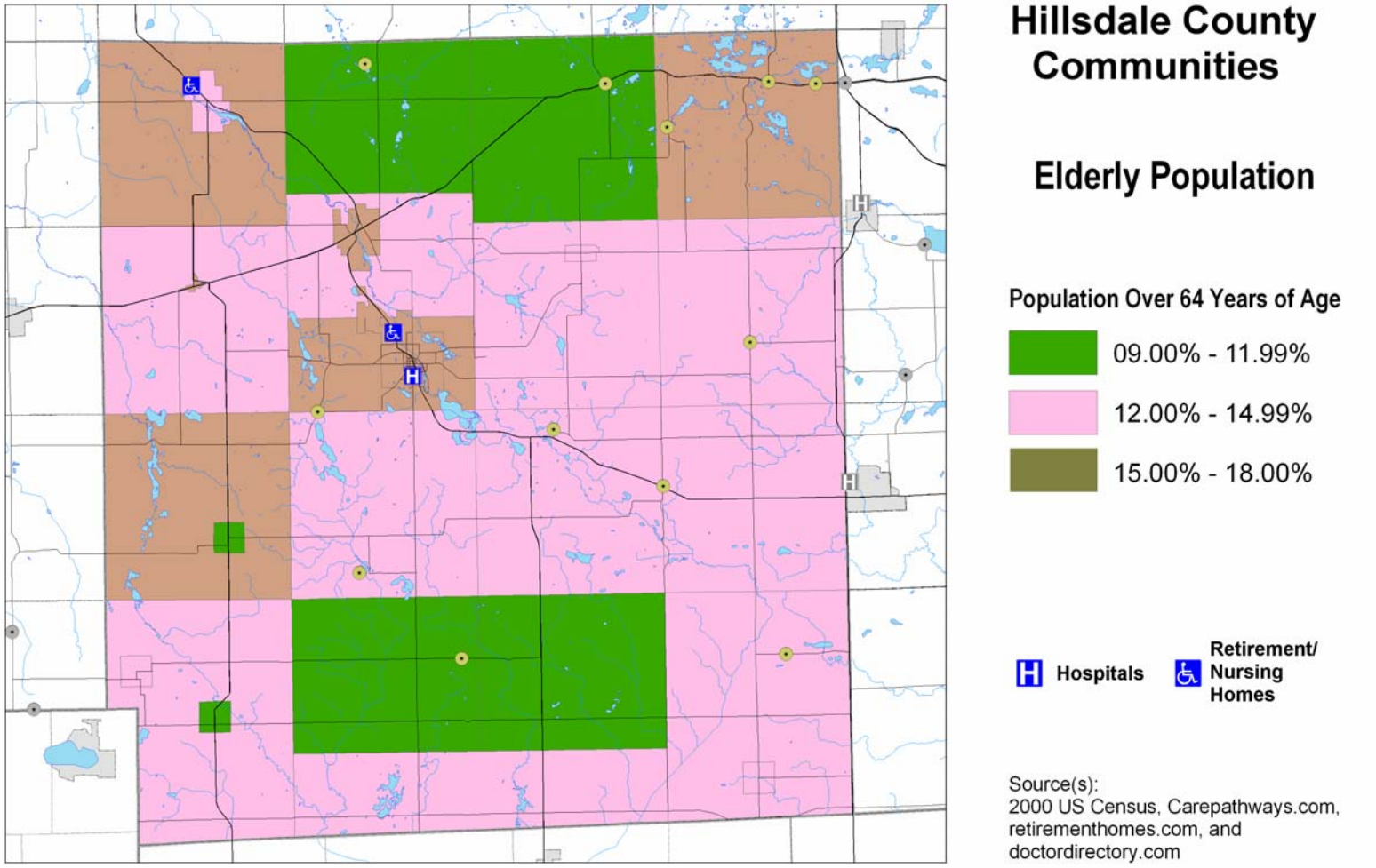
Several population groups within the county have special needs which must be given consideration in any serious analysis of the risks to residents:

Elderly Residents

Approximately 13% of Hillsdale County residents were at least 65 years old in 2000. For example, the City of Hillsdale (18%) and the Village of Jonesville (17%) had the highest ratios of elderly residents and the Villages of Reading (10%) and Camden (10%), and the Townships of Moscow (11%), Ransom (10%), Scipio (9%), and Woodbridge (10%) had the lowest ratios. A couple of municipalities also host retirement/nursing homes and/or hospitals:

- The Litchfield Nursing Centre, Inc, a retirement/nursing home, is located in the City of Hillsdale.
- The City of Hillsdale is the location of the Hillsdale County Medical Care Facility, a retirement/nursing home and the Hillsdale Community Health Center, a local hospital which includes a nursing home unit.

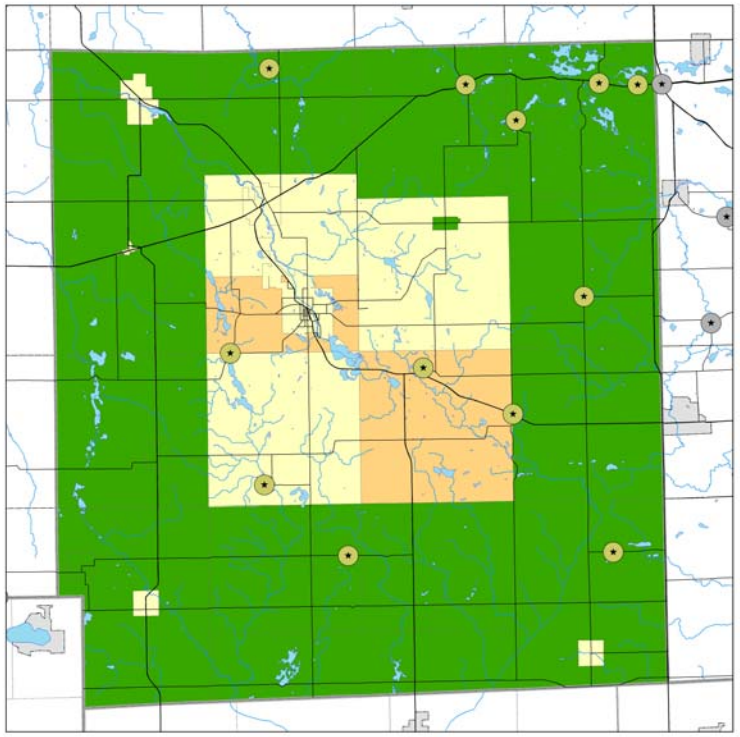

Hillsdale County
Population
Density
People Per Sq. Mile
28 - 45 ppsm
46 - 88 ppsm
89 - 156 ppsm
157 - 386 ppsm
387 - 866 ppsm
867 - 1,553 ppsm
Settlements
Unincorporated
Settlements
Urbanized Areas
Source:
2000 US Census,
Universal Maps, & R2PC


Hillsdale County Communities
Elderly Population
Population Over 64 Years of Age
09.00% - 11.99%
12.00% - 14.99%
15.00% - 18.00%
Hospitals
Retirement/ Nursing Homes
Source(s):
2000 US Census, Carepathways.com, retirementhomes.com, and doctordirectory.com

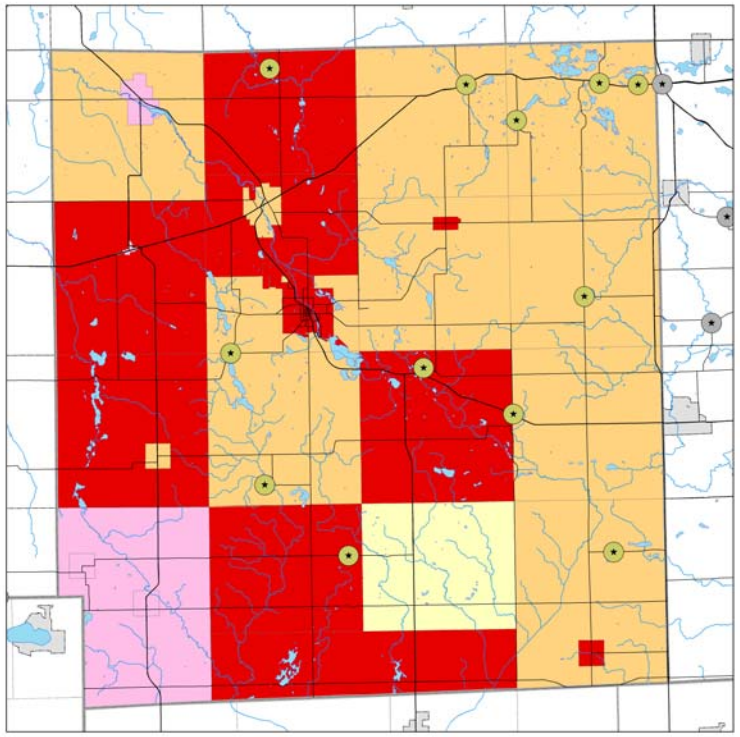
Disabled Residents

The 2000 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 2000. 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 2000. For example, the City of Litchfield (26%) and the Villages of Camden (29%) and Montgomery (30%), 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%), and Somerset (16%) had the lowest ratios.



5-20 Years of Age



21-64 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): 2000 US Census, Center for Geographic Information, Universal Maps, & R2PC

Hillsdale County Communities

Disabled Population

Impoverished Residents

Approximately 10% of Hillsdale County residents were considered poor by the US Census in the Year 2000. For example, the City of Reading (12%) and the Villages of Camden (12%), Montgomery (14%) and Waldron (13%), which are all located on the southern border of the county, had the highest ratios of poor residents. The Village of North Adams (3%) and the Townships of Hillsdale (4%), Moscow (4%), Pittsford (4%), and Somerset (4%) had the lowest ratios.

Foreign Language Speakers

Approximately 4% of county residents spoke a language other than English at home in 2000. For example, the Townships of Camden (8%) and Woodbridge (11%), located in the southwestern corner of the county, had the highest ratios of foreign language speakers. The Cities of Litchfield (1%) and Reading (1%); the Villages of Allen (2%), Camden (2%), and Jonesville (2%); and the Townships of Adams (2%), Allen (1%), Fayette (2%), Jefferson (2%), Moscow (2%), Scipio (2%), and Wright (1%) had the lowest ratios.

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:

- **Camden-Frontier School District.** Camden-Frontier Elementary, Camden Frontier Middle, and Camden Frontier High (K-12 and located on a single campus).

- **Hillsdale Community Schools.** Bailey Elementary (PK-1), Gier Elementary (2-4), 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 Schools.** Litchfield Elementary (K-5) and Litchfield High (6-12).

- **North Adams-Jerome Schools.** North Adams-Jerome Elementary and High School (K-12).

- **Pittsford Area Schools.** Pittsford Area Elementary and High School (K-12).

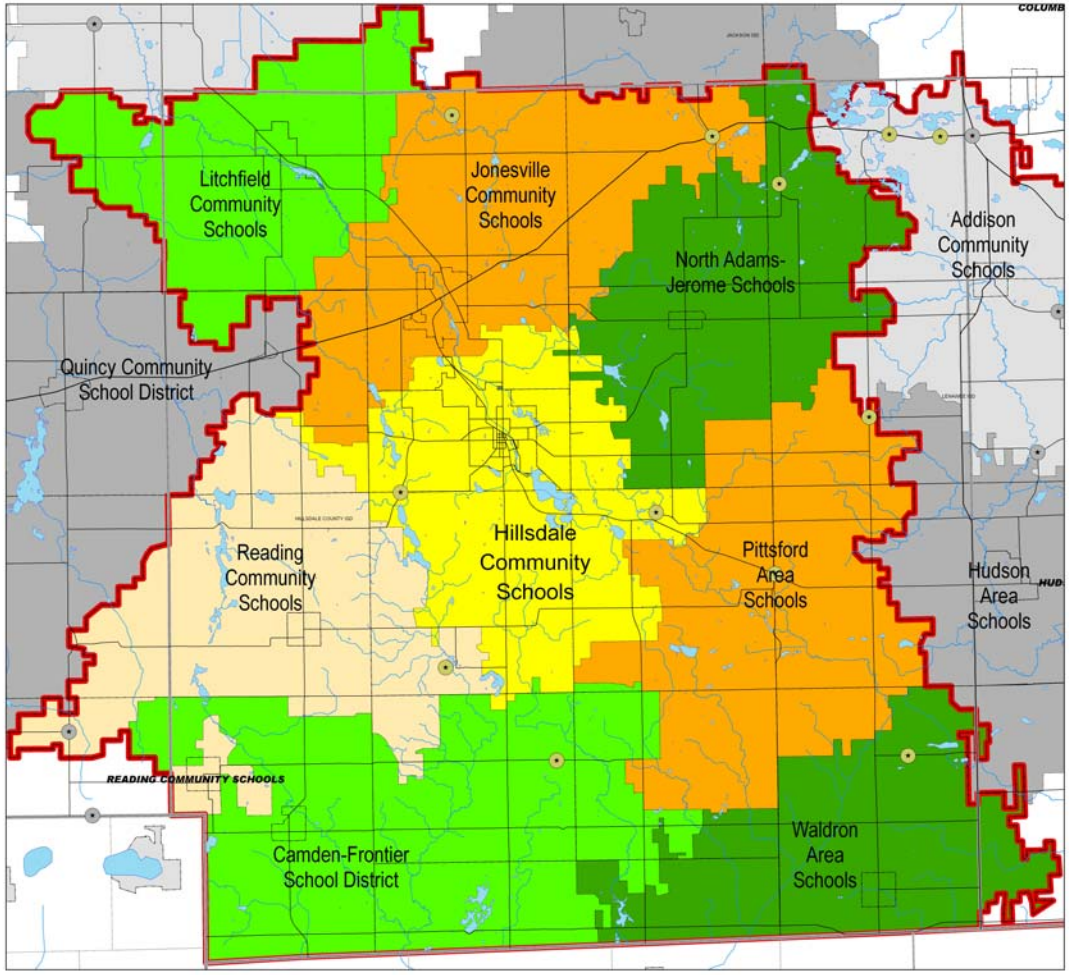
- **Reading Community Schools.** Reynolds Elementary (K-6) and Reynolds High (7-12)

- **Waldron Area Schools.** Waldron Elementary (K-5), Waldron Middle (6-8), and Waldron High (9-12) located on one campus.

- **Charter Schools.** There are 2 charter schools in Hillsdale County. Hillsdale Preparatory School (K-8) and Will Carleton Academy (K-11).

Other Local 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.



Hillsdale County Communities

School Facilities

Hillsdale County Boundary

Intermediate School District Boundaries

Local School Districts in the Jackson Intermediate School District

Local School Districts in other Intermediate School Districts

Source: www.greatschools.net & R2PC

Private School Facilities

There are nine private schools operating in Hillsdale County. Amish School #1 (1-8), Cooper Amish (1-8), Freedom Farm Christian (K-12), Hillsdale Academy (K-12), The Manor (K-12), New Hope United Brethren (K-12), Ridgeview (1-8), and Prattville SDA Elementary (K-8)

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 Rural FD, Jonesville FD, Litchfield FD, Montgomery FD, Moscow Township FD, North Adams FD, Pittsford-Jefferson 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.

EMS

The Reading Emergency Unit serves the county through mobile units stationed in the Cities of Reading (#1), Hillsdale (#2), and Litchfield (#3). Somerset and Waldron Fire Departments provide service to their townships. Medical First Responder (MFR) services are also provided by the Moscow Township FD, the Montgomery FD, the North Adams FD, the Pittsford-Jefferson FD, the Wright-Waldron FD, and the Woodbridge Township FD.

Police Departments

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

- **State Police Posts.** State Police Post #19 serves Hillsdale County and is located in Jonesville.
- **Sheriffs Office.** The County Sheriff's Office is located in Hillsdale.

- **Local Police Stations.** The following municipalities are also protected by their own municipal police force: the Cities of Hillsdale, Litchfield, and Reading, the Village of Jonesville, and the Township of Somerset.

Seasonal Housing

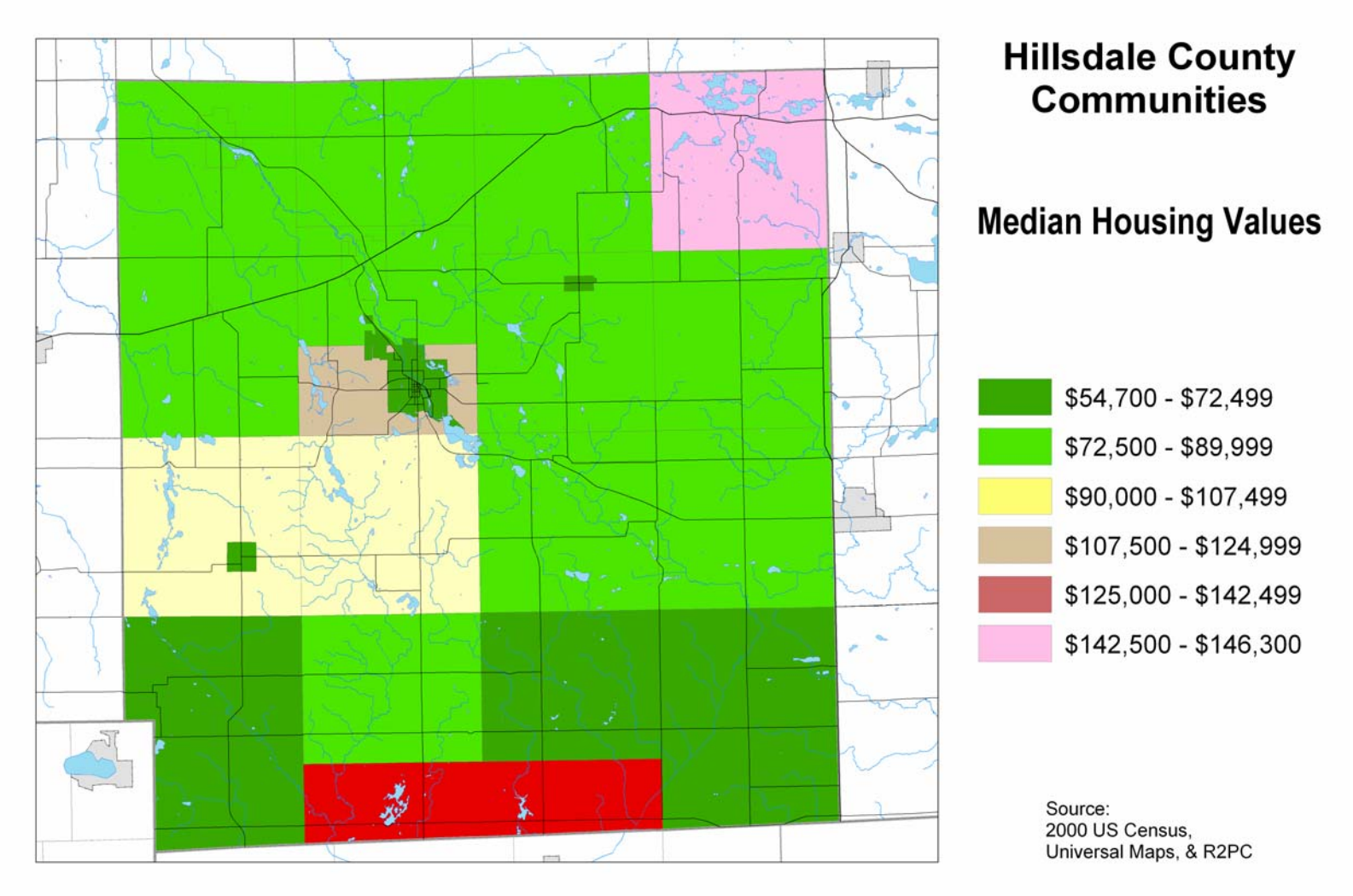
Approximately 9% of Hillsdale County housing units were used seasonally in 2000 according to the U.S. Census. The variability between the local units of government, however, is quite dramatic. For example, a large percentage of housing units in Reading (36%), Amboy (23%), Somerset (18%), Cambria (18%), 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 are scattered across the county and a residential college campus is located within the City of Hillsdale.

