

Tuscola County Hazard Mitigation Plan



2022

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Preface

Hazard mitigation is any action taken before, during or after a disaster to permanently eliminate or reduce the long-term risk to human life and property from natural, technological and human related hazards. It is an essential element of emergency management , along with preparedness, response and recovery. There is a cyclical relationship between the four phases of emergency management. A community prepares for a disaster and then responds when it occurs. Following the response, there is a transition into a recovery process, during which mitigation measures are evaluated and adopted. This, in turn, involves the preparedness posture of the community for the next incident. When successful, mitigation will lessen the impacts to such a degree that succeeding incidents will remain incidents and not become disasters.

Hazard mitigation strives to reduce the impact of hazards on people and property through the coordination of resources, programs and authorities so that, at the very least, communities do not contribute to the increasing severity of the problem by allowing repairs and reconstruction to pre-disaster conditions. While such efforts may expedite a return to “normalcy”, replication of pre-disaster conditions that could be changed results in a cycle of damage, reconstruction and damage again.

Hazard mitigation is needed to ensure that such cycles are broken, that post-disaster repairs and reconstruction take place after damages are analyzed and that sounder, less vulnerable conditions are produced. Through a combination of regulatory, administrative and engineering approaches, losses can be limited by reducing susceptibility to damage. Hazard mitigation provides the mechanism by which communities and individuals can break the damage-reconstruction cycle.

Recognizing the importance of reducing community vulnerability to natural and technological hazards, Tuscola County is actively addressing the issues through the development and subsequent implementation of this plan. The many benefits to be realized through this effort -

protection of the public health and safety, preservation of essential services, prevention of property damage, and preservation of the local economic base, to mention just a few- will help ensure that Tuscola County remains a vibrant, safe and enjoyable place to live and work.

Introduction

The Tuscola County Hazard Mitigation Plan was created to protect the health, safety and economic interests of residents by reducing the impact of natural and technological hazards through hazard mitigation, planning, awareness and implementation. Hazard mitigation is any action taken to permanently eliminate or reduce long term risk to human life and property from natural and technical hazards. It is an essential element of emergency management along with preparedness, response and recovery.

This plan serves as the foundation for hazard mitigation activities within the community. Implementation of the Plan's recommendations will reduce injuries, loss of life and destruction of property due to natural and technological hazards. The Plan provides a path toward continuous, proactive reduction of vulnerability to the most frequent hazards that result in repetitive and often severe social, economic and physical damage. The ideal end-state is total integration of hazard mitigation activities, programs, capabilities and actions into normal day-to-day governmental functions and management practices.

The Tuscola County Hazard Mitigation Plan examines multi-hazard mitigation activities and opportunities. Emphasis is placed on hazards that have had significant impact on the community in the past. The planning process followed in the development of the Tuscola County Hazard Mitigation Plan consisted of the following steps:

1. Identification of the hazards and risks
2. Identification and definition of goals and objectives
3. Identification of alternatives for solving problems
4. Selection of evaluation criteria
5. Selection of alternatives considered feasible as mitigation strategies
6. Implementation strategies

Chapter 1: The Planning Process

In the age of Covid-19 and the implications that it has caused, completing the required Hazard Mitigation Plan update has been challenging. Because of this, the kick off meeting was held on September 24, 2020 in conjunction with the Tuscola County LEPC & All Hazards meetings, which were held outside at the Almer Township Darbee Park.

The Tuscola County All Hazards is a group that is composed of volunteers and professionals from throughout the county and region. Those attending this meeting included the following:

Official	Title	Entity/Government
Steve Anderson	Emergency Manager	Tuscola County Emergency Management
Katie Alexander(Tennant)	Emergency Preparedness Coordinator	Tuscola/Huron Health Department
Lt. Brian McComb	Post Commander	Michigan State Police
Sheriff Glen Skrent	Sheriff	Tuscola County Sheriff's Office
Doug Young	Fire Chief	Fairgrove Fire Department
Roger Edwards	Chair	Tuscola RACES/ARES & Tuscola County LEPC Chair
Rick Cox	Maintenance	Caro Community Schools
Mary Scigel		McLaren Caro Region
Mark Jensen	Commissioner	Millington Fire Department /Tuscola County Board of Commissioners
Robert Hiiter	Fire Chief	Mayville Fire Department
Randy Heckroth	Fire Chief	Caro Fire Department
Jimmy McDaniel	Life Safety Officer	Tuscola County Medical Care Community
Jay Tuckey	Superintendent/Manager	Tuscola County Road Commission
Caryl Langmaid	Chief Deputy Clerk	Tuscola County Clerk's Office
Mark Newvine	Emergency Preparedness Coordinator	Hills and Dales General Hospital
Mindy Zmierski	HR/Administrative Assistant	Tuscola Behavioral Health Systems
Eric Snidersich	Assistant Director	Saginaw-Tuscola Medical Control Authority
Ann Westover	Transportation Director	Caro Community Schools
Melissa Hobson	Safety Coordinator	Lighthouse Rehabilitation Center
Meridith Latimer	Director	Davita Dialysis
Sandy Bills	Coordinator	Tuscola County CERT

During this initial roll out meeting, the Hazard Mitigation Plan was explained as well as the need to update the plan every five years as described in the Disaster Mitigation Act of 2000 which advises that states and local governments are required to develop local hazard mitigation plans in order to be eligible for pre- and post-disaster funding from the federal government. With COVID-19, it was also explained that the process would be different and that surveys would be conducted to help gather information and data for the plan.

During the process of drafting this plan, the Tuscola County All Hazards group was called upon to review and update risk and vulnerability assessments of hazards that are associated with Tuscola County.

The Hazard Mitigation Plan serves as the foundation for hazard mitigation activities within the community. Implementation of the plan's recommendations will assist in the reduction of injuries, loss of life, and the destruction of property due to natural and technological hazards. The Hazard Mitigation Plan provides a path toward continuous, proactive reduction of vulnerability to the most frequent hazards that result in repetitive and often severe social, economic and physical damage. The ideal end-state would be the total integration of hazard mitigation activities, programs, capabilities and actions into normal, day-to-day governmental functions and management practices.

Surveys:

To gather information about this Hazard Mitigation Plan update, multiple surveys were completed. The first survey was sent out to members of the All Hazards Team which gathered information about natural hazards and their associated risks. This survey was sent out on January 19th via Google Forms to 78 potential participants, with a reminder sent out on January 27, 2021. This survey was closed with 25 respondents answering the survey.

The second survey was also sent out to the All Hazards Team and it gathered information about technical & adversarial/human related hazards. The invite for this survey was sent out on February 10, 2021, to 91 potential participants via Google Forms. This survey received 35 responses.

The third survey was sent out on February 19, 2021, to the stakeholders (police, fire chiefs and local units of government) of the county and was used to gather information on the hazards they face and how that organization is impacted by hazards and what could be done to mitigate future hazards. Included in this survey was an area for the respondent for listing potential hazard mitigation projects and any concerns or comments about the hazard mitigation plan and its update.

The participants, the surveys and the results of those surveys are all included in appendices 2-8 at the end of this Plan..

Specific Plan Review/Update:

Chapter 1: The Planning Process

- Reviewed and updated the content and process of how the plan will be constructed.

Chapter 2: Community Profile and Data

- Reviewed and updated population and housing demographics, and economic information.

Chapter 3: Community Services and Facilities

- Reviewed and updated the county government, township, and local units of government divisions, public safety (law enforcement, fire, & emergency medical services), medical facilities, utility services, and other pertinent features within Tuscola County

Chapter 4: Hazard Identification

- Reviewed and updated all of the natural, technological, and human-related hazards. Sections dealing with cyber security and active assailant events were added to the plan.

Chapter 5: Overall Goals and Objectives

- Reviewed and updated the goals and objectives.

Chapter 6: Previous Mitigation Goals

- Reviewed and updated previous goals. History of what accomplishments have been added to each goal.

Chapter 7: Action Plan

- The Action Plan section was revised to be easier understood from the previous version. Action items that were most reasonable and would offer the best impact were selected.

Chapter 8: Previous Hazard Mitigation “Action Plans”

- Section was reviewed and included a short narrative about each Action Item and why it was placed in this section.