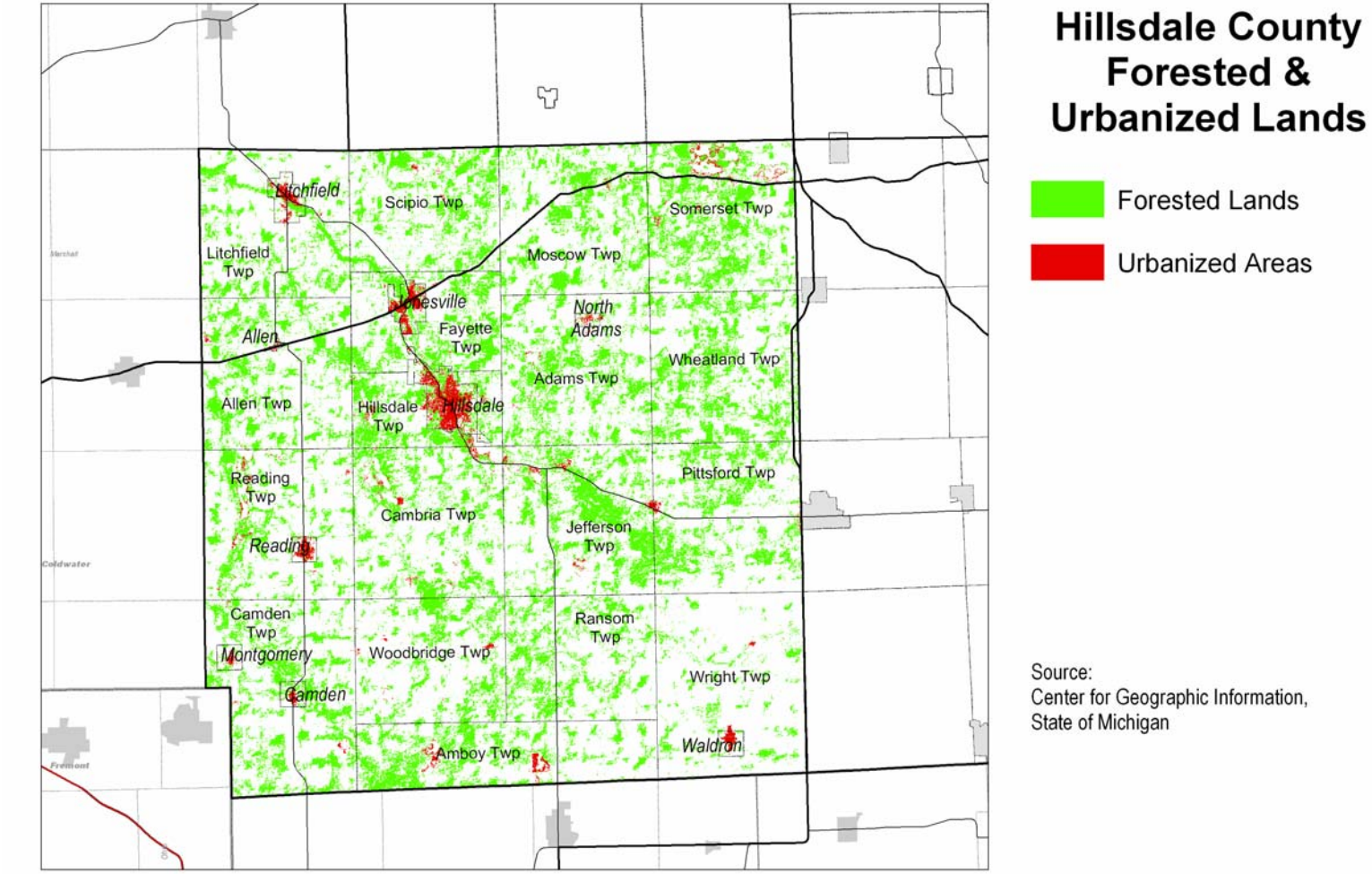
Median Home Values

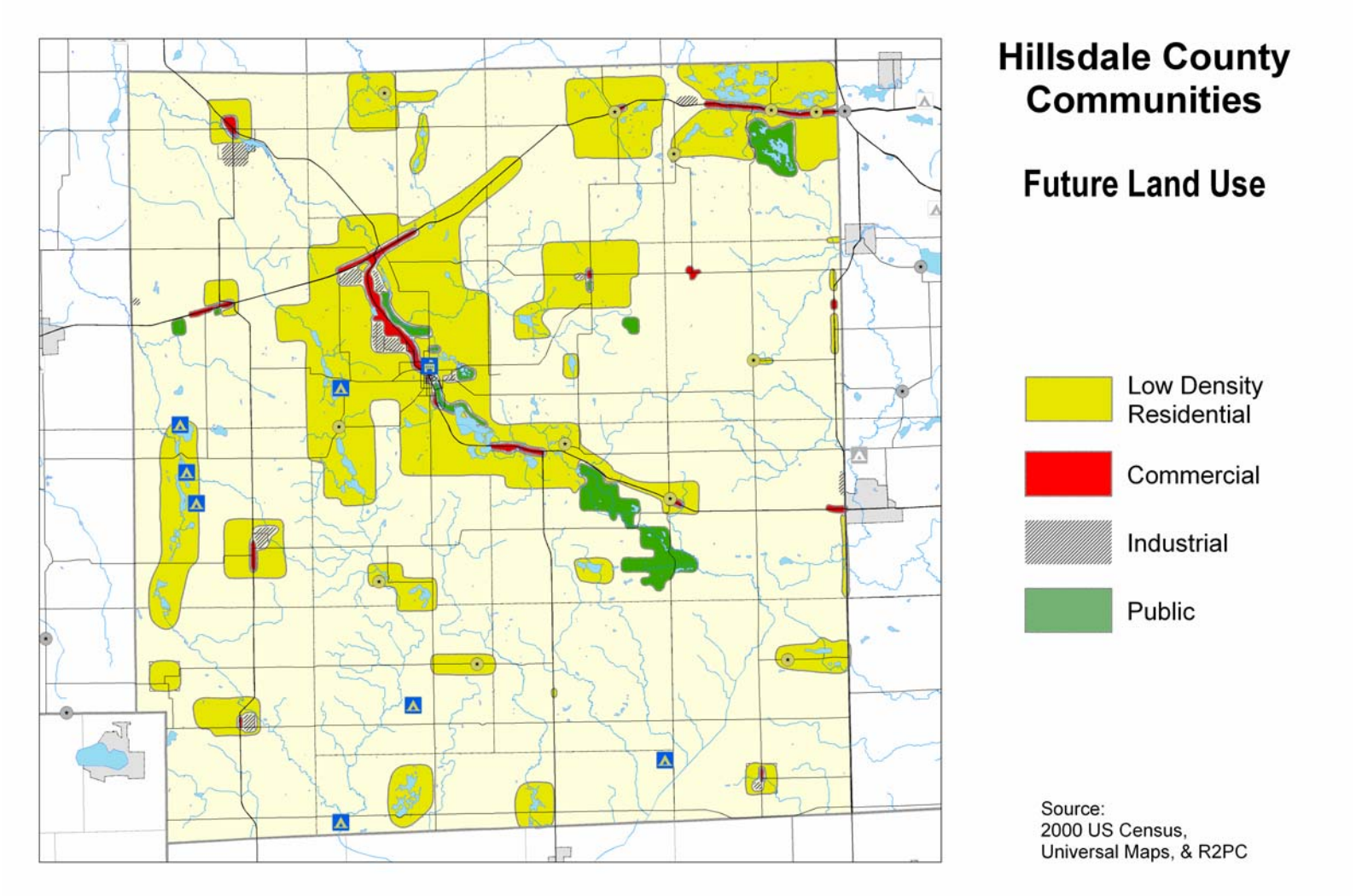
The median home value in Hillsdale County was $85,000 in 2000. Given the county's median home value and a total of 8,845 housing units, the housing stock within Hillsdale County was valued at almost $152 million. The variability in housing values between the local units of government, however, was quite dramatic. For example, the medium home values within Somerset ($146,300), Amboy ($140,800), and Hillsdale ($116,700) 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 $60,000.

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 lane—creating greatly dispersed ribbons of low density residential development.


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:
2000 US Census,
Universal Maps, & R2PC


Hillsdale County
Forested &
Urbanized Lands
Forested Lands
Urbanized Areas
Litchfield
Scipio Twp
Somerset Twp
Litchfield Twp
Moscow Twp
Jonesville
North Adams
Fayette Twp
Allen
Wheatland Twp
Adams Twp
Allen Twp
Hillsdale Twp
Hillsdale
Pittsford Twp
Reading Twp
Cambria Twp
Jefferson Twp
Reading
Camden Twp
Ransom Twp
Montgomery
Woodbridge Twp
Wright Twp
Camden
Amboy Twp
Waldron
Source:
Center for Geographic Information,
State of Michigan

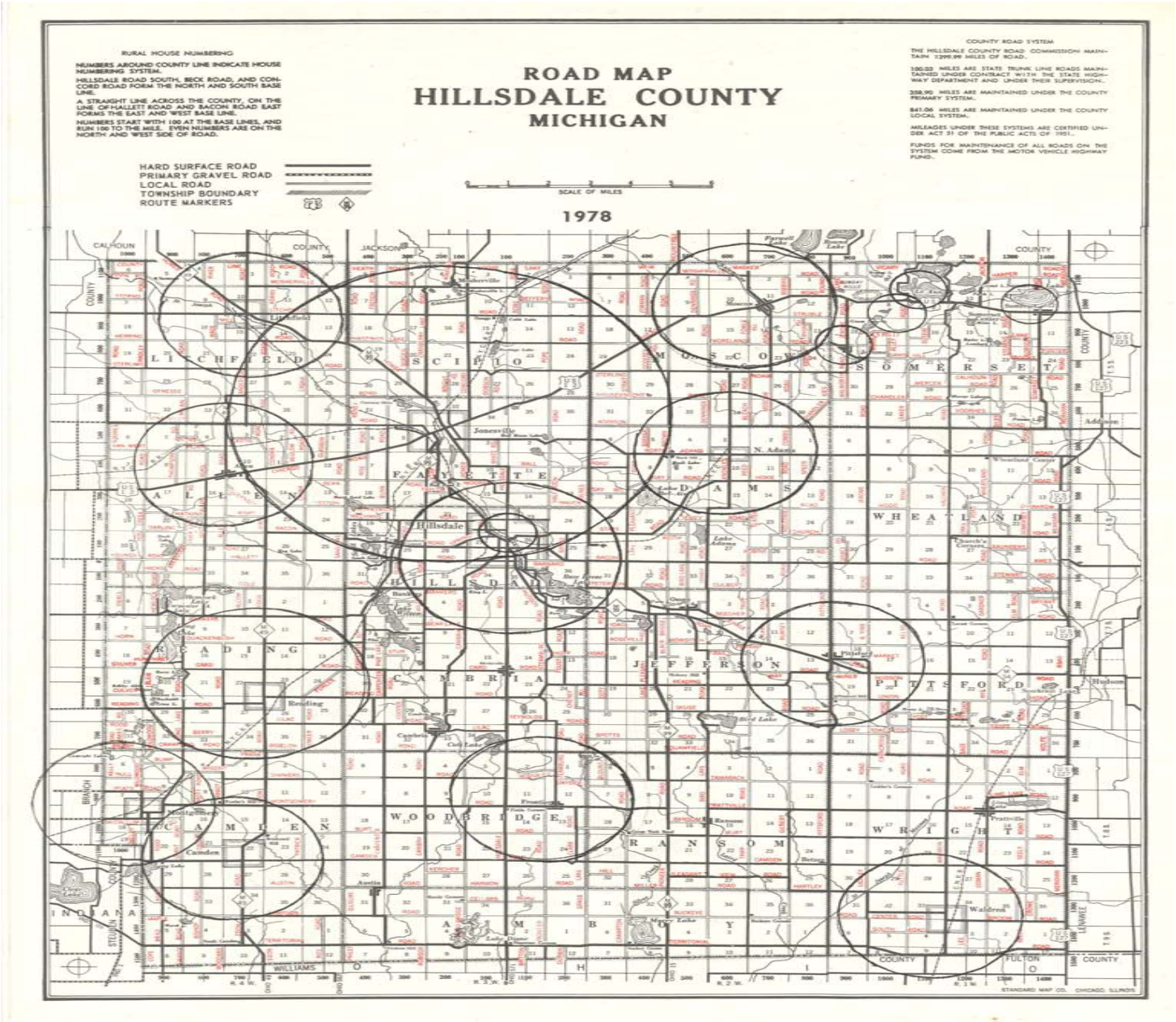

Hillsdale County
Communities
Future Land Use
Low Density
Residential
Commercial
Industrial
Public
Source:
2000 US Census,
Universal Maps, & R2PC

Emergency Warning Sirens

Hillsdale County has a system of emergency warning sirens to warn residents of the approach of tornadoes or nuclear attack. A listing of these sirens and their location are shown on the table entitled, "County Hazard Mitigation Plan – Emergency Warning Sirens". Seventeen sirens are located primarily in population centers. 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 on the following page:

Hillsdale County Hazard Mitigation Plan
EMERGENCY WARNING SIREN
2008

Siren Name	Make	Model	Range	Street	Remote
1	Federal	1000 at	128 DB	32 E. Carleton Rd, Hillsdale	Tone Signal
1A	Federal	2001 SRN	2 Miles	40 E. College St., Hillsdale	Tone Signal
2	Federal	5th 10B	3 Miles	2184 Ash-Te-Wette Dr., Hillsdale	Tone Signal
3	Federal	1100 Thunderbolt	5 Miles	261 E. Chicago St.	Yes
4	Federal	Unknown	2 Miles	120 W. St. Joe St., Litchfield	Siren Site
5	Sterling	5 UK	2 Miles	7731 E. Chicago Rd., Moscow	Siren Site
6	Federal	AU37X	2 Miles	229 W. Chicago Rd., Allen	Tone Signal
7	Federal	Unknown	2 Miles	101 S. Pittsford Rd., Pittsford	Siren Site
8	Federal	Unknown	2 Miles	106 E. Main St., Waldron	Siren Site
9	Federal	5th 10B	3 Miles	144 Michigan St., Reading	Siren Site
10	Unknown	Unknown	2 Miles	216 N. Michigan, Montgomery	Siren Site
11	Federal	AU37X	2 Miles	100 N. Main St., Camden	Siren Site
12	Federal	Unknown	2 Miles	2216 E. Montgomery Rd., Frontier	Siren Site
13	Federal	2001 SRN	2 Miles	Main Park, Shannon Dr., Somerset Township	Tone Signal
14	Federal	2001 SRN	2 Miles	Sauk Trail, Lake LeAnn, Somerset Township	Tone Signal
15	Federal	2001 SRN	2 Miles	Baker Rd., Somerset Twp	Tone Signal
16	Federal	2001 SRN	2 Miles	Jerome/Moore Rd., Somerset Twp	Tone Signal
17	Federal	1000 3-B	128 DB	119 W. Main St., North Adams	Tone Signal


RURAL HOUSE NUMBERING
NUMBERS AROUND COUNTY LINE INDICATE HOUSE NUMBERING SYSTEM.
HILLSDALE ROAD SOUTH, BECK ROAD, AND CONCORD ROAD FORM THE NORTH AND SOUTH BASE LINE.
A STRAIGHT LINE ACROSS THE COUNTY, ON THE LINE OF HALLETT ROAD AND BACON ROAD EAST FORMS THE EAST AND WEST BASE LINE.
NUMBERS START WITH 100 AT THE BASE LINES, AND RUN 100 TO THE MILE. EVEN NUMBERS ARE ON THE NORTH AND WEST SIDE OF ROAD.
HARD SURFACE ROAD
PRIMARY GRAVEL ROAD
LOCAL ROAD
TOWNSHIP BOUNDARY
ROUTE MARKERS
ROAD MAP
HILLSDALE COUNTY
MICHIGAN
SCALE OF MILES
1978
COUNTY ROAD SYSTEM
THE HILLSDALE COUNTY ROAD COMMISSION MAINTAIN 1299.99 MILES OF ROAD..
100.03 MILES ARE STATE TRUNK LINE ROADS MAINTAINED UNDER CONTRACT WITH THE STATE HIGHWAY DEPARTMENT AND UNDER THEIR SUPERVISION..
358.90 MILES ARE MAINTAINED UNDER THE COUNTY PRIMARY SYSTEM..
847.06 MILES ARE MAINTAINED UNDER THE COUNTY LOCAL SYSTEM..
MILEAGES UNDER THESE SYSTEMS ARE CERTIFIED UNDER ACT 51 OF THE PUBLIC ACTS OF 1951..
FUNDS FOR MAINTENANCE OF ALL ROADS ON THE SYSTEM COME FROM THE MOTOR VEHICLE HIGHWAY FUND..
CALHOUN COUNTY
JACKSON COUNTY
LENAWEE COUNTY
WILLIAMS COUNTY
FULTON COUNTY
INDIANA
LITCHFIELD
SCIPIO
MOSCOW
SOMERSET
ALLEN
FAYETTE
ADAMS
WHEATLAND
HILLSDALE
READING
CAMBRIA
JEFFERSON
PITTSFORD
WOODBRIDGE
CAMDEN
RANSOM
WRIGHT
Jonesville
N. Adams
Hillsdale
Reading
Camden
Pittsford
Hudson
Waldron
STANDARD MAP CO. CHICAGO, ILLINOIS

Potential Hazards

A wide variety of hazards is known or has the potential to occur in Hillsdale County:

Civil Disturbances

1. Correctional Facility Uprisings and Other Civil Disturbances

Earthquakes and Subsidence

2. Earthquakes
3. Subsidence

Fire Hazards

4. Scrap Tire Fires
5. Structural Fires
6. Wildfires

Flooding Hazards

7. Riverine Flooding
8. Dam Failures

Energy and Utility/Infrastructure Failures

9. Energy Emergencies
10. Significant Infrastructure Failures
11. Passenger Transportation Accidents

Hazardous Materials Incidents

12. Fixed Site and Transportation-Related Hazardous Materials Incidents
13. Nuclear Power Plant Accidents
14. Oil and Natural Gas Well Accidents
15. Oil and Natural Gas Pipeline Accidents

Homeland Security

16. Nuclear Attacks
17. Terrorism/Sabotage/WMD
18. Public Health Emergencies

Extreme Weather

19. Drought
20. Extreme Temperatures
21. Hail
22. Lightning
23. Severe Wind Events
24. Tornados
25. Snowstorms
26. Ice and Sleet Storms
27. Invasive Species

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.