Chapter 9: Implementation, Maintenance and Integration

- Reviewed and made minor changes to this section

Community Involvement:

Because of the ongoing Covid-19 Public Health Emergency, alternative means of communication were used to gather input and collect data from the public, local units of government, stakeholders and neighboring jurisdictions. Information about the Hazard Mitigation Plan update was disseminated to these groups by the use of the media, emails and other electronic means including online surveys.

A copy of this document was also forwarded to the Tuscola County Planning Commission for their review as well.

A Draft Hazard Mitigation Plan was placed on the county website and the public was given an opportunity to leave comments on the draft plan. The Hazard Mitigation Plan was also presented to the Tuscola County Board of Commissioners during one of their public meetings for their review before adopting the document. The Hazard Mitigation Plan was also disseminated to neighboring counties for their input as well.

Any comments received from these processes are included in the Appendix section of this plan.

Documents used to assist with the preparation of this hazard mitigation plan:

This update process included the review and incorporation of several documents which included the following; the most recent County's Master Plan, the 2019 Michigan Hazard Mitigation Plan, the Vassar Flood Mitigation Plan, miscellaneous maps from the Tuscola County GIS and other documents and information sources that included the U.S. Census, National Weather Service, EGLE, National Centers for Environmental Information, and other emergency management planning documents.

Local Unit of Government Structures to Implement Hazard Mitigation:

Each local unit of government within Tuscola County has an annual budget, unfortunately each unit of government has budget restraints that don't allow for mitigation projects to become priority without additional funding assistance. Most municipalities have previously participated in the County's Hazard Mitigation planning process to become eligible for FEMA mitigation program funding. It is the intent for this plan to be adopted by all 36 local units of government within Tuscola County. Further, most of the municipalities have a master plan or another type of comprehensive planning document and administer zoning. Through these regulatory and policy systems, as laid out in the Michigan Planning and Enabling Act, as amended, municipalities can regulate and enforce hazard mitigation strategies to lessen the effects of known hazards.

Using the information from all of the above sources, the Tuscola County Hazard Mitigation plan has been reviewed and updated to contain the most up to date information available.

As this plan has evolved, it has been sent out for review of multiple stakeholders. With the hopes that they will review the plan and provide any feedback or suggestions.

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Chapter 2: Community Profile and Data

The following summary provides a brief overview of the key characteristics of Tuscola County. This information will assist in understanding potential hazard risks and vulnerable areas, and will help in determining feasible mitigation strategies.

General Information:

Tuscola County is made up of 804.5 square miles of land and approximately 111 square miles of water. Of the approximate 520,805 acres of land, 39,036 acres are considered to be wetlands. Tuscola County ranks 20th out of 83 Michigan counties in square miles of land

There is an average of 66.2 people per square mile within the county.

Our current population as of 2019 is 52,245 which ranks Tuscola County 34th out of 83 counties in Michigan.

History:

Tuscola County was originally inhabited by Ojibwa Native Americans who arrived in the presumably uninhabited area around the 14th century.

The first European settlers in the area arrived from New York. In 1835, Ebenezer Davis, along with his first wife and eleven children, founded the first settlement in what is today known as Tuscola County. Around 1850, Tuscola County began to flourish with the introduction of the logging industry. In 1864, the county sent 40 million feet of logs down the Cass River to be processed as far away as the Saginaw Bay.

History would prove that this prosperity could not last forever. The great forest fires of 1871 and 1881 effectively ended logging in Tuscola County. With these apparent disasters, however, came great opportunity. Tuscola County's land was left cleared of trees and its soil was fertilized by ash, positioning it to become a prosperous farming community. Government incentives to grow sugar beets, originally introduced to the area by German settlers, ensured the crop's importance in Tuscola County's agriculture that remains today.

Corn is another important agricultural product to the county. Originally grown for food, until 2001 when construction began on the POET Biorefining Plant in Caro. Corn growers throughout the state supported the effort with coordination from Michigan State University and today the ethanol plant in Caro buys corn from farmers throughout the region and employs many people from within Tuscola County.

Another recent addition to the agricultural community was the building of the Dairy Farmers of America in Cass City which accepted its first load of raw milk in February of 2015. The factory

processes about 3 million pounds of raw milk into cream, condensed whole milk and condensed skim milk annually.

Local Units of Government:

Tuscola County is comprised of the following twenty-three townships, two cities and nine villages, of which is listed below:

Cities: Caro and Vassar

Villages: Akron, Cass City, Fairgrove, Gagetown, Kingston, Mayville, Millington, Reese and Unionville.

Townships: Akron, Almer, Arbela, Columbia, Dayton, Denmark, Elkland, Ellington, Elmwood, Fairgrove, Fremont, Gilford, Indianfields, Juniata, Kingston, Koylton, Millington, Novesta, Tuscola, Vassar, Watertown, Wells and Wisner.

Tuscola County also has several unincorporated areas which have no local forms of government and depend on their townships for governmental control.

Unincorporated Areas include: Deford, Fostoria, Richville, Tuscola, Wilmot, and Quanicassee.

Map 1: Tuscola County:

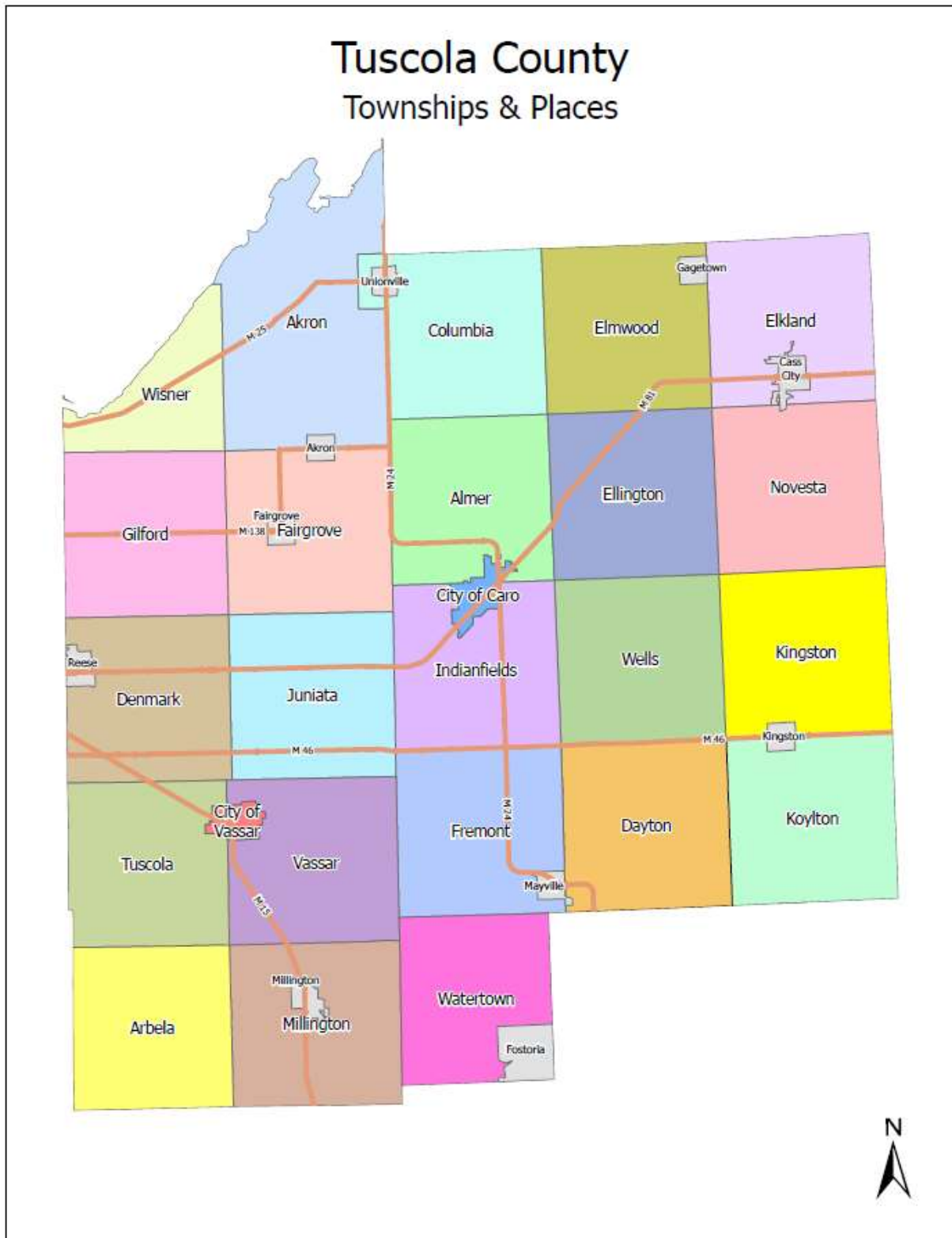


Table #1: Community Information & Participation in current and previous Hazard Mitigation Plans

Community Name	2010 Population	2019 Population	Change	Participated in 2016 plan	Participated in 2022 plan	NFIP participant	NFIP map date
Akron Twp	1503	1447	-3.73%	yes	no	yes	4/3/12
Almer Twp	2081	2097	+0.77%	yes	yes/	yes	4/3/12
Arbela Twp	3067	2957	-3.59%	yes	yes	no	n/a
Columbia Twp	1284	1167	-9.11%	yes	yes/	yes	4/3/2012
Dayton Twp	1847	1866	+1.03%	yes	no	yes	4/3/2012
Denmark Twp	3065	2923	-4.63%	yes	yes/	no	4/3/2012
Elkland Twp	3526	3351	-4.96%	yes	yes/	no	n/a
Ellington Twp	1332	1207	-9.38	yes	no	no	4/3/12