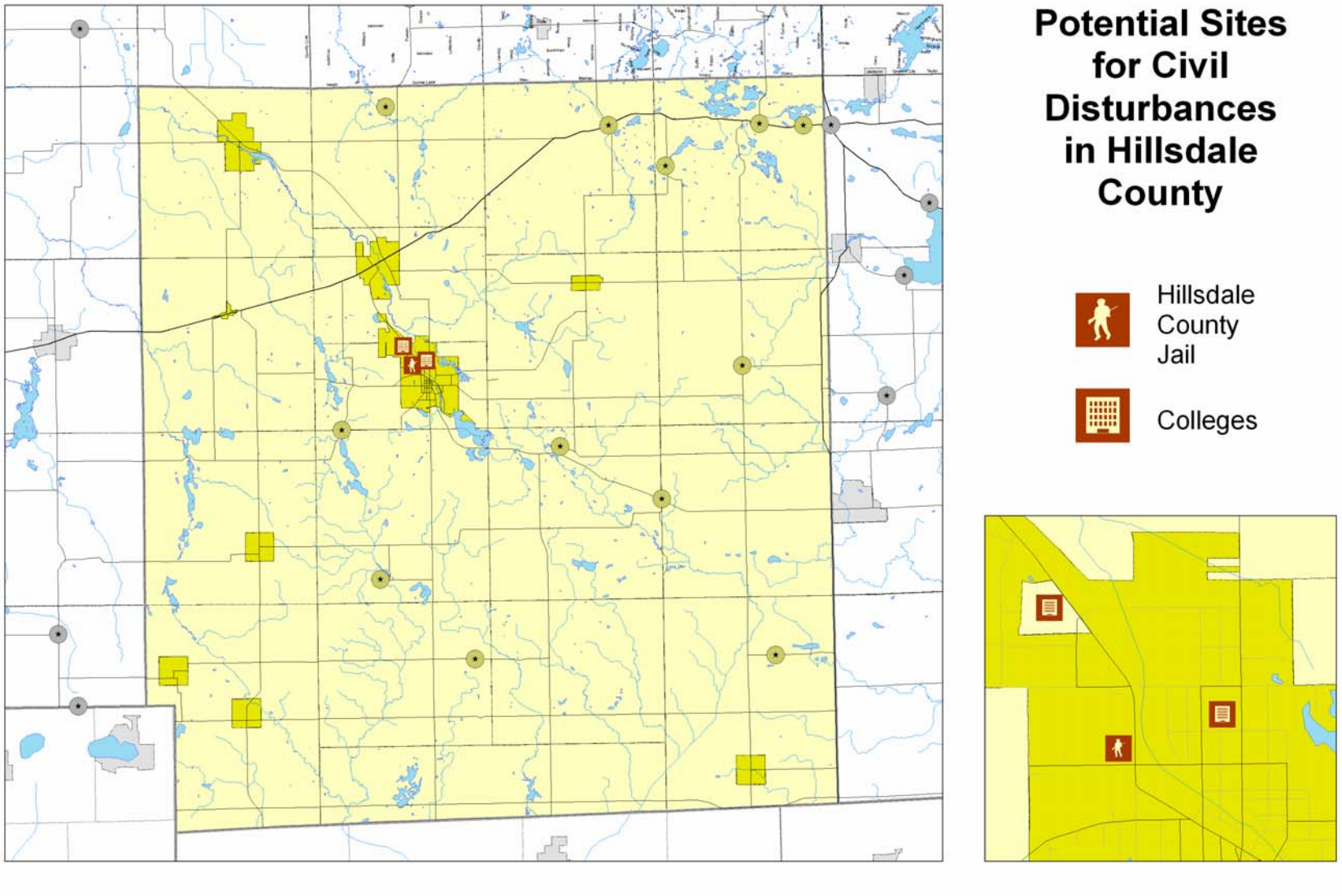
The county jail is the only correctional facility in Hillsdale County. No uprisings in the county jail are known to have occurred.

Other Civil Disturbances

According to the Michigan Hazard Analysis and Hillsdale County's Emergency Management Coordinator, civil disturbances rarely occur, but when they do they are usually an offshoot or result of one or more of the following events:

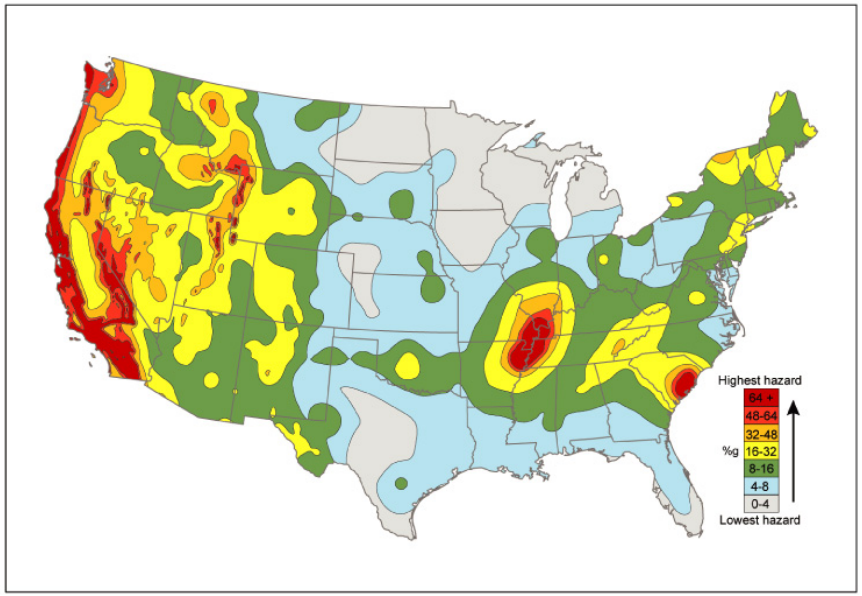
- labor disputes where there is a high degree of animosity between the participating parties,
- high-profile/controversial judicial proceedings,
- implementation of controversial laws or other governmental actions,
- resource shortages caused by a catastrophic event,
- disagreements between special interest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

No other types of civil disturbance within Hillsdale County were recorded in the Michigan Hazard Analysis. However, the potential still exists. Civil disturbances can occur at institutions for higher learning (e.g., Hillsdale College and Jackson Community College's LaTarte Center) as well as during labor disputes with major employers in the county. Considering the past history, there is little probability that a civil disturbance will occur in Hillsdale County.


Potential Sites for Civil Disturbances in Hillsdale County
Hillsdale County Jail
Colleges

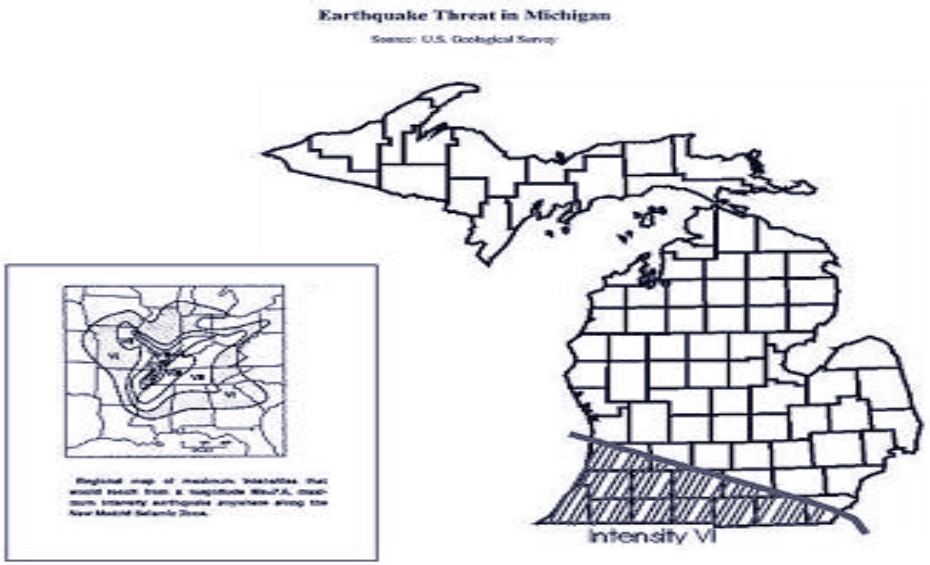
2. Earthquakes

According to the Michigan Hazard Analysis, Michigan has never suffered a "severely destructive earthquake". Hillsdale County is in an area that could be affected by an earthquake that would occur in the New Madrid Seismic Zone and upstate New York, more so than the rest of the state. There is a very low probability, but based on recent scientific studies, if a large earthquake should occur in the New Madrid Seismic Zone, quite likely some tremors would be felt in Hillsdale County.



"The greatest impact on" Hillsdale County, according to the Michigan Hazard Analysis, 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" .

EARTHQUAKE THREAT IN MICHIGAN



3. Subsidence

"Subsidence, as the 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 and none are anticipated in the future.

4. Scrap Tire Fires

According to the Michigan Hazard Analysis, 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."

There are no registered scrap tire collection sites or haulers in Hillsdale County, according to the Michigan Department of Environmental Quality (MDEQ). 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 312,500 scrap tires were stockpiled in the county in 2004, according to the Michigan Hazard Analysis. Because there are scrap tires located in Hillsdale County, there is always a probability of a fire, but it is very low.

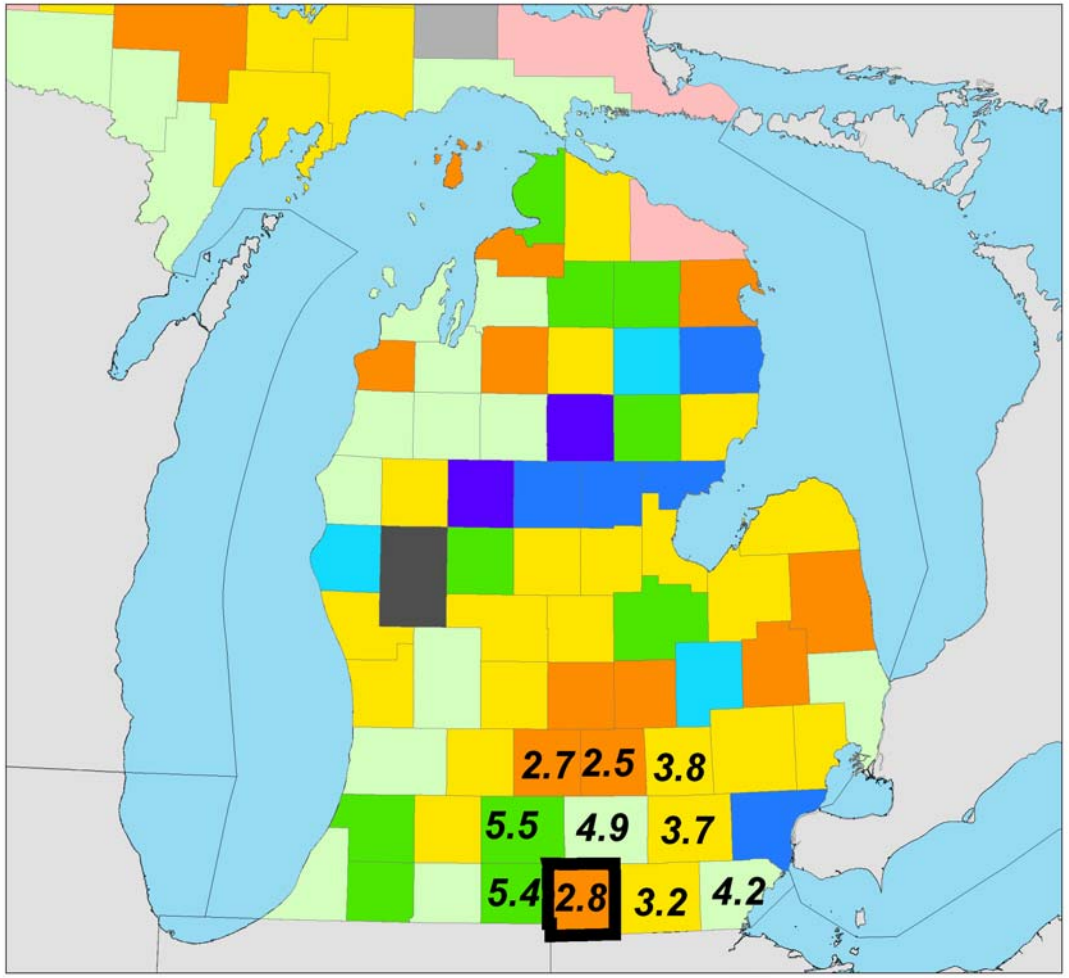
5. Structural Fires

"In terms of average annual loss of life and property," according to the Michigan Hazard Analysis, "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." According to the State Fire Marshal Division, Michigan experienced almost 19,000 structural fires in 2003, resulting in 161 deaths, 624 injuries, and over $230 million in property loss. Hillsdale County was in the bottom half of Michigan counties for the number of fires per 1,000 people in 2003.

Unfortunately, death can be an outcome of structural fires, and "Michigan's fire death rate in 1996 of 21.2 persons per million people puts it in the upper third of all states in the nation." According to the State Fire Marshal Division, an average of 157 persons a year died in Michigan fires during the period of 2000-2004.

2003 Michigan Fire Statistics				
	Incidents	**Injuries**	**Deaths**	**Loss ($)**
Residential	12,025	507	148	$170,375,902
Public Assembly/Stores	1,834	51	0	$20,176,696
Industry	4,900	138	9	$42,941,484

Fires can occur in virtually any structure, be it industry, public assembly, retail, and of course, residences. As the adjacent table illustrates, residential fires comprised 64% of the total number of fires and 72% of the monetary losses. Fires in stores and other places of public assembly comprised 10% of the total number of fires and 9% of the monetary losses. Industrial fires comprised 26% of the total number of fires and 18% of the monetary losses.



1998 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

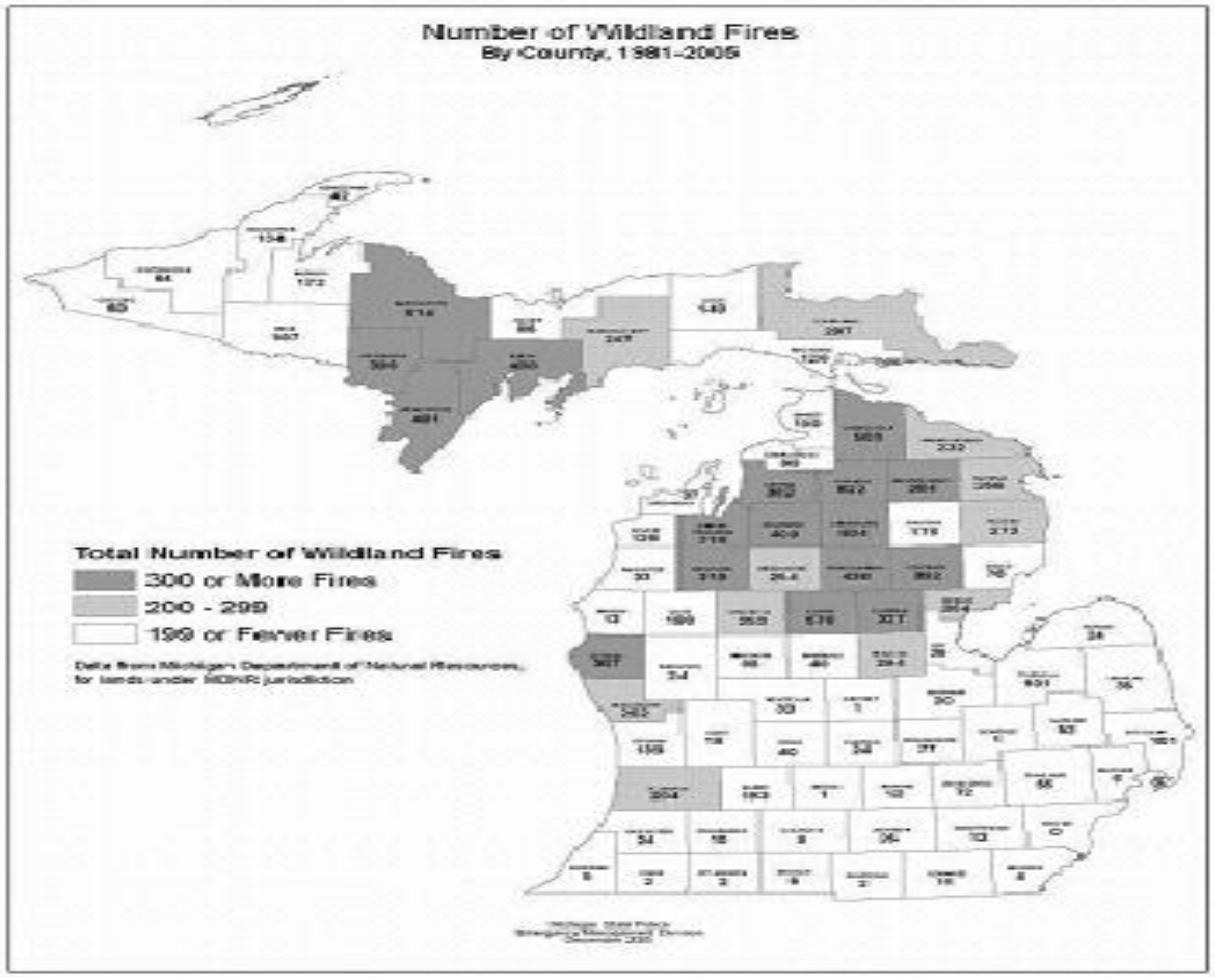
Sources:
Michigan State Police, Fire Marshal Divison; The National Atlas for the USA; and Center for Geographic Information, State of Michigan

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. The Irish Hills is an area of specific concern, for example, due to the exurban development which exists around its many lakes.

According to the MDNR, 365 fires occurred statewide 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 wildfires can happen anytime, not just the dry summer months.

There were two fires affecting 20 acres on Michigan Department of Natural Resources (MDNR) controlled land in Hillsdale County between 1981 and 2000. Wildfires are always a possibility as long as you have wooded areas surrounding developments. Since Hillsdale County has not experienced wildfires in the past, there is a very low probability that one will occur.


Number of Wildland Fires
By County, 1981-2005
Total Number of Wildland Fires
300 or More Fires
200 - 299
199 or Fewer Fires

7. Riverine Flooding

"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, broken sewer lines causing water supply pollution, downed power lines, broken gas lines, fires, and the release of hazardous materials."

Flooding Events

Limited flooding has occurred in Hillsdale County, causing little damage. There are no "repetitive loss properties" located in the county, according to a FEMA list dated March 31, 2010. The National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) recorded the following occurrences of flooding in the Hillsdale County from 1950 through 2003:

TABLE IV-7, Flood Events, Hillsdale County (1950-2010)

Date	Description	MCD's*
May 9, 1996	03:30:00 PM EST. Flash Flood. Rain totals of nearly 3 inches resulted from thunderstorms moving across the county, causing flooding of streets and some basements as well as overflow of small streams.	Hillsdale
June 17, 1996	04:00:00 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

September 9, 1997	11:00:00 PM EST. The Hillsdale County Sheriff's Department reported several rural roads in Allen Township were washed out.	Allen
September 9, 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

*** Minor Civil Division**

Over the last 60 years, there have been only four flooding events in Hillsdale County. Therefore, there is less than a 6% chance of flooding occurring in the future.

National Flood Insurance Program (NFIP)

The cities of Hillsdale and Litchfield, the Village of Jonesville, and Reading Township have all been mapped and participate in the National Flood Insurance Program (NFIP).

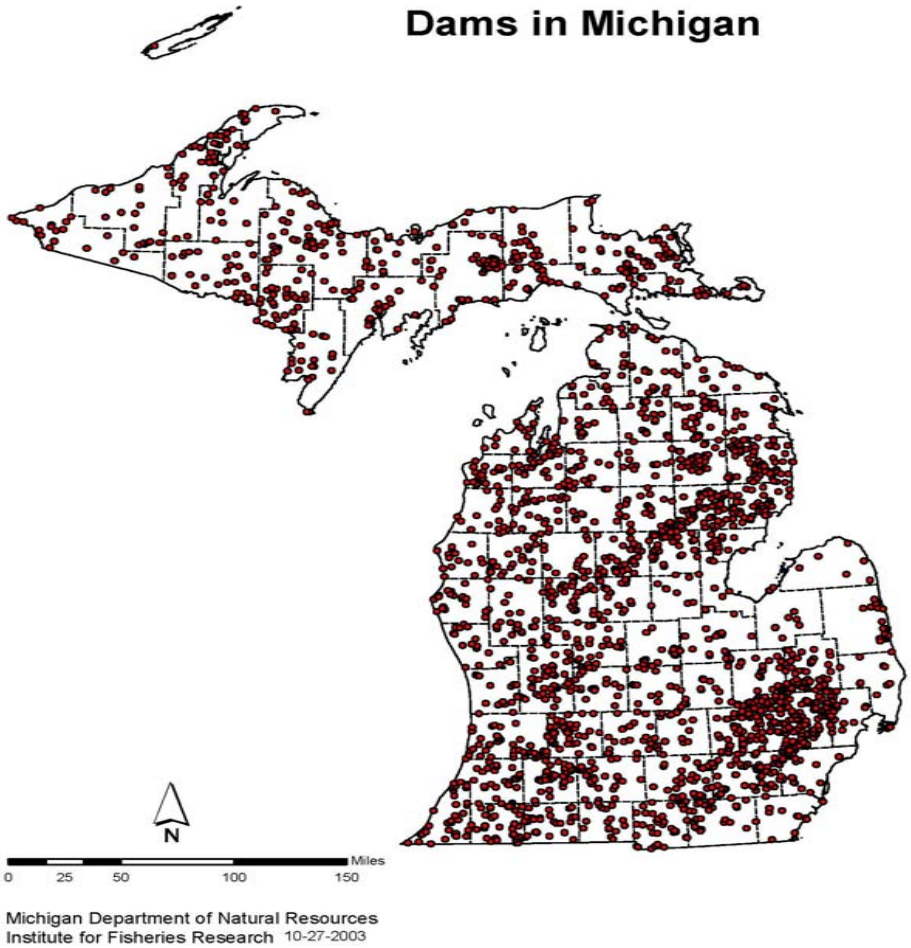
According to the Federal Emergency Management Agency, Hillsdale County has no repetitive loss properties. Hillsdale communities have a lower risk of serious flood problems, because the county's location is at a relatively high elevation where the headwaters of rivers form, rather than where such waters drain off. Although four communities are current NFIP participants, additional communities will be encouraged to join the program. Concerned homeowners should refer to the new NFIP Q&A document at http://www.fema.gov/library/viewRecord.do?id=1404 and are encouraged to act upon the principles described there in arranging as needed for flood insurance or to promote NFIP participation by their communities. As part of the effort to integrate hazard mitigation practices into comprehensive planning within the county, these principles of NFIP-participation and ongoing compliance should be considered in the ongoing and future master plans, watershed management, zoning/development, and specific building or mitigation activities in any and all areas that may have flood risks.