Elmwood Twp	1207	1109	-8.12%	yes	yes	no	12/3/2009
Fairgrove Twp	1579	1633	+3.42%	yes	yes	yes	4/3/12
Fremont Twp	3309	3154	-4.68%	yes	no	yes	4/3/12
Gilford Twp	741	783	+5.67%	yes	yes	In progress	4/3/12
Indianfields Twp	2803	2539	-9.42%	yes	no	yes	4/3/12
Juniata Twp	1567	1511	-3.57%	yes/	yes	yes	4/3/12
Kingston Twp	1574	1358	-13.72%	yes	yes	no	n/a
Koylton Twp	1585	1439	-9.21%	yes	yes	no	n/a
Millington Twp	4353	4131	-5.10%	yes	no	yes	4/3/12
Novesta Twp	1491	1322	-11.33%	yes	yes	yes	7/1/1991
Tuscola Twp	2081	1975	-5.09%	yes	yes	yes	4/3/12
Vassar Twp	4086	3910	-4.31%	yes	yes	yes	4/3/12
Watertown Twp	2201	2105	-4.36%	yes	yes	no	n/a
Wells Twp	1773	1685	-4.96%	yes	yes	no	n/a
Wisner Twp	690	640	-7.25%	yes	yes	yes	4/3/12
City of Caro	4229	4054	-4.14%	yes	yes	yes	4/3/12
City of Vassar	2702	2576	-4.66%	yes	yes	yes	4/3/12
Village of Akron	402	424	+5.47%	yes	yes	no	n/a
Village of Cass City	2423	2353	-2.89%	yes	yes	no	n/a
Village of Fairgrove	563	511	-9.24%	yes	yes	no	n/a
Village of Gageton	388	260	-33%	yes	yes	no	n/a

Community Name	2010 Population	2019 Population	Change	Participated in 2016 plan/adopted	Participated in 2021 plan/adopt	NFIP participant	NFIP map date
Village of Kingston	440	439	-0.23%	yes	yes	no	n/a
Village of Mayville	948	905	-4.54%	yes/	yes	no	n/a
Village of Millington	1072	1120	+4.48%	no/	yes	no	n/a
Village of Reese	1453	1397	-3.85%	yes	yes	no	4/3/12
Village of Unionville	508	533	+4.92%	yes/	yes	no	n/a

Source: NFPI: <https://www.fema.gov/cis/MI.pdf>

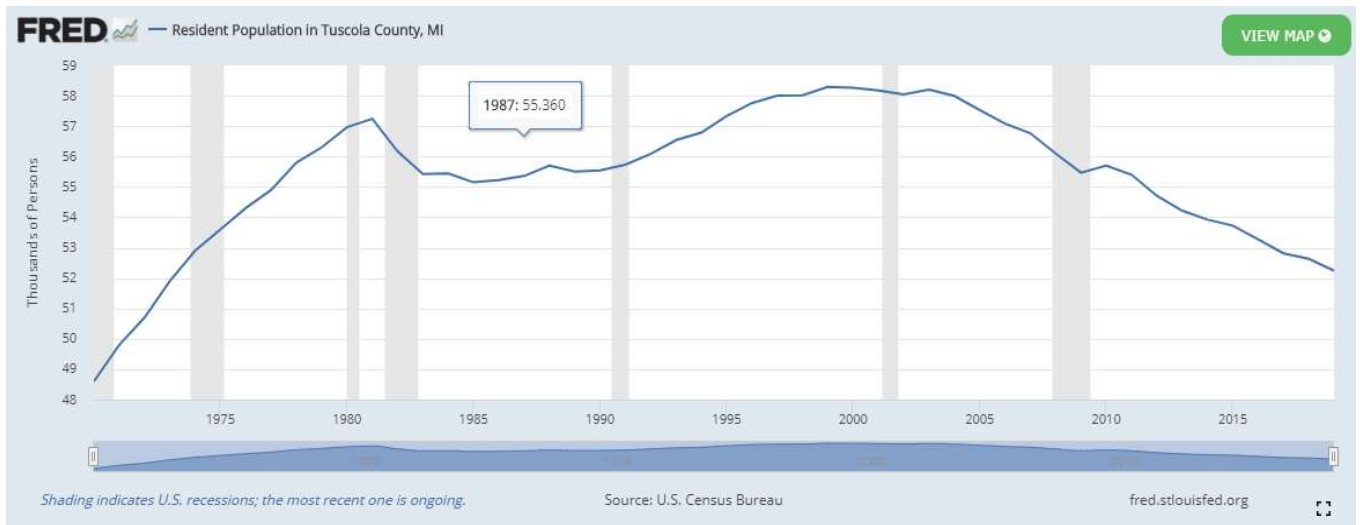
2019 info: censusreporter.org

Note: A survey was sent out to 187 governmental officials/community partners seeking input for this plan, 43 of those individuals completed the survey (roughly 23%). Please refer to Appendix #7 for a list of those officials/partners who received the email and those who participated in the survey for each municipality.

Population Information:

The following demographics for Tuscola County have been compiled from the January 1, 1970 to the January 1, 2019 US Censuses.

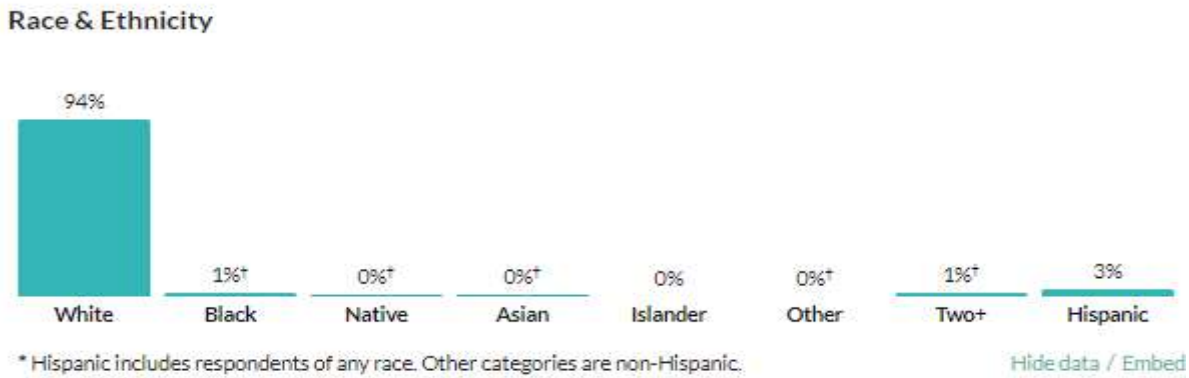
Figure 1: Tuscola County Population



The total population of Tuscola County as of 2019 was 52,245, a decrease of 6.48% or 3191 residents from 2010, which had a population of 55,729.