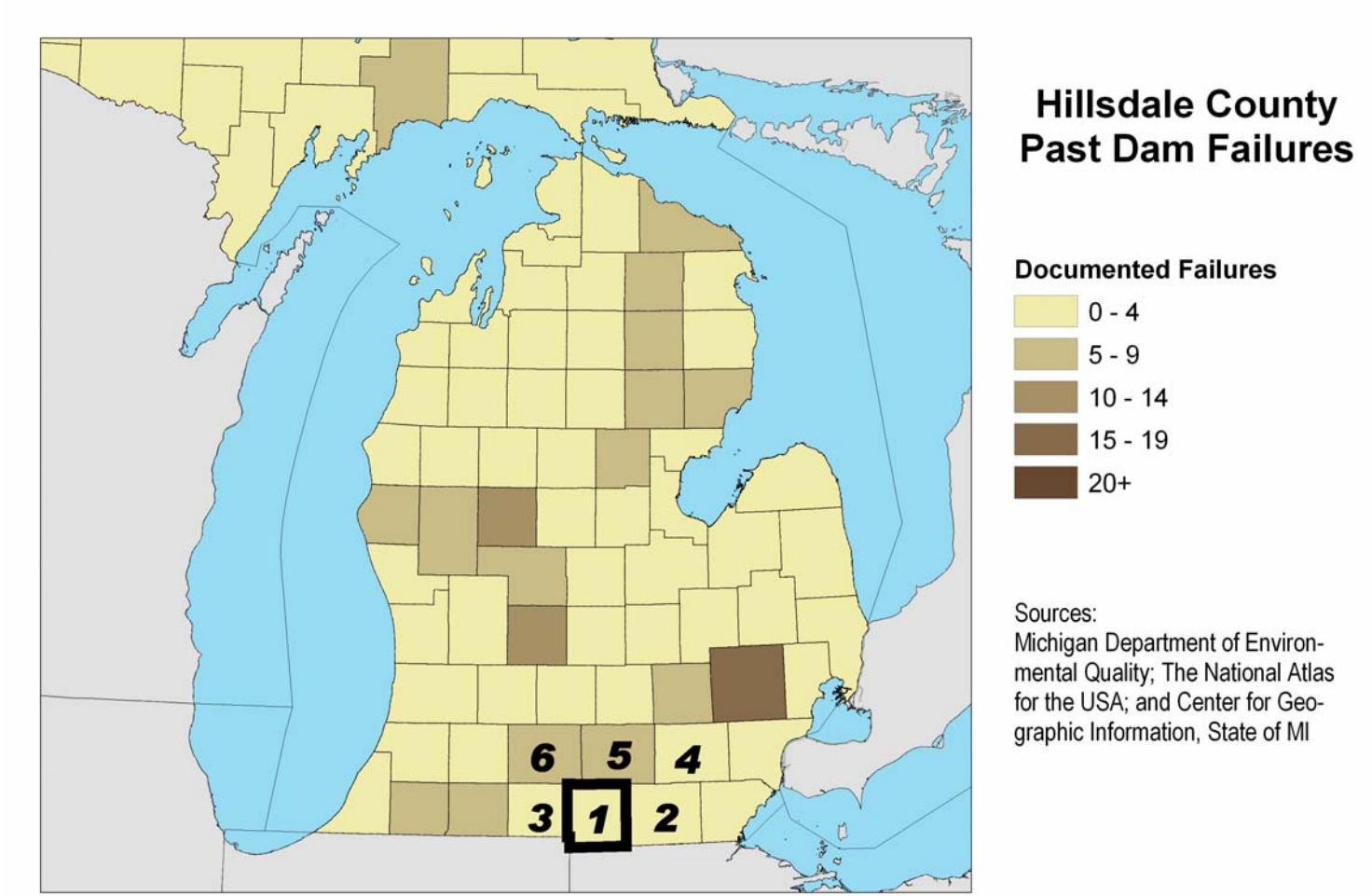
8. Dam Failures

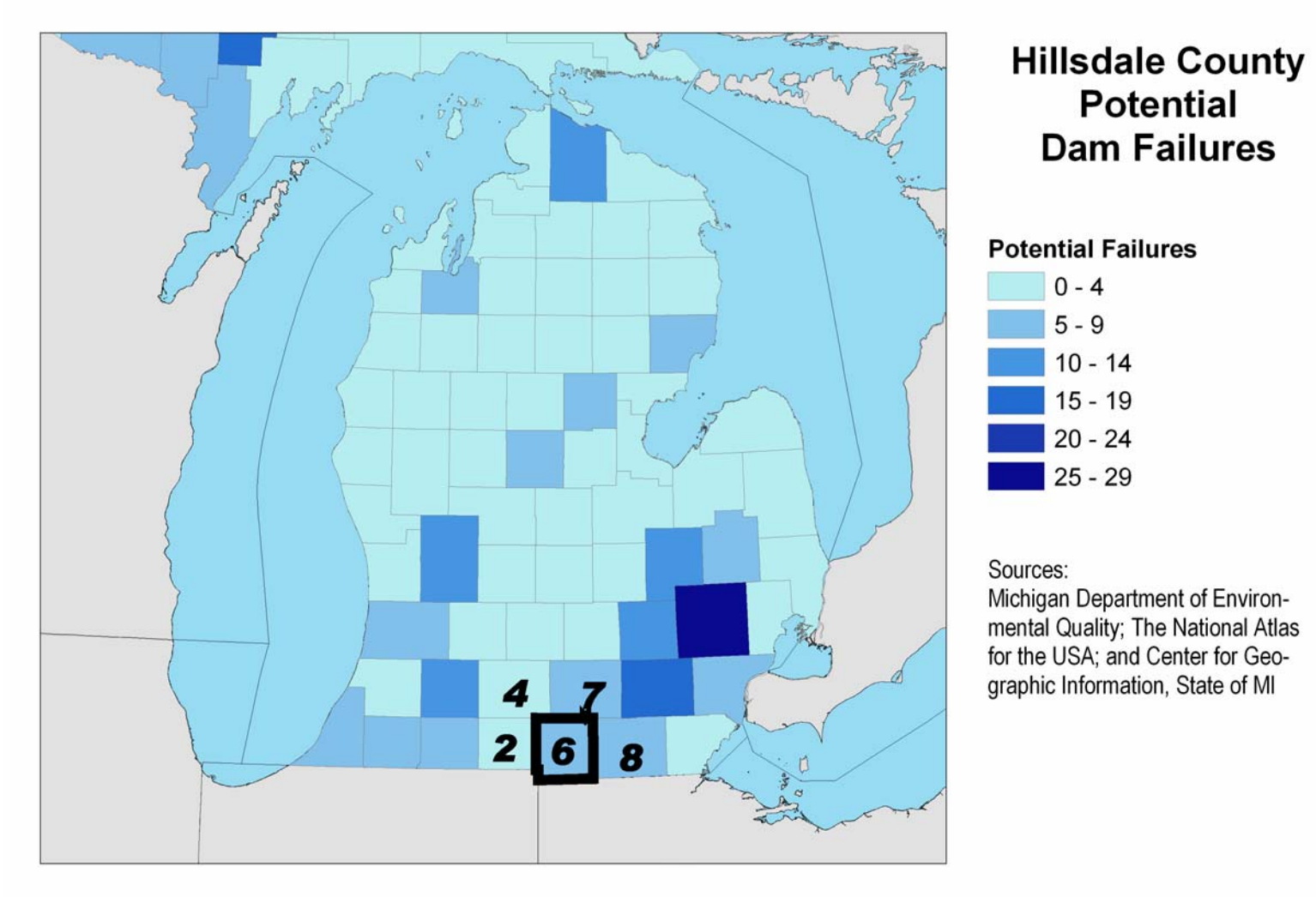
"A dam failure," according to the Michigan Hazard Analysis, "can result in loss of life and extensive property or natural resource damage for miles downstream from the dam. Dam failures occur not only during flood events, which may cause overtopping of a dam, but also as a result of poor operation, lack 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 Environment (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 downstream 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 indicate the presence or absence of deficiencies with the dam.

According to MDNRE's database, as of 2010, there are five dams with significant hazard potential ratings and 42 dams with low hazard potential ratings. Additionally, the only dam with significant deficiencies which could lead to immediate failure is the Jonesville Millpond Dam, which failed earlier this year. Considering the condition of the existing dams, there is a medium likelihood that Hillsdale County will experience a dam failure in the upcoming years.


Dams in Michigan
N
Miles
0 25 50 100 150
Michigan Department of Natural Resources
Institute for Fisheries Research 10-27-2003


Hillsdale County
Past Dam Failures
Documented Failures
0 - 4
5 - 9
10 - 14
15 - 19
20+
Sources:
Michigan Department of Environmental Quality; The National Atlas for the USA; and Center for Geographic Information, State of MI
6
5
4
3
1
2


4
7
2
6
8
Hillsdale County
Potential
Dam Failures
Potential Failures
0 - 4
5 - 9
10 - 14
15 - 19
20 - 24
25 - 29
Sources:
Michigan Department of Environmental Quality; The National Atlas for the USA; and Center for Geographic Information, State of MI

9. 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 been able to deal 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 Oil Embargo of 1973-74, 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, and

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.

Hillsdale County has experienced "numerous and severe electrical power outages, caused mostly by severe weather such as windstorms or ice and sleet storms" 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 power outages will occur caused by future events.

10. 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, but the likelihood is very low.

11. 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.

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 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 fires,
- rescuing and providing emergency first aid for survivors,
- establishing mortuary facilities for victims,
- detecting the presence of explosive or radioactive materials, and
- providing crash site security, crowd and traffic control, and protection of evidence.

Any time commercial transportation is interspersed with people there is a chance for a catastrophic crash. Hillsdale County has the same probability of this happening as any other county with a population similar to Hillsdale’s.

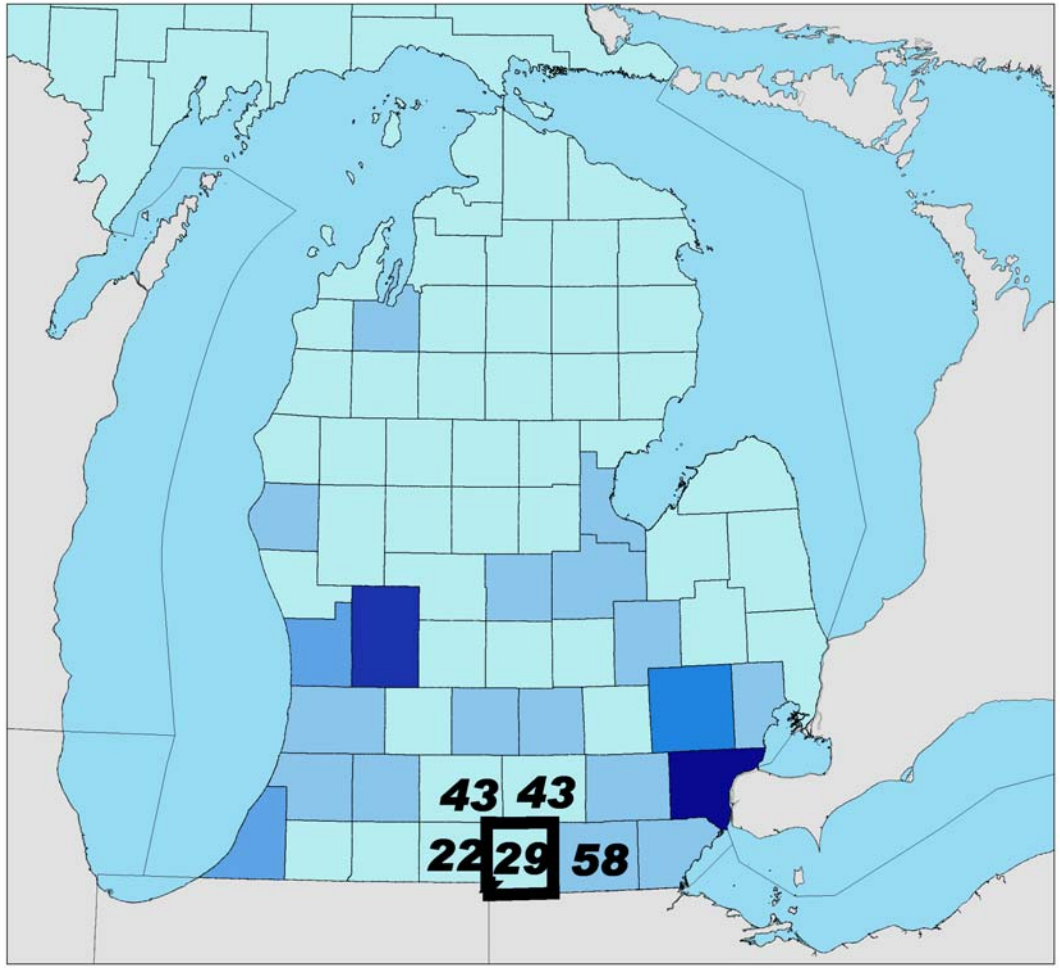
12. Hazardous Material Incidents: Fixed Site and Transportation

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 27 SARA Title III sites as of June 2005. Hillsdale County has had no industrial accidents of any significance since 1976, the first year such records were kept. Considering this history, there is an extremely low probability of Hillsdale County experiencing an industrial accident in the future.



Michigan's SARA Title III Sites

- 0 - 49
- 50 - 99
- 100 - 149
- 150 - 199
- 200 - 249
- 250 - 299
- 300 - 349

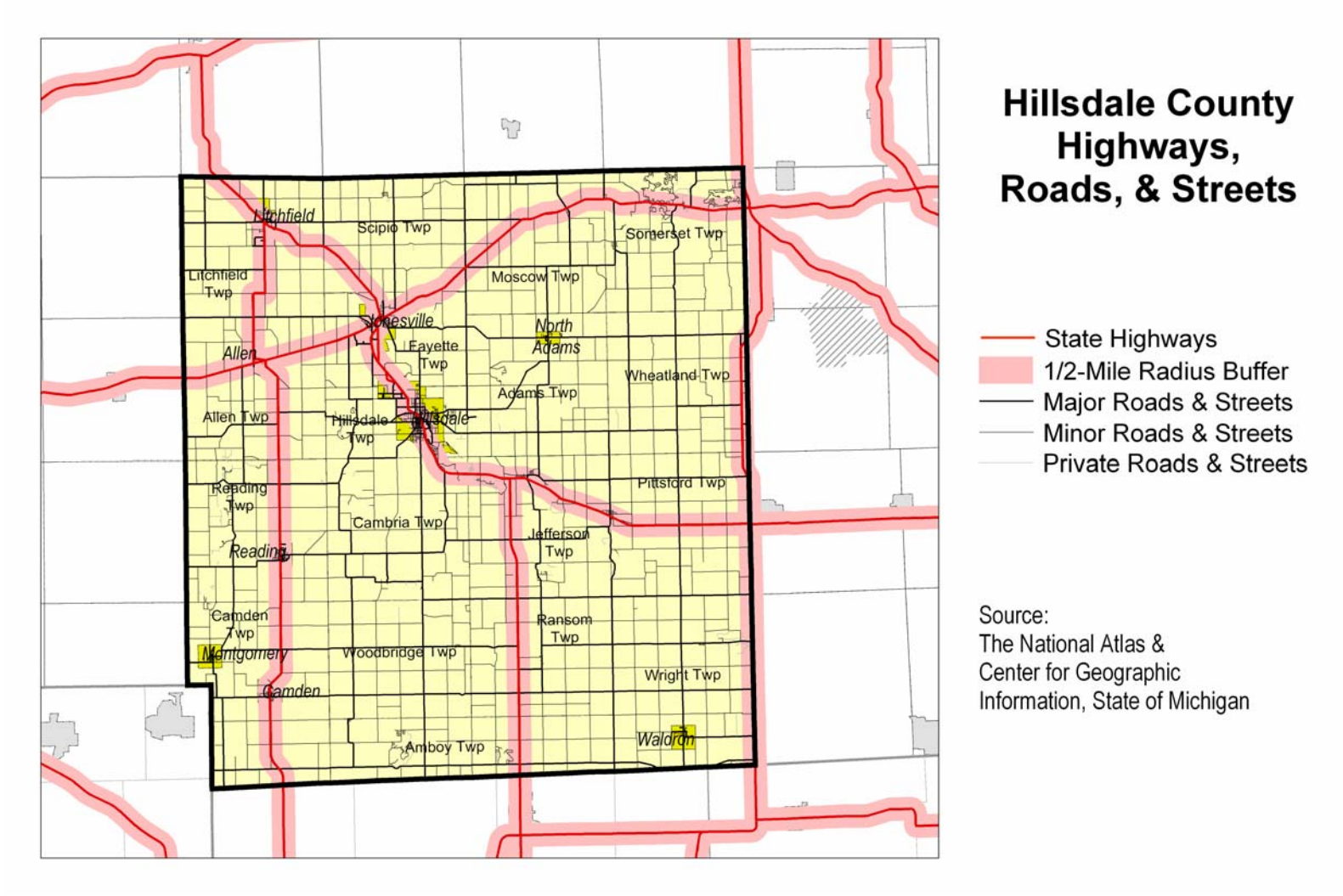
Sources:
Michigan Hazard Analysis, The National Atlas for the USA; and Center for Geographic Information, State of Michigan

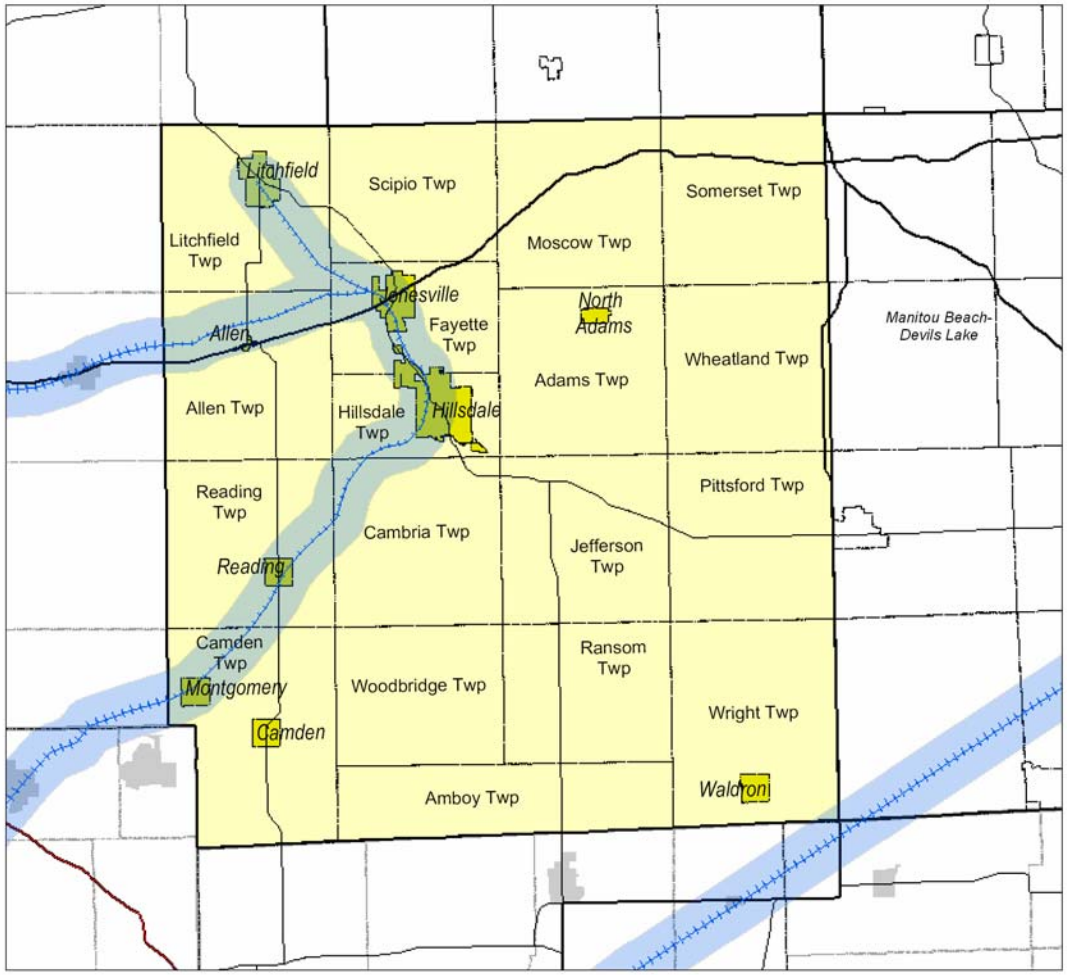
Transportation

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

Several state highways traverse Hillsdale County (e.g., US-12; US-127; M-34; M-49; and M-99). 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 trips will occur on minor local roads and streets. Railroads are also utilized for the transport of hazardous materials. Several rail lines are located in the county (e.g., Hillsdale County and Penn Central).