Ethnic Breakdown:

Figure 2: Tuscola County Racial/Ethnicity graph



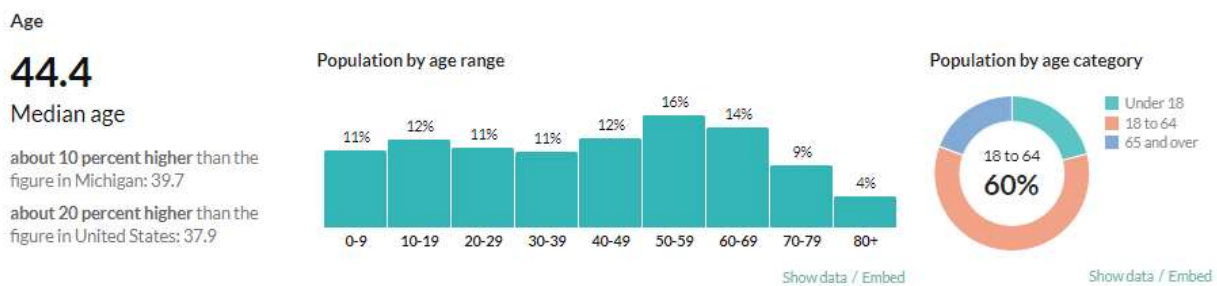
Citation: U.S. Census Bureau (2018). *American Community Survey 5-year estimates*. Retrieved from *Census Reporter Profile page for Tuscola County, MI* <<http://censusreporter.org/profiles/05000US26157-tuscola-county-mi/>>

The population of Tuscola County is majority white; total minority populations equal less than 5% of the total population within the county.

Age Breakdown:

The biggest age group in Tuscola County in 2018 was in the Midlife age range (ages 40 to 69) which is approximately 42% of the population, followed closely by the Family Forming age range (age 20 to 40) which is approximately 22% of the population.

Figure 3: Tuscola County age breakdowns and averages

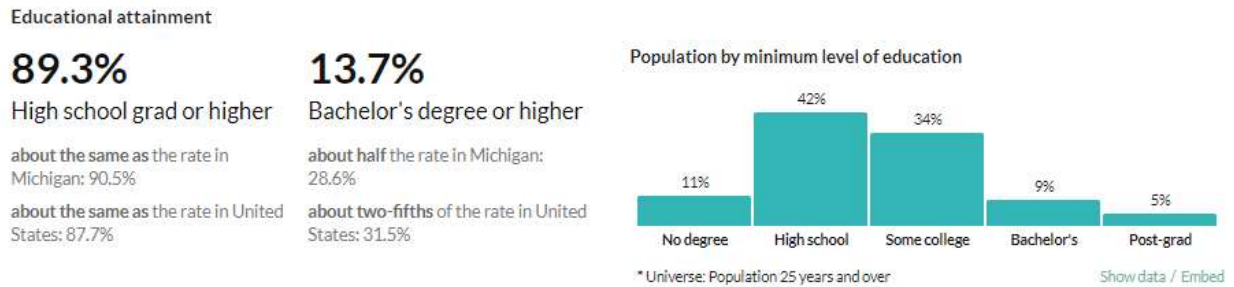


Citation: U.S. Census Bureau (2018). *American Community Survey 5-year estimates*. Retrieved from *Census Reporter Profile page for Tuscola County, MI* <<http://censusreporter.org/profiles/05000US26157-tuscola-county-mi/>>

Educational Attainment:

High School graduation rates for Tuscola County (89.3%) is slightly lower than the state average which is 90.5%. The same is also true for those who have attained Bachelor degrees or higher within the County (13.7% vs 28.6%).