Fortunately, no disastrous post-1978 (the first year of records) Hillsdale County hazardous material transportation incidents were recorded in the Michigan Hazard Analysis. With all of the highways traversing Hillsdale County, there is a medium probability that a hazardous material incident could occur.


Litchfield
Scipio Twp
Somerset Twp
Litchfield Twp
Moscow Twp
Jonesville
North Adams
Fayette Twp
Allen
Wheatland Twp
Adams Twp
Allen Twp
Hillsdale Twp
Hillsdale
Pittsford Twp
Reading Twp
Cambria Twp
Jefferson Twp
Reading
Camden Twp
Ransom Twp
Montgomery
Woodbridge Twp
Wright Twp
Camden
Amboy Twp
Waldron
Hillsdale County Highways, Roads, & Streets
State Highways
1/2-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

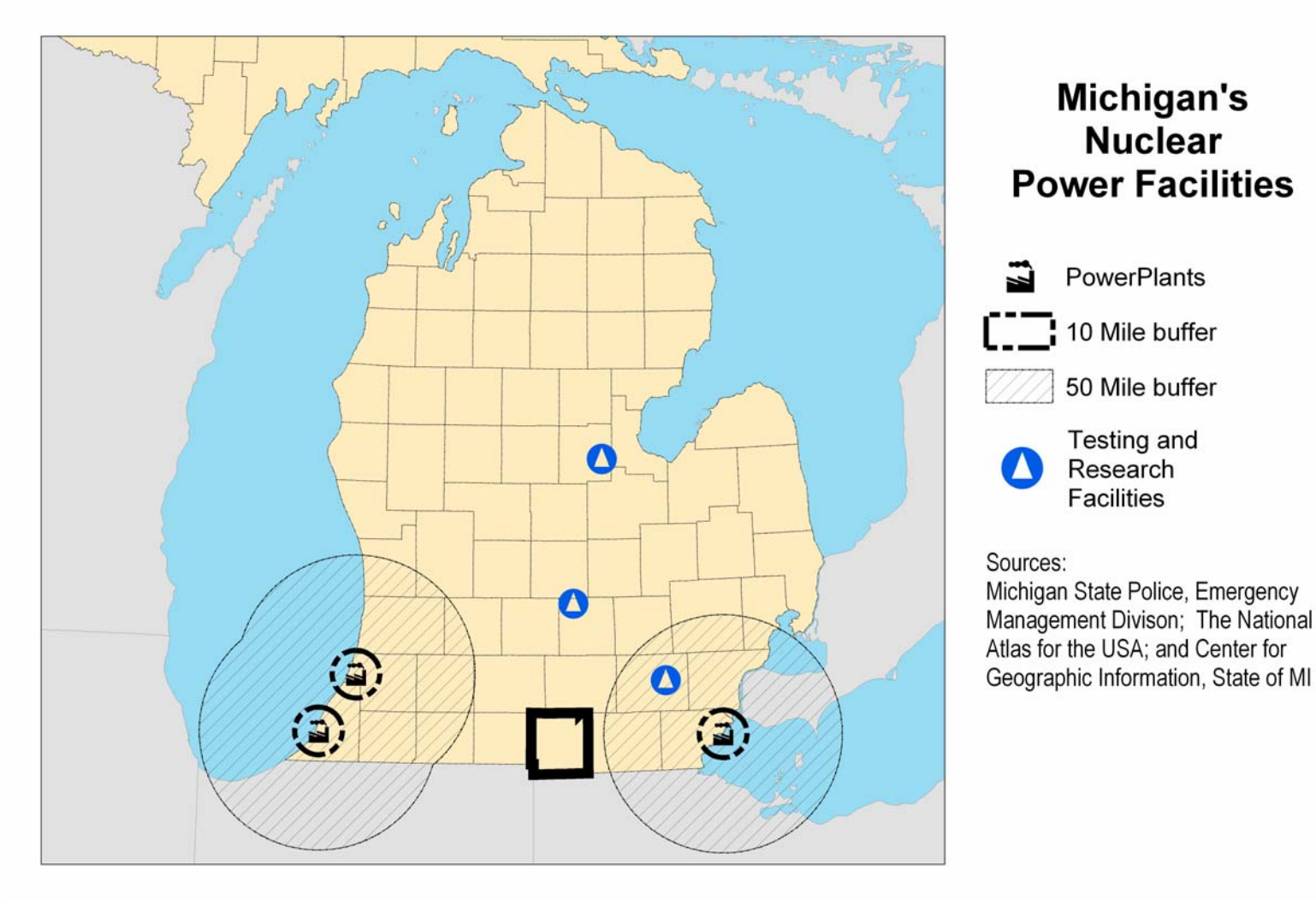
13. Nuclear Power Plant Accidents

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 to 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. Given its location, Hillsdale County has a very low probability of experiencing a nuclear power plant disaster.


Michigan's
Nuclear
Power Facilities
PowerPlants
10 Mile buffer
50 Mile buffer
Testing and
Research
Facilities
Sources:
Michigan State Police, Emergency
Management Divison; The National
Atlas for the USA; and Center for
Geographic Information, State of MI

14. 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):

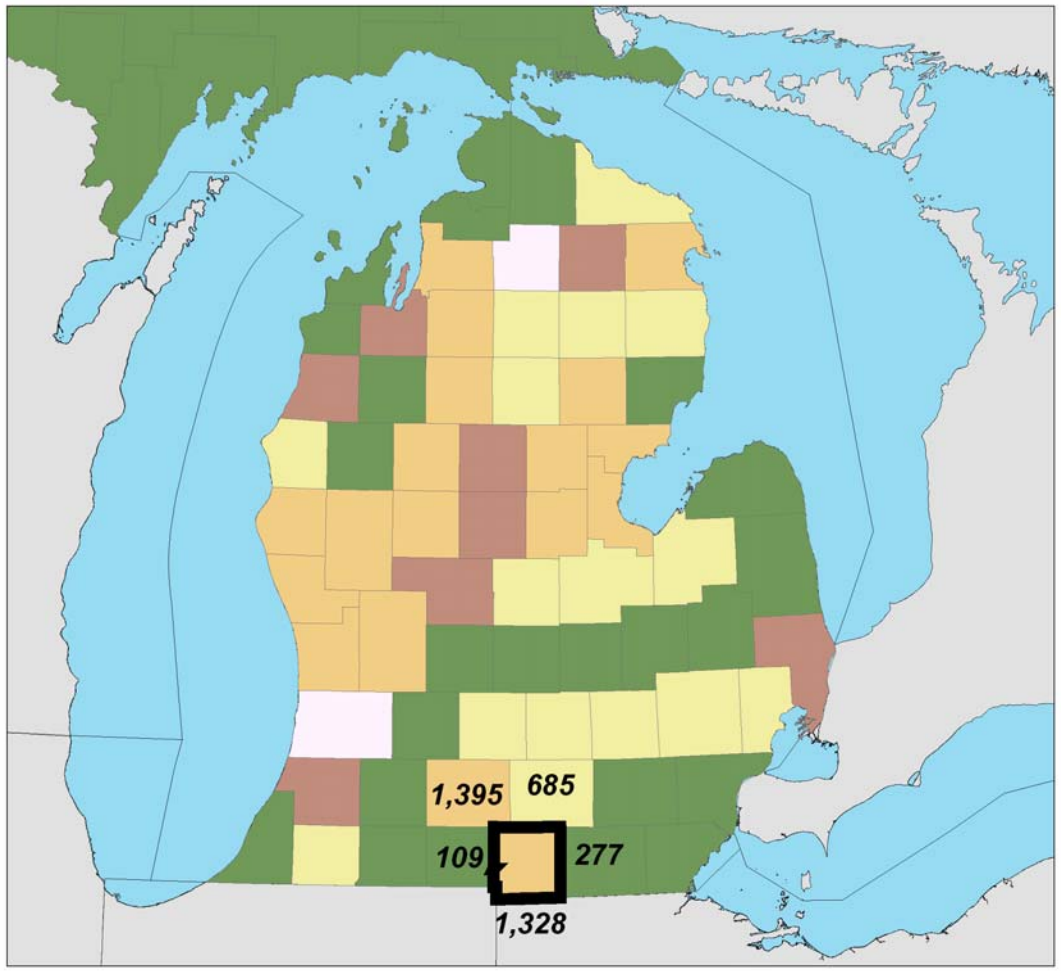
The following table summarizes the physiological responses likely to occur with exposure to H_2S:

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 – 200 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	Unconsciousness at once, with early cessation of respiration and death in a few minutes. Death may occur even if the individual is removed to fresh air at once.

Source: Michigan Hazard Analysis

There have been no oil or natural gas incidents in Hillsdale County. The potential for an incident exists, but the probability is very low.



Hillsdale County Oil and Gas Wells

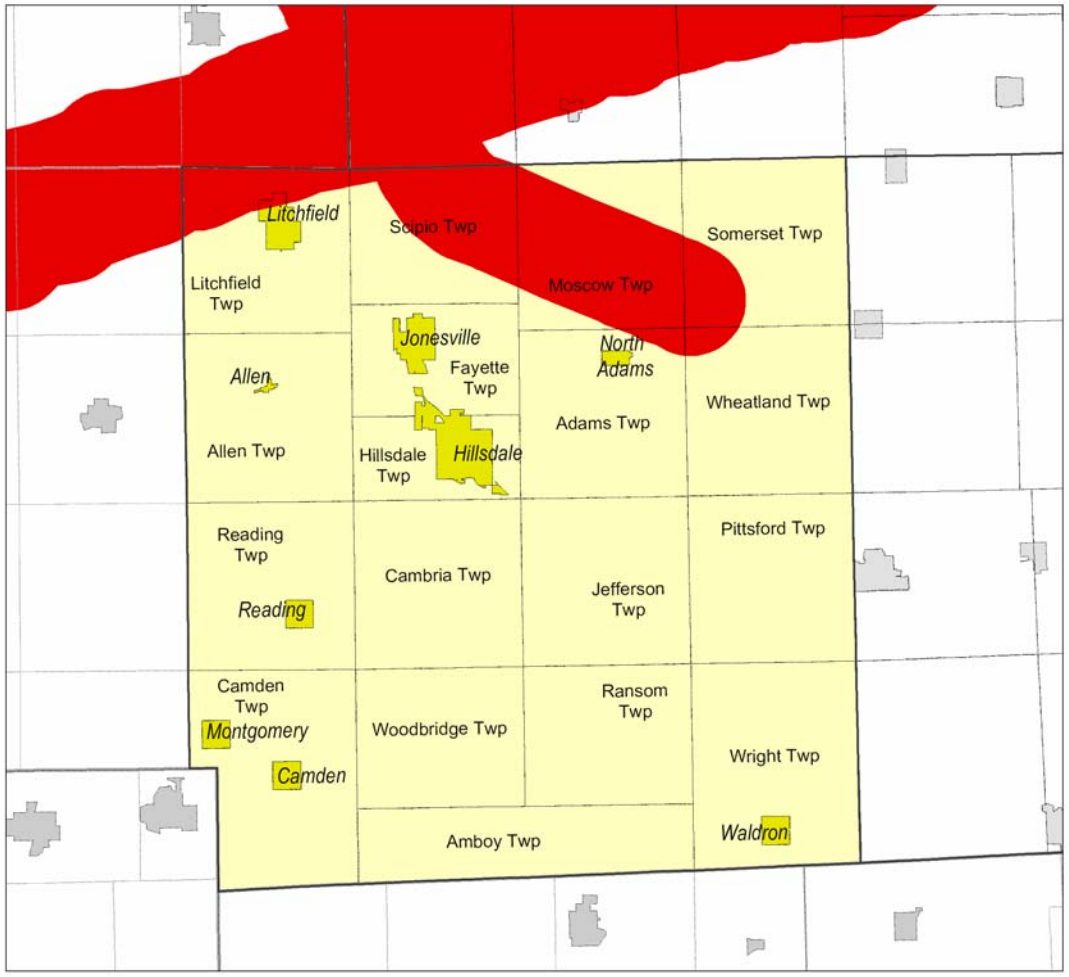
- 0 - 277
- 278 - 734
- 735 - 1,442
- 1,443 - 2,792
- 2,793 - 5,190

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

15. 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 preceding table summarizes the physiological responses likely to occur with exposure to H_2S.

Pipelines extend into the northern tier of 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, the possibility is there.



Hillsdale County Oil & Gas Pipelines

4-mile Wide Pipeline Corridors

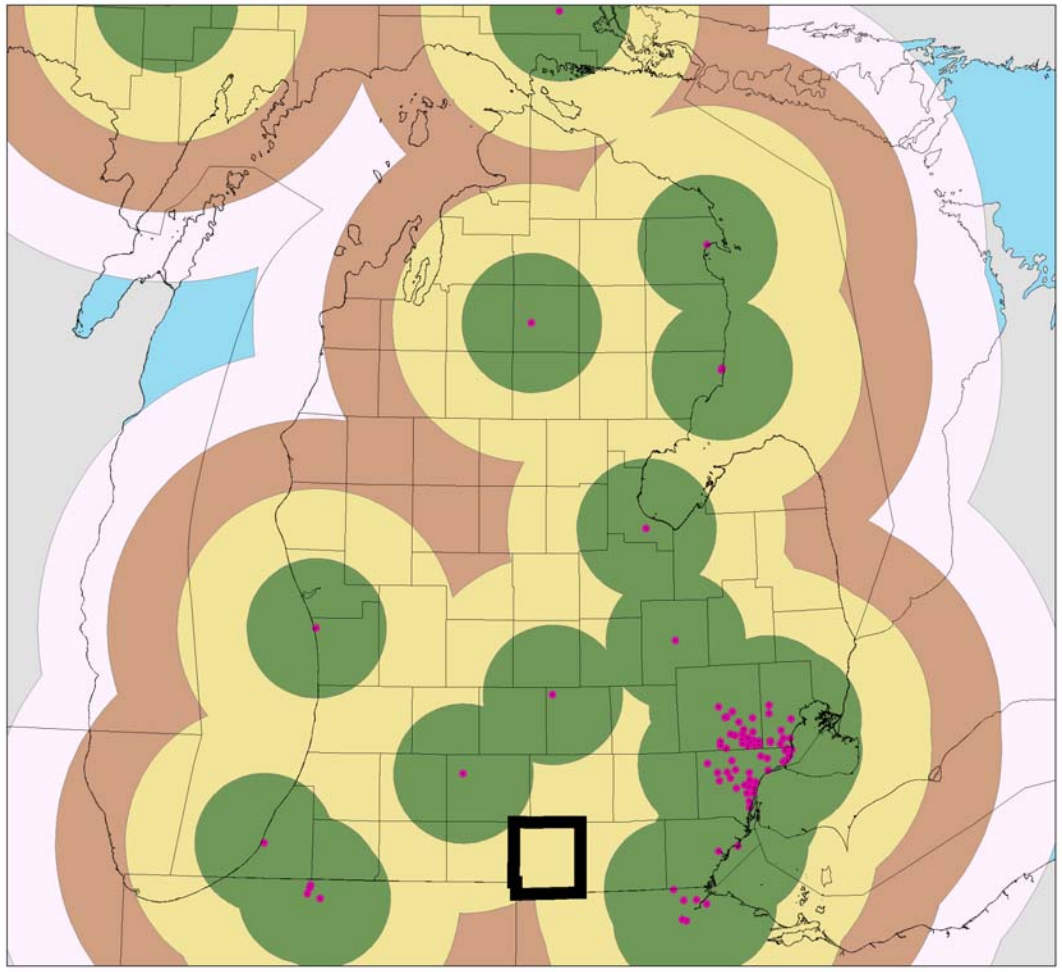
Source:
Center for Geographic Information, State of Michigan

116. 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." 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 potential nuclear targets are located in Hillsdale County and there is no anticipation of future attacks.



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

17. 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,
- 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, and
- 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.

The following are occurrences of sabotage/terrorism that affected southern Lower Michigan:

- May 2003 – Supermarket employee in Kent County intentionally contaminated 250 pounds of ground beef.
- May 27, 2003 – Four new home constructions were set on fire by a group opposed to urban sprawl.
- April 10, 2001 – A student inadvertently brought a bottle bomb into the school during Clean-Up Day. The detonated and sprayed students and teachers with an unknown substance that burned their skin.

- 2000-2001 – Various bombings took place in Michigan including Michigan Technological University in Houghton, Bloomfield Township, Clinton County, Highland Park, Roseville, Clio, and Barry County.
- July 25, 2000 – A saboteur ripped wiring out of 100 street lights in downtown Detroit leaving and wires exposed and causing the city to shut down power.
- December 31, 1999 – Arsonists set fire to research offices at Michigan State University (MSU) in protest of research MSU was conducting in helping developing countries improve agriculture.
- February 2, 1992 – A militant animal rights protest group set fire to MSU's Mink Research Facility.
- May 1978-April 1995 – The Unabomber hit Ann Arbor and various other locations in the US.
- August 30, 1971 – Pontiac School buses were firebombed and destroyed in response to a court-ordered school busing plan to integrate Pontiac Schools.
- 1920s & 1930s – Hate crimes were perpetrated by the Black Legion in Detroit and other cities.
- May 18, 1927 – A disgruntled farmer bombed Bath Consolidated Schools resulting in 41 deaths. It is still the worst school-related attack in US history.
- Various dates and locations – Premeditated workplace and school violence.

As with all types of disasters, the potential is there for this type of incident to occur in Hillsdale County, but the probability is very low.

18. 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, and
- large scale infestations of disease-carrying insects or rodents, to name just a few.

"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 have ever been declared in Hillsdale County, according to the Michigan Hazard Analysis. However, there is a low probability that one may occur. At least three 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 Spring 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.

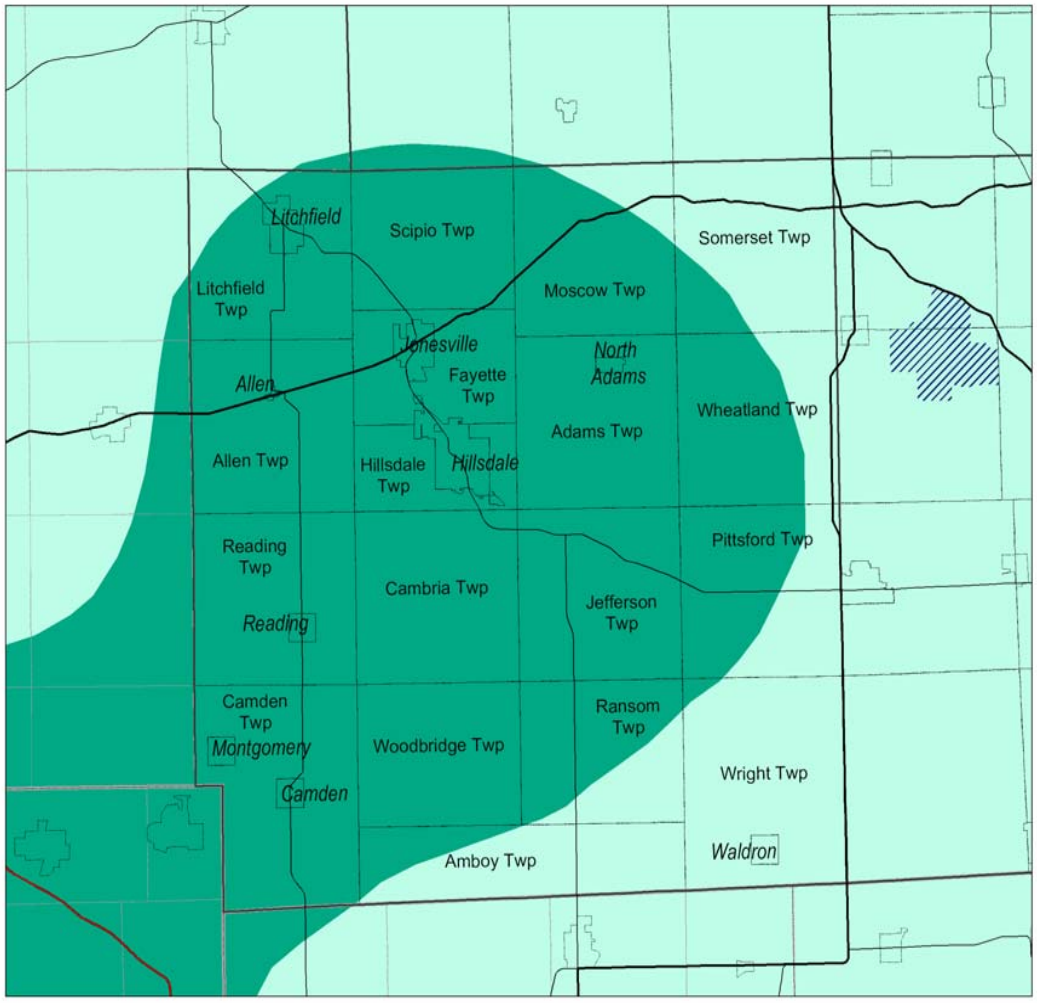
19. Drought

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." No droughts were recorded in the county by the National Climatic Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA). 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. There is a very low probability that Hillsdale County will experience a drought in the future.

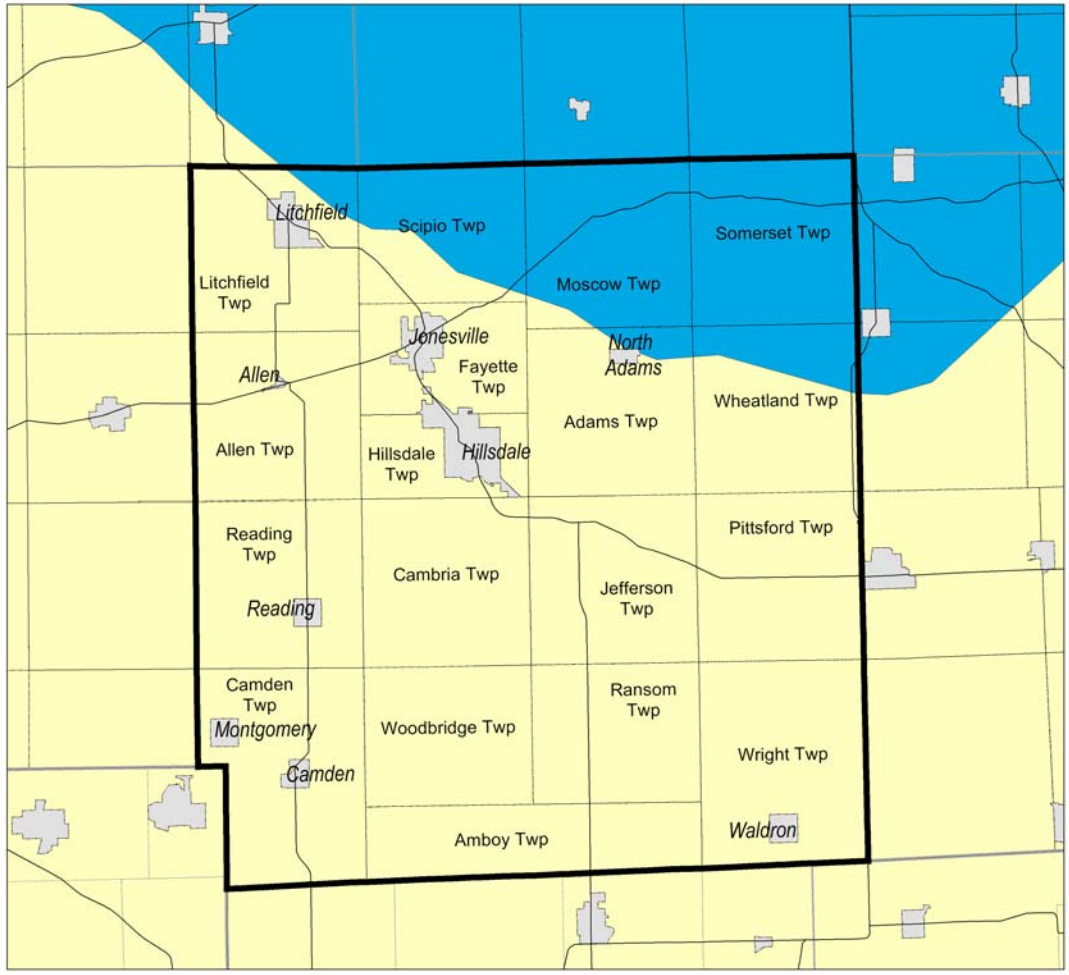


Hillsdale County Annual Precipitation

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 Aquifers

Marshall Aquifer

Source:
Center for Geographic Information, State of Michigan

20. 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 30-year (i.e., 1951-1980) 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 14.5ºF – 82.1ºF. Over the 30-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. Considering the effects of global warming, it is highly likely that Hillsdale County will experience temperature extremes in the coming years.

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. Michigan's record high temperature (112 degrees in Mio) still stands today.
- **Summer 1988:** Michigan experiences 39 days straight with 90 degree or higher heat.
- **July 1995:** Michigan experienced 28 heat-related deaths.
- **July 1999:** City residents were treated for heat-related problems statewide.

- **June-August 2001:** Heat stress index readings soared well above 100 degrees F on many days. The deaths caused by this heat wave prompted the Michigan Legislature to require all nursing homes to have air conditioning in resident rooms and common areas.

21. 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 pea to a golf ball, but hailstones larger than baseballs have occurred with the most severe thunderstorms. Hail is formed when strong updrafts within the storm carry water droplets above the freezing level, where they remain suspended and continue to grow larger until their weight can no longer be supported by the winds. They finally fall to the ground, battering crops, denting autos, and injuring wildlife and people. Large hail is a characteristic of severe thunderstorms, and it may precede the occurrence of a tornado.

The National Weather Service began recording hail activity in Michigan in 1967. Statistics since that time indicate that approximately 50% of the severe thunderstorms that produce hail have occurred during the months of June and July, and nearly 80% have occurred during the prime growing season of May through August. As a result, the damage to crops from hail is often extensive."

TABLE IV-21, Hail Events, Hillsdale County (1950-2010)

Date	Description	MCD's
May 25, 1973	9:45 PM EST. Beginning LAT/LON: 41°56'N / 84°48'W. Magnitude: 1.00 inches. No additional details reported.	Allen
May 11, 1974	3:30 PM EST. Beginning LAT/LON: 41°55'N / 84°37'W and 42°03'N / 84°30'W.. Magnitude: 1.75 inches. No additional details reported.	Hillsdale/Moscow

June 15, 1974	9:20 AM EST. Beginning LAT/LON: 42°03'N / 84°45'W and 41°55'N / 84°37'W.. Magnitude: 1.25 inches. No additional details reported.	Litchfield/Hillsdale
July 3, 1975	1:30 PM EST. Beginning LAT/LON: 41°50'N / 84°45'W. Magnitude: 1.00 inches. No additional details reported.	Reading
June 2, 1980	8:00 PM EST. Beginning LAT/LON: 41°43'N / 84°25'W. Magnitude: 0.75 inches. No additional details reported.	Waldron
July 12, 1980	8:00 PM EST. Beginning LAT/LON: 41°47'N / 84°48'W. Magnitude: 1.50 inches. No additional details reported.	Montgomery
September 22, 1980	4:50 PM EST. Beginning LAT/LON: 41°55'N / 84°37'W. Magnitude: 1.75 inches. No additional details reported.	Hillsdale
May 2, 1983	9:30 AM EST. Beginning LAT/LON: 41°53'N / 84°46'W and 41°53'N / 84°34'W. Magnitude: 1.50 inches. No additional details reported.	Reading/Osseo
June 13, 1984	10:50 AM EST. Beginning LAT/LON: 41°59'N / 84°40'W. Magnitude: 0.75 inches. No additional details reported.	Jonesville
August 26, 1986	5:39 PM EST. Beginning LAT/LON: 41°45'N / 84°46'W. Magnitude: 2.00 inches. No additional details reported.	Camden
April 23, 1988	9:35 PM EST. Beginning LAT/LON: 41°55'N / 84°48'W. Magnitude: 1.75 inches. No additional details reported.	Allen
April 23, 1992	3:45 PM EST. Beginning LAT/LON: 41°53'N / 84°34'W. Magnitude: 1.00 inches. No additional details reported.	Osseo
April 12, 1994	9:18 PM EST. Magnitude: 0.75 inches. Marble-sized hail was reported along with a 50 mph winds gust.	Montgomery
June 13, 1994	7:05 PM EST. Magnitude: 0.75 inches. No additional details reported.	Hillsdale

September 25, 1994	7:22 PM EST. Beginning Location: Unknown. Ending Location: 14 SSE JXN and 23 SW JXN. Magnitude: 1.00 inches. Hail covered ground along U.S. 12 in Somerset.	Litchfield/Somerset
April 12, 1996	2:45 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
July 6, 1997	3:32 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
May 31, 1998	5:11 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
June 26, 1998	5:20 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
July 28, 1999	7:20PM 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
July 29, 1999	9:42 PM EST. Beginning LAT/LON: 41°45'N / 84°46'W. Ending	Camden

	LAT/LON: 41°49'N / 84°40'W. Magnitude: 0.75 inches. No additional details reported.	
April 20, 2000	1:48 PM EST. Beginning LAT/LON: 41°47'N / 84°48'W. Ending LAT/LON: 41°47'N / 84°48'W and 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.	Montgomery/Somerset
May 9, 2000	6:45 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	Hillsdale

	in Ohio where the greatest widespread wind damage was observed.	
July 28, 2000	2:46 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
June 14, 2002	2:23 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
April 4, 2003	7:00 PM EST. Beginning LAT/LON: 41°49'N / 84°45'W. Ending LAT/LON: 41°49'N / 84°45'W and 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.	Reading/North Adams
May 9, 2003	10:50 PM EST. Beginning LAT/LON: 41°50'N / 84°45'W. Ending LAT/LON: 41°50'N / 84°45'W and 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.	Reading/North Adams
July 20, 2003	2:19 PM EST. Beginning LAT/LON: 41°57'N / 84°46'W. Ending LAT/LON: 41°57'N / 84°46'W and Beginning LAT/LON: 41°42'N / 84°42'W. Ending LAT/LON: 41°42'N / 84°42'W. Magnitude: 1.50 inches. No additional details reported.	Allen/Camden
August 1, 2003	2:58 PM EST. Beginning LAT/LON: 41°53'N / 84°39'W. Ending LAT/LON: 41°53'N / 84°39'W and Beginning LAT/LON: 42°01'N / 84°32'W. Ending LAT/LON: 42°01'N / 84°32'W and Beginning LAT/LON: 41°55'N / 84°37'W. Ending LAT/LON: 41°55'N / 84°37'W. Magnitude: 1.75 inches. No additional details reported.	Hillsdale/N. Adams

May 6, 2004	9:20 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
May 13, 2005	4:35 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
September 22, 2005	6:05 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
April 22, 2006	6:30 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
June 21, 2006	6:20 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
May 1, 2007	12:54 PM EST. Beginning LAT/LON: 41°45'N / 84°45'W. Ending LAT/LON: 41°53'N / 84°32'W and Beginning LAT/LON: 41°53'N / 84°32'W. Ending LAT/LON: Not Known and Beginning LAT/LON: 41°50'N / 84°45'W. Ending LAT/LON: Not Known. 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.	Camden Osseo Reading

Hillsdale County has experienced 35 severe hail events over the last 60 years. There is over a 50% chance that the County will experience more hail events in the future.

22. 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. . . . 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 101 lightning deaths, 711 lightning injuries, and 812 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	28.7%	35.0%	33.4%
Unspecified locations	18.8%	37.1%	34.8%
Under a tree (not on golf course)	25.7%	14.6%	16.0%
Commercial & heavy equipment/machinery	3.9%	2.8%	2.9%
Golf Course	9.9%	4.9%	5.5%
At telephone	1.9%	2.6%	2.5%
Water related (boating, fishing, swimming, etc.)	10.8%	3.6%	4.5%
	101	711	812

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.

The future probability of lightning causing damage in Hillsdale County is less than 3%.

TABLE IV-22, Lightning Events, Hillsdale County (1950-2010)		
Date	**Description**	**MCD's**
April 27, 1994	1:00 AM EST. Property Damage: $50,000. Lightning struck a home causing extensive damage from smoke.	Hillsdale
July 21, 2001	4:00 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.	Hillsdale

23. Severe Wind Events

"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 (mph) 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 (46 mph) to 60 knots (70 mph). A wind speed of 50 knots (58 mph) 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."

Hillsdale County has experienced 9 severe wind events and over 70 thunderstorm wind events over the last 60 years. There is over a 100% chance that the County will experience these strong wind events in the future.

TABLE IV-23, Severe Wind Events, Hillsdale County (1950-2010)		
Date	**Description**	**MCD's**
November 18, 1994	12:00 PM EST. Beginning and Ending Locations Unknown. Magnitude: 62 knots (71 mph). 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.	Hillsdale County
April 6, 1997	4:00 PM EST. Beginning and Ending Locations Unknown. 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. Widespread wind damage and lake shore beach erosion was reported across the area. Property Damage was estimated at $5 Million.	Hillsdale County
September 29, 1997	12:00 PM EST. Beginning and Ending Locations Unknown. Magnitude: 42 Knots (48 mph). 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.	Hillsdale County
March 9, 2002	12:37 PM EST. Beginning and Ending Locations Unknown. Winds just above the surface ranged from 70 to 80 mph. The combination of these two 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.	Hillsdale County

November 12, 2003	5:00 PM EST. Beginning and Ending Locations unknown. Magnitude: 56 Knots (64 mph). 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.	Hillsdale County
March 5, 2004	12:00 PM EST. Beginning and Ending Locations Unknown. Magnitude: 52 Knots (60 mph). 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.	Hillsdale County
October 30, 2004	5:10 PM EST. Beginning and Ending Locations Unknown. Magnitude: 42 knots (48 mph). 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, 51 in Hillsdale and 48 mph at Benton Harbor.	Hillsdale County
February 11, 2009	10:00 PM EST. Beginning and Ending Locations Unknown. Magnitude: 50 Knots (58 mph). 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.	Hillsdale County

December 9, 2009	11:00 AM EST. Beginning and Ending Locations Unknown. Magnitude: 50 Knots (58 mph). 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.	Hillsdale County

A Governor's Disaster Declaration was passed on September 4, 2005 that affected the entire state, including Hillsdale County. This declaration was to help handle the large number of evacuees and persons displaced by Hurricanes Katrina and Rita that were seeking shelter in the northern states. A Presidential Declaration was enacted (Emergency 3225) on September 7, 2005 for the entire state because of the same emergency.

TABLE IV-23a, Thunderstorm Wind Events, Hillsdale County (1950-2010)

MCD	Date	Time	Type	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Jonesville	04/19/1963	6:21 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	06/28/1965	3:10 PM	Thunderstorm Wind	60 Knots	0	0	0	0
Moscow	06/01/1980	3:30 PM	Thunderstorm Wind	52 Knots	0	0	0	0
Montgomery	09/22/1980	3:50 PM	Thunderstorm Wind	52 Knots	0	0	0	0
Osseo	07/07/1991	6:35 PM	Thunderstorm Wind	52 Knots	0	0	0	0

Waldron	07/04/1992	9:30 PM	Thunderstorm Wind	54 Knots	0	0	0	0
Allen	07/13/1992	7:00 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	04/15/1993	4:50 PM	Thunderstorm Winds	52 Knots	0	0	0	0
Somerset	08/01/1995	3:15 PM	Thunderstorm Winds	50 Knots	0	0	0	0
Somerset	08/12/1995	7:20 PM	Thunderstorm Winds	50 Knots	0	0	0	0
Reading	08/15/1995	3:45 PM	Thunderstorm Winds	50 Knots	0	0	0	0
Litchfield	07/20/1998	10:50 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Reading	07/20/1998	10:55 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Litchfield	07/21/1998	4:35 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	07/21/1998	4:49 AM	Thunderstorm Wind	50 Knots	0	0	0	0
Litchfield	04/20/2003	2:55 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Litchfield	06/28/2003	4:30 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Litchfield	06/28/2003	4:35 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Montgomery	07/04/2003	6:23 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Litchfield	07/04/2003	10:50 AM	Thunderstorm Wind	50 Knots	0	0	0	0
Somerset Center	07/04/2003	11:05 AM	Thunderstorm Wind	50 Knots	0	1	0	0
Waldron	07/04/2003	11:26 AM	Thunderstorm Wind	50 Knots	0	0	0	0
Bankers	07/08/2003	1:45 AM	Thunderstorm Wind	50 Knots	0	0	0	0

Litchfield	07/20/2003	2:15 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Jonesville	07/20/2003	2:20 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Allen	07/20/2003	2:25 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	08/01/2003	4:39 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Osseo	08/16/2003	3:25 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	08/16/2003	3:32 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	08/16/2003	3:32 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	08/16/2003	3:39 PM	Thunderstorm Wind	51 Knots	0	0	0	0
Jonesville	08/25/2003	10:45 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Jonesville	08/25/2003	10:45 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	08/27/2003	2:55 AM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	09/24/2003	5:50 PM	Thunderstorm Wind	50 Knots	0	0	0	0
North Adams	09/24/2003	6:00 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Osseo	05/21/2004	12:40 PM	Thunderstorm Wind	60 Knots	0	0	0	0
Hillsdale	06/14/2004	1:25 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	07/06/2004	11:07 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	07/06/2004	11:15 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	07/21/2004	8:10 PM	Thunderstorm Wind	50 Knots	0	0	0	0

Osseo	05/13/2005	4:40 PM	Thunderstorm Wind	55 Knots	0	0	0	0
Osseo	06/09/2005	2:30 PM	Thunderstorm Wind	50 Knots	0	0	5K	0
Hillsdale	06/26/2005	5:45 PM	Thunderstorm Wind	50 Knots	0	0	20K	0
Moscow	06/26/2005	5:58 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Hillsdale	06/30/2005	5:45 PM	Thunderstorm Wind	50 Knots	0	0	15K	0
Pittsford	06/30/2005	6:25 PM	Thunderstorm Wind	50 Knots	0	0	10K	0
Litchfield	06/30/2005	9:45 AM	Thunderstorm Wind	50 Knots	0	0	10K	0
Hillsdale	06/30/2005	10:00 AM	Thunderstorm Wind	50 Knots	0	0	10K	0
Hillsdale	07/21/2005	6:15 PM	Thunderstorm Wind	50 Knots	0	0	1K	0
Jonesville	07/25/2005	9:30 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Camden	07/25/2005	9:50 PM	Thunderstorm Wind	50 Knots	0	0	0	0
Osseo	11/06/2005	3:58 AM	Thunderstorm Wind	50 Knots	0	0	0	0
Allen	05/30/2006	3:03 PM	Thunderstorm Wind	55 Knots	0	0	0	0
Hillsdale	05/30/2006	3:19 PM	Thunderstorm Wind	55 Knots	0	0	0	0
Hillsdale	06/21/2006	5:35 PM	Thunderstorm Wind	50 Knots	0	0	5K	0
Hillsdale	07/17/2006	11:54 PM	Thunderstorm Wind	52 Knots	0	0	0	0
Hillsdale	05/15/2007	2:15 PM	Thunderstorm Wind	55 Knots	0	0	0K	0K
Hillsdale	05/15/2007	5:33 PM	Thunderstorm Wind	55 Knots	0	0	0K	0K

Hillsdale	06/27/2007	3:50 PM	Thunderstorm Wind	55 Knots	0	0	10K	0K
Litchfield	06/27/2007	3:58 PM	Thunderstorm Wind	55 Knots	0	0	10K	0K
Hillsdale	08/07/2007	5:11 PM	Thunderstorm Wind	55 Knots	0	0	0K	0K
Hillsdale	08/23/2007	6:22 PM	Thunderstorm Wind	55 Knots	0	0	10K	0K
Hillsdale	08/24/2007	4:20 PM	Thunderstorm Wind	55 Knots	0	0	0K	0K
Waldron	06/15/2008	5:22 PM	Thunderstorm Wind	55 Knots	0	0	10K	0K
Hillsdale	06/26/2008	2:06 PM	Thunderstorm Wind	50 Knots	0	0	0K	0K
Jonesville	07/02/2008	5:50 PM	Thunderstorm Wind	55 Knots	0	0	0K	0K
Cambria	07/02/2008	6:00 PM	Thunderstorm Wind	55 Knots	0	0	0K	0K
Somerset Center	07/02/2008	6:00 PM	Thunderstorm Wind	55 Knots	0	0	0K	0K
Reading	07/02/2008	6:01 PM	Thunderstorm Wind	60 Knots	0	0	0K	0K
Allen	06/08/2009	7:55 PM	Thunderstorm Wind	50 Knots	0	0	0K	0K
				TOTALS:	**0**	**2**	**507K**	**0**

50	**Knots**	**=**	**57.6**	**MPH**
55	**Knots**	**=**	**63.4**	**MPH**
60	**Knots**	**=**	**69.1**	**MPH**
65	**Knots**	**=**	**74.9**	**MPH**

24. Tornadoes

"Tornadoes in Michigan," according to the 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 region 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 Michigan Hazard Analysis, "indicates that there were 23 tornadoes resulting in eight deaths and 133 injuries in Hillsdale County during the period between 1950 and 2004. These tornadoes resulted in almost $30 Million in property damage. All of the tornado events in Hillsdale County occurred during the months of March through October.

The intensity of the tornadoes ranged from F0 – F4, with 5% at F4, 5% at F3, 37% at F2, 21% at F1, 31% at F0. F3 tornadoes are classified as "severe" with wind speeds of 158 to 206 mph resulting in severe damage. F4 tornados are classified as "devastating". F4 tornados can level even well-constructed houses. Cars are thrown, thus generating large missiles.

Hillsdale County has experienced 19 tornadoes over the last 60 years. There is a 30% chance that they will experience tornadoes in the future.

TABLE IV-23b, Tornado Events, Hillsdale County (1950-2010)		
Date	**Description**	**MCD's**
June 24, 1958	8:00 PM EST. 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. No additional details reported.	Camden
August 22, 1964	2:25 PM EST. 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. No additional details reported.	Waldron
April 11, 1965	7:20 PM EST. 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: 6. Injuries: 94. This particular storm system spawned over 50 tornadoes, 23 in Michigan, of which two touched down in Hillsdale County. Nationally, this storm system caused 53 fatalities, 798 injuries, and over $51 million in damage to public and private property.	Somerset
April 11, 1965	A Presidential Major Disaster (190) was declared for 16 counties, including Hillsdale during the aftermath of tornadoes and severe storms.	Hillsdale County
April 23, 1968	12:50 PM EST. 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. No additional details reported.	Hillsdale

July 23, 1968	7:30 PM EST. 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. No additional details reported.	Hillsdale
July 4, 1969	5:00 PM EST. 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. No additional details reported.	Jonesville
June 12, 1973	5:30 PM EST. Beginning LAT/LON: 41°56'N / 84°38'W. Ending LAT/LON: Not Known. Magnitude: F0. No additional details reported.	Hillsdale
April 3, 1974	7:44 PM to 8:15 PM EST. Beginning LAT/LON: 41°55'N / 84°39'W. Ending LAT/LON: 42°05'N / 84°24'W and Beginning LAT/LON: 41°45'N / 84°25'W. Ending LAT/LON: 41°50'N / 84°23'W and Beginning LAT/LON: 41°43'N / 84°25'W. Ending LAT/LON: 41°47'N / 84°20'W. Magnitude: F2. Length: 22.40 Miles. Width: 167 to 440 Yards. Property Damage: $2.525 Million. Fatalities: 2. Injuries: 33.	Hillsdale/Waldron
April 3, 1974	A Presidential Major Disaster (429) was declared for Hillsdale County after a tornado struck.	Hillsdale County
May 21, 1975	5:30 PM EST. 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. No additional details reported.	Allen
March 12, 1976	5:05 PM EST. Beginning LAT/LON: 41°48'N / 84°24'W. Ending LAT/LON: 41°49'N / 84°22'W. Magnitude: F2. Property Damage: $250,000. No additional details reported.	Pittsford

March 12, 1976	5:40 PM EST. 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. No additional details.	Moscow
July 18, 1977	12:00 PM EST. 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. No additional details reported.	Adams
June 7, 1979	5:25 PM EST. Beginning LAT/LON: 42°00'N / 84°32'W. Ending LAT/LON: Not Known. Magnitude: F0. Length: 0.50 Miles. Width: 20 Yards. No additional details reported.	Moscow
September 25, 1984	4:20 PM EST. Beginning LAT/LON: 41°56'N / 84°25'W. Ending LAT/LON: Not Known. Magnitude: F2. Length: 2.10 Miles. Width: 90 yards. Property Damage: $250,000. No additional details reported.	Wheatland
May 15, 1988	5:04 PM EST. Beginning LAT/LON: 41°43'N / 84°25'W. Ending LAT/LON: Not Known. Magnitude: F0. Length: 0.2 Miles. Width: 10 yards. . No additional details reported.	Waldron
March 27, 1991	7:37 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. No additional details reported.	Amboy
October 24, 2001	6:00 PM EST. Beginning LAT/LON: 41°45'N / 84°33'W. Ending LAT/LON: 41°47'N / 84°32'W. Magnitude: F1. Length: 2.00 Miles. Width: 60 yards. Property Damage: $350,000. Tornado with F1 damage mainly on the north side of Ransom. Garages and sheds destroyed and significant roof damage to homes with twisting of signs and trees.	Ransom

July 10, 2003	8:24 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
August 1, 2003	3:40 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 with the touchdown.	Hillsdale

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.

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 below. Several recent significant snowstorms, as reported in the Michigan Hazard Analysis, are worth mentioning:

TABLE IV-24, Snow Events, Hillsdale County (1950-2010)

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
February 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 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.	Hillsdale County

December 6, 1994	6:00 PM 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
March 19, 1996	8:30 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
November 11, 1997	9:00 PM EST. 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.	Hillsdale County
November 15, 1997	7:00 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
December 10, 1997	1:00 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

January 22, 1998	7:00 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
December 11, 2000	8:00 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 was declared from 39 counties, including Hillsdale.	Hillsdale County
February 22, 2003	4:00 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
January 27, 2004	9:00 PM EST. A combination of snow from an area of low pressure moving across Ohio and lake enhancement from northwest flow behind this storm caused heavy snow across the area with general accumulations of 8 to 10 inches and over 12 inches in some locations.	Hillsdale County
December 22, 2004	11:50 AM EST. Low pressure moved out of the western Gulf of Mexico and tracked towards eastern Ohio. Abundant moisture accompanying the	Hillsdale County

	system allowed for a large area of snow to blanket much southern Lower Michigan. Amounts were generally from 2 to 5 inches, with Kinderhook in Hillsdale County receiving 6 inches of total snowfall.	
December 1, 2007	5:000 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
December 15, 2007	10:15 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
March 4, 2008	2:00 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
February 9, 2010	4:00 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

Hillsdale County has experienced 17 severe snowstorms over the last 60 years. There is a 28% change that the County will experience more snowstorms in the future.

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." Sleet, on the other hand, is very similar to hail, "only smaller and can be easily identified as frozen rain drops that bounce when hitting the ground or other objects."

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 snowstorm that mixed with freezing rain causing more than $5 million in property damage over most of Michigan (including Hillsdale County) in January 1994. No deaths or injuries were attributed to these winter storm events. The future probability of ice and sleet events is approximately 5%.

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

TABLE IV-25, Ice and Sleet Events, Hillsdale County (1950-2010)

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
January 1, 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	Hillsdale County

	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.	
March 14 ,1997	1:30 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

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.

Hillsdale County is one of 20 counties that have been quarantined because of the invasion of the emerald ash borer. An Emerald Ash Borer Awareness Week, generally the last week in May, has been implemented to educate residents and visitors to be on the lookout for these pests and report any possible signs of infestation. There is a medium probability of Hillsdale County experience invasive species problems in the future.

County-Wide Summary of Hazards

The following table, entitled “Actual and Potential Hazard Experience by Local Units of Government”, provides a quick summary of hazards faced by county governments. The table documents which governmental units have actually experienced a particular hazard as well as where the potential for the hazard exists.

Hillsdale County Hazard Mitigation Plan

Actual and Potential Hazards Experience by Local Units of Government

Local Unit	Cvl Disturbance	Earthquakes	Subsidence	Scrap Tire Fires	Structural Fires	Wildfires	Riverine Flood-ing	Dam Failures	Energy Emer-gencies	Infrastructure Failures	Transportation Accidents	Fixed Site – Haz Mat	Transportation – Haz Mat	Nuclear Power Plant Accidents	Oil & Nat. Gas Well Accidents	Oil & Natural Gas Pipeline	Nuclear Attacks	Sabotage Ter-rorism	Public Health Emergencies	Drought	Extreme Temperatures	Hail	Lightning	Severe Wind	Tornadoes	Snow, Ice & Sleet Storms	Invasive Species
Hillsdale Co.				P	A		A		A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	A	A	N/A
Hillsdale City					A		A		A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	A	A	N/A
Litchfield City					A		P		A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	P	A	N/A
Reading City					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	P	A	N/A
Adams Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	P	P	P	P	A	N/A
Allen Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	A	A	N/A
Amboy Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	P	P	P	A	A	N/A
Cambria Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	P	A	A	P	A	N/A
Camden Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	A	A	N/A
Fayette Twp				P	A				A	P	P	P	P		N/A	P		P	P	P	A	P	A	P	P	A	N/A
Hillsdale Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	A	A	N/A
Jefferson Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	P	A	N/A
Litchfield Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	P	A	P	P	A	N/A
Moscow Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	A	A	N/A
Pittsford Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	A	A	N/A
Ransom Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	P	A	P	A	A	N/A
Reading Twp					A		P		A	P	P	P	P		N/A	P		P	P	P	A	A	A	P	P	A	N/A
Scipio Twp				P	A				A	P	P	P	P		N/A	P		P	P	P	A	P	A	P	P	A	N/A
Somerset Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	A	P	A	A	A	N/A
Wheatlnd Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	P	A	P	A	A	N/A
Woodbrdg Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	P	P	A	N/A
Wright Twp					A				A	P	P	P	P		N/A	P		P	P	P	A	P	A	P	P	A	N/A
Allen Village					A		A		A	P	P	P			N/A	P		P	P	P	A	A	A	A	A	A	N/A
Camden Vilg.					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	A	A	N/A
Jonesville Vlg.				P	A		P		A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	A	A	N/A
Montgomery Vl					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	P	A	N/A
North Adams V					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	P	A	N/A
Waldron Vlg.					A				A	P	P	P	P		N/A	P		P	P	P	A	A	A	A	A	A	N/A

A = Actual Experiences P = Potential Experiences N/A = Not Available

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. The staff of the Region 2 Planning Commission reviewed potential hazards from the perspective of six characteristics. These characteristics include:

- 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.

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 complete 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. A high score indicates the importance of developing 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 comprised the total ranking for each hazard.

Hazard Ranking and Vulnerability													
					Potential for								
	Likelihood of Occurrence		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**
Civil Disturbances	1	0.30	0	0.00	6	1.20	1	0.15	10	0.50	1	0.10	2.25
Earthquakes & Subsidence													
Earthquakes	2	0.60	10	2.00	1	0.20	1	0.15	10	0.50	1	0.10	3.55
Subsidence	1	0.30	0	0.00	1	0.20	0	0.00	10	0.50	0	0.00	1.00
Fire Hazards													
Scrap Tire Fires	3	0.90	1	0.20	1	0.20	0	0.00	10	0.50	1	0.10	1.90
Structural Fires	10	3.00	3	0.60	5	1.00	2	0.30	0	0.00	0	0.00	4.90
Wildfires	7	2.10	2	0.40	1	0.20	1	0.15	9	0.45	2	0.20	3.50
Flooding Hazards													
Riverine Flooding	8	2.40	1	0.20	1	0.20	4	0.60	5	0.25	5	0.50	4.15
Shoreline Flooding	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.00
Dam Failures	1	0.30	1	0.20	1	0.20	3	0.45	10	0.50	5	0.50	2.15
Energy and Utility/Infrastructure Failures													
Energy Emergencies	10	3.00	10	2.00	2	0.40	3	0.45	0	0.00	2	0.20	6.05
Significant Infrastructure Failures	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

Hazard Ranking and Vulnerability Cont...													
	Likelihood of Occurrence		Percent of Population Affected		Potential for				Public Awareness of Hazard		Corollary Effects		Total
Hazard	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rank**	**Rate**	**Rate**
Hazardous Materials Incidents													
Fixed Site HazMat Incident	1	0.30	1	0.20	2	0.40	2	0.30	9	0.45	1	0.10	1.75
HazMat Transportation Incident	1	0.30	1	0.20	1	0.20	1	0.15	5	0.25	1	0.10	1.20
Nuclear Power Plant Accidents	0	0.00	0	0.00	0	0.00	0	0.00	10	0.50	0	0.00	0.50
Oil & Gas Well Accidents	4	1.20	1	0.20	1	0.20	0	0.00	8	0.40	0	0.00	2.00
Pipeline Accidents	1	0.30	1	0.20	1	0.20	1	0.15	9	0.45	1	0.10	1.40
Homeland Security													
Nuclear Attacks	1	0.30	5	1.00	5	1.00	5	0.75	10	0.50	5	0.50	4.05
Terrorism/Sabotage/WMD	1	0.30	1	0.20	1	0.20	0	0.00	10	0.50	0	0.00	1.20
Public Health Emergencies	1	0.30	5	1.00	5	1.00	5	0.75	10	0.50	5	0.50	4.05
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													
Hail	10	3.00	3	0.60	1	0.20	1	0.15	0	0.00	2	0.20	4.15
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
Tornadoes	8	2.40	3	0.60	5	1.00	5	0.75	0	0.00	2	0.20	4.95
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
Percent of Points		**30%**		**20%**		**20%**		**15%**		**5%**		**10%**	**100%**

The evaluation of risk and vulnerability conducted by staff led to a preliminary prioritization of hazards facing Hillsdale County to be: 1) Energy Emergencies, 2) Snow Storms, 3) Ice Storms, 4) Tornadoes, 5) Structural Fires, 6) Lightning, and 7) Significant Infrastructure Failures. 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.

Top Hazards
#1 Energy Emergencies & Infrastructure
#2 Snow and Ice Storms
#3 Tornadoes
#4 Structural and Wild Fires
#5 Oil and Gas Well Accidents
#6 Public Health Emergencies

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

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

Hillsdale County Comprehensive Plan

A Hazard Mitigation Plan has to be developed and monitored in combination with the county's Comprehensive Plan. Goals and policies for development in Hillsdale County are outlined in their Comprehensive Plan that was adopted on December 12, 2002. The General County Goals are:

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 the business and industries the conduction operations within Hillsdale County.
2. Encourage well-planned intensive development in existing urban areas or existing growth corridors that have public services available.
3. Encourage the preservation of the County's agricultural basis, its open space, and natural resources by supporting growth in and around existing urbanized areas.
4. Promote Hillsdale County as a place with individual identify while maintaining a rural character; keeping the diversity of people and environment in balance and encouraging orderly community growth.
5. Support the establishment of a sound economic base through a combination of industrial and commercial establishments.

For more detail on these goals, please go to www.co.hillsdale.mi.us.

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

Hazard Mitigation Plan and Mitigation Strategies

This 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 pubic health emergencies.

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 four 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 needed for all local governmental operations.

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

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 well being of our nation.

A set of mitigation strategies has been developed for Hillsdale County by the staff of the Region 2 Planning Commission and reviewed by the Hillsdale County Board of Commissioners at a regular meeting on August 26, 2008. Citizens in attendance were offered an opportunity to participate in the review process.

The proposed plan and mitigation strategies were also presented to the Hillsdale Chapter of the Michigan Townships Association at their regular meeting of October 1, 2008. The Chapter recommended changes to priorities and strategies relating to concern for risk from wildfires and oil and gas well hazards. The draft plan was modified accordingly.

The result of the efforts by the Hillsdale County Board of Commissioners with input from citizens and from Hillsdale Townships were a set of mitigation strategies which could be applied to address the hazards the community faces. These strategies could be categorized in two ways. First, a set of strategies were proposed which could apply generally to address all of the hazards which face the Hillsdale communities. Second, strategies were identified to address each of the priority hazards agreed upon by the Hillsdale County Board of Commissioners and the Hillsdale County MTA Chapter.

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

Strategies that Apply to All Hazards:

1. **Implement and enhance public information and education programs aimed at Hillsdale County citizens regarding potential emergencies and how to prepare and respond**. As a 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 in the community master planning**. As a means of mitigating the hazards facing the county, there is a need to incorporate hazard mitigation planning into each community's master planning process. 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 ensure a review of the hazard mitigation plan at least once every five years when the Community Master Plan is reviewed and updated.
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.

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

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 and Ice Storms
3. Tornadoes
4. Structural and Wild Fires
5. Oil and Gas Well Hazards
6. 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.

Currently, no funds exist to complete the proposed mitigation strategies. The mitigation strategies need to be prioritized so that when funds become available, the highest priority strategy can begin to be implemented. In all cases, the most important mitigation strategy is an informed and educated public.

Energy Emergencies and Infrastructure Failures

The top hazard facing Hillsdale County is the interruption of electrical energy to the community's industry, business, institutions, and residences. Interruptions are frequently caused by storm events. The following mitigation strategies are proposed:

1. Proper location, design, and maintenance of water and sewer systems.
2. Burying electrical and phone lines, where possible, to resist damage from severe winds.
3. Redundancies in utility and communication systems, especially "lifeline" systems.
4. Separation and/or expansion of sewer systems to handle anticipated stormwater volumes.
5. Use of generators for backup power at critical facilities.
6. Replacement or renovation of aging structures and equipment.
7. Tree-trimming programs to protect utility wires from falling branches. Ideally, the establishment of a community forestry program with the main goal of creating and maintaining a disaster-resistant landscape in public rights-of-way.
8. Acquire portable generators for use at school buildings as possible emergency shelters.

Snow and Ice Storm 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. Pre-planning for debris management staging and storage areas. Specific plans for disposal of debris cannot be made until you have knowledge of what it is and where it is located. Ideally, identifying predetermined locations for the collection and processing of snow and tree limbs in

urban areas would be helpful, but that doesn't mean that these locations would be suitable in any given situation. Hillsdale County's Emergency Plan states that the disposal of debris will be handled in an expeditious manner.

2. Schools and other buildings have been designated as shelters for several years. These sites are not publicly announced, since in many circumstances, a particular shelter may not be open. Appropriate shelters will be opened when needed and the public will be advised of such availability via local radio, newspaper, television, and public postings

Tornadoes

Hillsdale County has experienced deaths and substantial property damage from tornadoes. While no serious tornado damage has been experienced over the past several years, tornado events are possible and could result in loss of human life and substantial property damage. 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 repaired or replaced as local funds permit. Hillsdale County does not own or maintain any sirens. It is the responsibility of each municipality, lake association, township, etc. to install and maintain their siren system(s). Particular attention should be focused on mobile home parks in rural areas where a small warning siren may be displayed to provide an audible warning to residents. Citizens will be encouraged to keep themselves informed of daily weather forecasts and hazards using an NOAA weather radio and other tools.
2. Proper anchoring of manufactured homes and exterior structures such as carports and porches.
3. Schools and other buildings have been designated as shelters for several years. These sites are not publicly announced, since in many circumstances, a particular shelter may not be open. Appropriate shelters will be opened when needed and the public will be advised of such availability via local radio, newspaper, television, and public postings

4. Hillsdale County's Emergency Management Center should be reviewed to determine its adequacy. If the review justifies the construction of a new emergency management center to facilitate emergency warning and response, local officials must determine where the center could be located and how construction and necessary equipment could be financed.

Structural and Wild Fires

Structural

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 the Hillsdale downtown area, where, due to the number of persons working in buildings, evacuation of large numbers of people is cumbersome. It is suggested that a committee be established to consist of the emergency management coordinator for the county, the fire inspector, and building owners in the downtown area to discuss and address this issue.
2. Hillsdale County has a good system of fire protection provided by its local units of government, the City of Hillsdale, townships, and villages. An effective mutual aid system exists. The community will review and consider the development of intergovernmental 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 enhanced fire protection services at a reduced cost. The responsibility for the implementation of these measures rests with the collective fire departments and their local units of government.
3. Measures to reduce urban blight and associated arson.

4. Transportation planning that provides roads, overpasses, etc. to maximize access and improve emergency response times and evacuation potential for all inhabited or developed areas of a community.

Wildfires

Wildfires are a concern of local officials. Though the county has experienced few serious wildfires since 1980, there exists a threat, particularly due to the amount of residential development in rural areas. A sizable wildfire could pose a threat to a large number of dwellings. The following strategies are recommended to mitigate the potential impacts of wildfires:

1. There are currently state laws that govern burning permits, campfires, and outdoor burning during dry times. These laws are enforced within Hillsdale County so there is no need for additional ordinances in regards to preventing wildfires.
2. Many local communities currently require the clean-up of areas of abandoned or collapsed structures and removal of accumulated junk and debris to minimize the potential for arson or spontaneous combustion through their zoning ordinances. Those areas of the county that do not have specific zoning ordinances will be assisted in developing guidelines for these areas.
3. Promote the safe disposal of yard and house waste rather than through open burning.
4. Residents should be educated in the safe use, cleaning, and maintenance of fireplaces and chimneys and encouraged to use spark arresters.

Oil and Natural Gas Well Accidents

Hillsdale County has 1,320 oil and gas wells. Although the industry has a fine 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. Representatives from Calhoun County should be interviewed so that lessons learned from their pipeline spill can be utilized if the same disaster occurs in Hillsdale County.

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 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 coordinator:

1. Encourage residents to receive immunizations against communicable diseases.
2. Improve ventilation techniques in areas/facilities prone to crowding, or that may involve exposure to contagion or noxious atmospheres.
3. Maintain community water and sewer infrastructure at acceptable operating standards.
4. Provide back-up generators for water and wastewater treatment facilities to maintain acceptable operating levels during power failures.
5. Demolish and clear vacant condemned structures to prevent rodent infestations.

6. Increase public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies.
7. Promote brownfield and urban blight clean-up activities.

Mitigation Strategy Prioritization and Implementation

Strategy Prioritization

The mitigation strategies proposed to address potential hazards in Hillsdale County were analyzed to determine their benefit, cost, and implementation potential. While the analysis was subjective, the process resulted in a defensible priority determination for strategy implementation. The initial determination for benefit, cost, and implementation potential was made by the Region 2 planning staff. The organizations and entities charged with implementation then confirmed this initial listing.

The benefit of each strategy was determined to be of “High”, “Medium”, or “Low” value relative to the range of strategies suggested. Costs were similarly estimated with consideration of both capital and on-going, long-term operational costs. Implementation potential represents the ease of implementation given:

1. political considerations;
2. where the cost would not necessarily benefit the implementing organization; and
3. the need to convince third party organizations of the value of the implementation of the strategy (i.e., requesting a manufactured housing park to construct a shelter).

Each government agency was asked to fill out the following form. “High”, “medium”, and “low” ratings were assigned to each mitigation factor and than extrapolated into the following table. All mitigation measures were given a rating.

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

Hillsdale County Hazard Mitigation Plan HAZARD MITIGATION STRATEGY PRIORITIZATION					
Hazard	**Strategy**	**Estimates of Benefits and Costs**		**Implementation Potential**	**Priority**
		Potential Impact (Benefit)	**Cost**		
Energy Emergencies	Water & Sewer Systems	HIGH	HIGH	LOW	MEDIUM
	Buried Lines	HIGH	HIGH	LOW	MEDIUM
	Redundancies in Communication	LOW	LOW	LOW	LOW
	Generators	MEDIUM	MEDIUM	MEDIUM	MEDIUM
	Aging Structures and Equipment	MEDIUM	HIGH	LOW	MEDIUM
	Tree Trimming	HIGH	HIGH	MEDIUM	HIGH
Snow and Ice Storms	Debris Management	HIGH	HIGH	MEDIUM	HIGH
	Public Shelters	LOW	LOW	MEDIUM	MEDIUM
Tornadoes	Public Warning System	HIGH	MEDIUM	MEDIUM	HIGH
	Manufactured Housing Anchoring	MEDIUM	MEDIUM	LOW	LOW
	Designated Shelters	LOW	MEDIUM	MEDIUM	LOW
	New Emergency Center	MEDIUM	MEDIUM	LOW	LOW
Structural and Wild Fires	Sprinkler Systems	HIGH	HIGH	LOW	MEDIUM
	Cooperation among Agencies	HIGH	LOW	HIGH	HIGH
	Reduce Urban Blight	LOW	MEDIUM	LOW	MEDIUM
	Improved Transportation System	MEDIUM	HIGH	LOW	LOW
	Reaffirm State Laws	LOW	LOW	HIGH	LOW
	Clean-up of Unused Structures	LOW	MEDIUM	LOW	MEDIUM
	Safe Disposal of Waste	HIGH	HIGH	LOW	LOW
	Fireplace and Chimney Cleaning	HIGH	LOW	HIGH	HIGH

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

Hillsdale County Hazard Mitigation Plan HAZARD MITIGATION STRATEGY PRIORITIZATION					
Hazard	**Strategy**	**Estimates of Benefits and Costs**		**Implementation Potential**	**Priority**
		Potential Impact (Benefit)	**Cost**		
Oil and Gas Wells	Education	MEDIUM	MEDIUM	MEDIUM	MEDIUM
	Buffer Strips	MEDIUM	HIGH	LOW	LOW
	Location and Emergency Procedures	HIGH	MEDIUM	HIGH	HIGH
Public Health Emergencies	Immunizations	HIGH	MEDIUM	HIGH	HIGH
	Improved Ventilation	MEDIUM	MEDIUM	LOW	LOW
	Water & Sewer Operating Systems	HIGH	HIGH	LOW	MEDIUM
	Back-Up Generators	MEDIUM	HIGH	MEDIUM	MEDIUM
	Demolish Vacant Structures	LOW	HIGH	LOW	LOW
	Increase Public Awareness	HIGH	LOW	MEDIUM	MEDIUM
	Clean Up Urban Blight	LOW	HIGH	LOW	LOW

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

Responsible Lead Organization, Funding, and Time Frame for Implementation

The table entitled “Responsible and Potential Lead Agencies” identifies the agency or agencies responsible for strategy implementation. More than one agency is identified as responsible for the implementation of a particular strategy if there is a logical reason for such a designation. Other agencies are identified as potential lead organizations if they could assume some or all of the responsibility for strategy implementation.

“High” priority strategies, such as tree trimming, debris management, and improved public warning systems, should be currently underway or implemented immediately upon plan adoption. “Medium” priority strategies, including water and sewer system improvements, public shelters, and cleaning up urban blight and unused structures, will be implemented as soon as possible after adoption. The implementation of “Low” priority strategies will be initiated in future years as funding is identified and becomes available.

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

RESPONSIBLE AND POTENTIAL LEAD AGENCIES AND POSSIBLE FUNDING SOURCES																					
Hazard	**Strategy**	**Responsible and Potential Lead Organizations**												**Possible Funding Sources**							
		R2PC	HCEM	R2CAA	HCHD	HCDA	Local Gov't	Utilities	Private	CHPW, HCRC	CHCD	HCSD	MDOT	FEMA	County Funds	CDBG	R2CAA	Private	Foundation	Local Gov't	MDOT / FHWA
Energy Emergencies	Water & Sewer						R	P	R	P				X		X	X	X	X	X	X
	Buried Lines						R	R	R					X				X		X	X
	Redundancy							R		R				X		X		X	X		
	Generators		P				P	R	R					X	X	X	X	X			
	Aging Infrastructure & Equipment						P	R		R				X	X	X	X	X	X	X	
	Tree Trimming						R	R	R	R			P	X	X	X	X	X	X	X	X
Snow & Ice Storms	Debris Management		P			P	P		P					X	X	X	X	X	X	X	X
	Public Shelters		P	P			R				P			X	X	X				X	
Tornadoes	Warning System		R				R							X	X	X				X	
	Manufactured Housing Anchor				P	P	R							X	X	X	X			X	
	Designated Shelters		R		R		R							X	X			X	X	X	
	New Emergency Center		P				R							X	X			X	X	X	
Structural and Wild Fires	Sprinkler Systems						R		P									X			
	Cooperation among Agencies		R				R					P			X					X	
Oil and Gas Well Emergencies	Education		P				R	R						X	X	X	X	X		X	
	Buffer Strips						R	P						X				X			
	Location & Emergency Procedures		R				R	R						X	X	X	X	X		X	
Public Health Emergencies	Immunizations	P	P		R	P	R													X	
	Improved Ventilation	P			P		R													X	
	Water & Sewer Operating Systems						R			R			R	X		X		X		X	
	Backup Generators		P		P		P	P		R			R		X					X	X
	Demolish Vacant Structures	P					R													X	
	Clean Up Urban Blight						R													X	

R + Responsible Organization P + Potentially Responsible Organization

R2PC = Region 2 Planning Commission; **HCEM** = Hillsdale County Emergency Management; **HCSD** = Hillsdale County Sheriffs Dept; **R2CAA** = Region 2 Community Action Agency; **HCHD** = Hillsdale County Health Dept; **FEMA** = Federal Emergency Management Agency; **CDBG** = Community Development Block Grant; **CHPW** = City of Hillsdale Public Works Dept.; **CHCD** = City of Hillsdale Community Development; **MDOT** = Michigan Department of Transportation; **HCDA** = Hillsdale County Department on Aging; **HCRC** = Hillsdale County Road Commission; **HCDA** = Hillsdale Commission on Aging; **FHWA** = Federal Highway Administration

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

Implementation of Strategies by Local Units of Government

Each of Hillsdale County's local units of government has at least one action that may be taken as a means of mitigation of a hazard. These actions, or the implementation of a strategy contained within the plan, are shown on the table entitled "Strategy Implementation by Local Unit of Government". The reference to Hillsdale County includes the involvement and participation of the Hillsdale County Emergency Management Department, the Hillsdale County Health Department, the Hillsdale County Sheriff's Department, and the Hillsdale County Road Commission. Each of Hillsdale County's townships and villages are shown on the table, as are the City of Hillsdale and Hillsdale County.

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

HILLSDALE COUNTY HAZARD MITIGATION PLAN Strategy Implementation by Local Unit of Government																														
		Hillsdale County	City of Hillsdale	City of Litchfield	City of Reading	Adams Twp	Allen Twp	Amboy Twp	Cambria Twp	Camden Twp	Fayette Twp	Hillsdale Twp	Jefferson Twp	Litchfield Twp	Moscow Twp	Pittsford Twp	Ransom Twp	Reading Twp	Scipio Twp	Somerset Twp	Wheatland Twp	Woodbridge Twp	Wright Twp	Village of Allen	Village of Camden	Vil of Jonesville	Vil of Montgomery	Vil of N. Adams	Vil of Waldron City of Reading
Energy Emergencies & Infrastructure Failures	Water & Sewer Systems	X														X							X			X			
	Buried Lines	X														X							X			X			
	Redundancies in Communication	X														X							X			X			
	Generators	X														X							X			X			
	Aging Structures and Equipment	X														X							X			X			
	Tree Trimming	X														X							X			X			
Snow and Ice Storms	Debris Management	X						X								X							X			X			
	Public Shelters	X						X								X							X			X			
Tornadoes	Public Warning System	X						X								X							X			X			
	Manufactured Housing Anchoring	X						X								X							X			X			
	Designated Shelters	X						X								X							X			X			
	New Emergency Center	X						X								X							X			X			
Structural and Wild Fires	Sprinkler Systems	X														X					X		X			X			
	Cooperation Among Agencies	X														X					X		X			X			
	Reduce Urban Blight & Abandoned Buildings	X														X					X		X			X			
	Improved Transportation System	X														X					X		X			X			
	Reaffirm State Laws	X														X					X		X			X			
	Save Disposal of Waste	X														X					X		X			X			
	Fireplace & Chimney Cleaning	X														X					X		X			X			

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

HILLSDALE COUNTY HAZARD MITIGATION PLAN Strategy Implementation by Local Unit of Government																														
		Hillsdale County	City of Hillsdale	City of Litchfield	City of Reading	Adams Twp	Allen Twp	Amboy Twp	Cambria Twp	Camden Twp	Fayette Twp	Hillsdale Twp	Jefferson Twp	Litchfield Twp	Moscow Twp	Pittsford Twp	Ransom Twp	Reading Twp	Scipio Twp	Somerset Twp	Wheatland Twp	Woodbridge Twp	Wright Twp	Village of Allen	Village of Camden	Vil of Jonesville	Vil of Montgomery	Vil of N. Adams	Vil of Waldron City of Reading
Oil and Gas Well Emergencies	Education	X														X														
	Buffer Strips	X														X														
	Location and Emergency Procedures	X														X														
Public Health Emergencies	Immunizations	X														X					X		X							
	Improved Ventilation	X														X					X		X							
	Water & Sewer Operating Systems	X														X					X		X							
	Back-Up Generators	X														X					X		X							
	Demolish Vacant Structures	X														X					X		X							
	Increase Public Awareness	X														X					X		X							
	Clean Up Urban Blight																													

Additionally, Pittsford Township would place siren sub-stations in further locations to ensure all residents are within hearing range when a disaster is pending. Hillsdale County Schools suggest collaboration among all agencies and organizations and communicate expectations. The school's automatic telephone system can also be utilized. All schools have a crisis management plan that has been reviewed by law enforcement. The Hillsdale County Park Commission requires an upgrade so that proper equipment is available to deal with hazards. The Hillsdale County Chamber of Commerce has faith in their current emergency management system. The county also utilizes the local radio system to broadcast any emergency. A Hillsdale County Commissioners suggests an elevated communication loop would be benefit as well as coordinated planning and publicity.

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

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, the Emergency Management Director within the Hillsdale County Sheriff's Department, and local units of government. Upon plan adoption, the Emergency Management Director will begin the implementation of the strategies established in the Hazard Mitigation Plan in the order of the priority contained within the plan.

A sub-committee may be established to address specific mitigation strategies within local units of government which might be affected by specific hazards in the plan. Where capital improvements are necessary or where significant outlays of community funds are required, the Community Planning Committee will work with local units of government to identify the improvements or projects necessary and to locate appropriate funding.

Annual Report

An annual report will be prepared which will describe progress in the implementation of the Hillsdale County Hazard Mitigation Plan. The annual report will include a review of the hazardous occurrences, including successes, failures, opportunities, and obstacles associated with them. Projects or programs which are underway, or which have been completed will be presented in the report. The annual report will also include the preparation of a hazard mitigation work program for the coming year, and will identify specific tasks to be completed. Finally, the annual report will include a determination as to whether any amendments are necessary to the plan. Amendments will be determined by the committee and will be posted for public notification in the same manner as other public documents.

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

Plan Update

The Hillsdale County Hazard Mitigation Plan will be incorporated into each community's master planning process and updated as required by law.

In addition, local units of government including Hillsdale County's cities, townships, and villages will be encouraged to incorporate the hazard mitigation planning process into their local master plans. At the time of update, the community will be advised of the contents of the Hazard Mitigation Plan so that they may incorporate relevant provisions of the plan into their local master plan. In addition, the local units will be encouraged to review potential hazards facing their unit of government and to develop mitigation strategies which can be applied. The strategies resulting from this effort will be provided to the Hillsdale County Planning Commission for their use in the preparation of the update to the Hillsdale County Hazard Mitigation Plan.

Public Participation

Public participation is viewed to be an important component in the planning process. This participation is integral in developing goals, objectives, and strategies contained within the plan, but it is also necessary in order to facilitate the implementation of strategies.

The public is offered the following opportunities for participation in the hazard mitigation planning process:

1. **Public hearings** – public hearings will be held before each unit of government which considers adoption of the Hillsdale County Hazard Mitigation Plan.
2. **Public discussion** – public discussion will be held in open forums at Hillsdale County Planning Commission meetings, city, township and village planning commission meetings, and the meetings of the city council, the Hillsdale County Board of Commissioners, township boards, and village councils.
3. **Web based opportunities** – The Hillsdale County Planning Commission will consider the use of web based opportunities for citizen participation and implement them to facilitate the citizen participation process.

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

APPENDIX 1

Survey Sent to Local Governments

HILLSDALE COUNTY HAZARD MITIGATION SURVEY

Local Unit of Government:_____

Question 1:

In 2008, the Hillsdale County Hazard Mitigation Planning Committee selected a list of hazards that have the greatest potential impact on Hillsdale County. The top six hazards from their point of view are:

1. **Energy Emergencies and Infrastructure Failures**
2. **Snow and Ice Storms**
3. **Tornadoes**
4. **Structural and Wild Fires**
5. **Oil and Gas Well Accidents**
6. **Public Health Emergencies**

The following table includes a list of 27 hazard categories that were cconsiderednsidered in the Hillsdale County Hazard Mitigation Plan. What you feel are the top six hazard categories that your community is most likely to face:

Civil Disturbances
E

Hazard #1_____

Hazard #2_____

Hazard #3_____

Hazard #4_____

Hazard #5_____

Hazard #6_____

Is your community vulnerable to other hazards that are not listed in the above table? If so, please list those hazards.

Question 2:

Is your community currently taking any actions to prevent or reduce the impact of hazards that may affect your community? If so, please describe these actions. *(Use additional pages if necessary.)*

Question 3:

If your top six hazards are listed below, please indicate with an "X" how prepared your community is for any of these hazards. If your hazard is not noted below, please add it to the bottom of the list along with your preparedness for it.

Hazard Type	Very Prepared	Somewhat Prepared	Unprepared	Unknown
Energy Emergencies				
Snow and Ice Storms				
Tornadoes				
Structural and Wild Fired				
Oil and Gas Well Accidents				
Public Health Emergencies				

Question 4:

Are there any actions that can be taken to lessen the effects of the hazards which can affect your community?

General Comments:

Name of person who completed this survey: _____

Governmental Agency: _____

Phone:_____

Email:_____

Actual (A), Potential (P)

Wildfire _____

Dam Failure _____

Thank you for completing this survey.

Mail to: Region 2 Planning, 120 W. Michigan, Jackson MI 49201
E-Mail to: srichard@co.jackson.mi.us
Fax to: 517-788-4635

APPENDIX 2

Public Involvement