Figure 4: Tuscola County Educational Information



Citation: U.S. Census Bureau (2018). *American Community Survey 5-year estimates*. Retrieved from *Census Reporter Profile page for Tuscola County, MI* <<http://censusreporter.org/profiles/05000US26157-tuscola-county-mi/>>

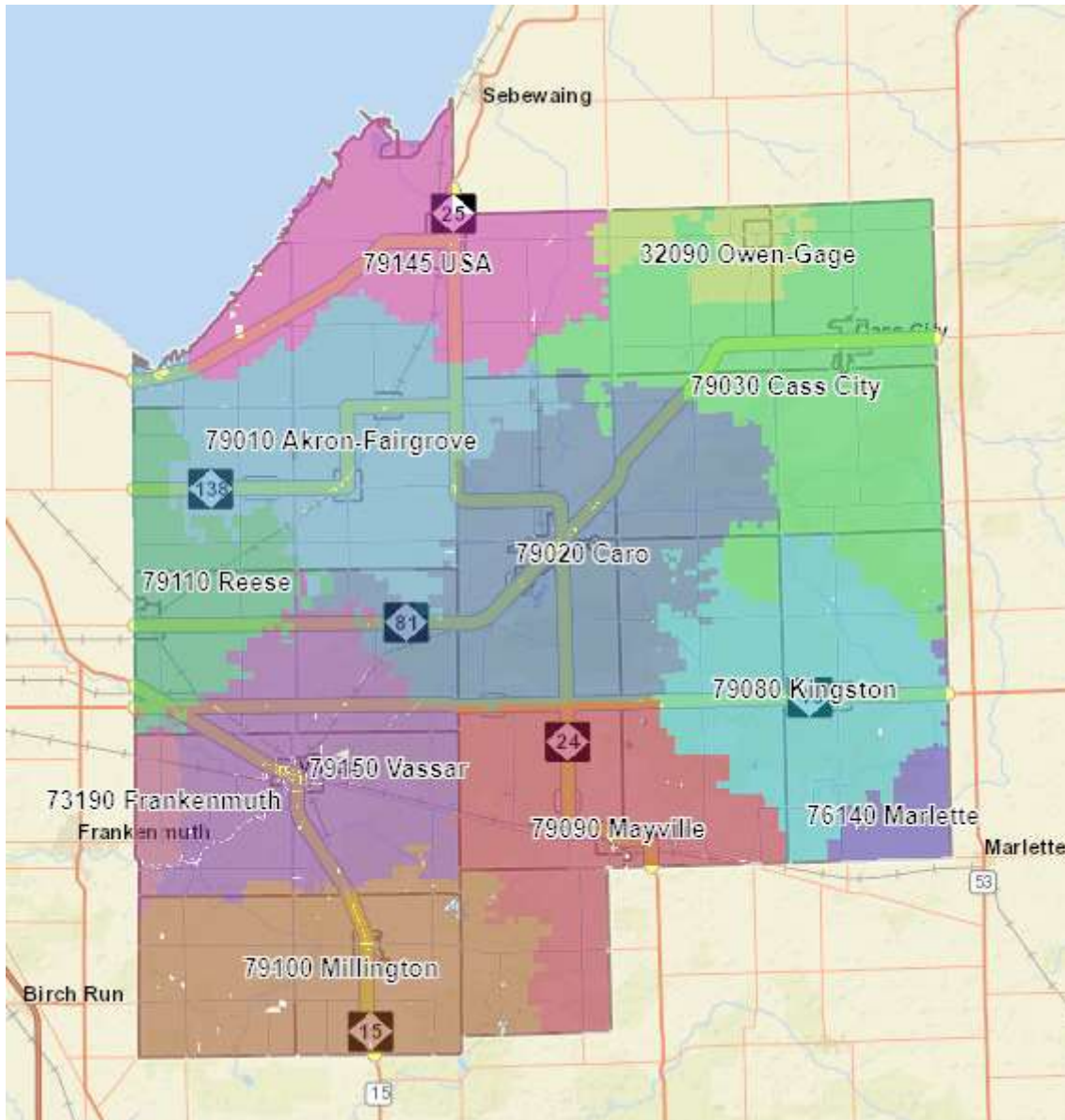
Tuscola County has a total of 7923 students enrolled in public schools throughout Tuscola County.

Table 2: Public School Districts and Enrollment

School District	Enrollment (from 2020-2021 School Year)
Akron-Fairgrove Schools	342
Caro Community Schools	1450
Cass City Public Schools	925
Kingston Community Schools	642
Mayville Community Schools	580
Millington Community Schools	1205
Reese Public Schools	822
Tuscola ISD	169
Unionville-Sebewaing Area Schools	802
Vassar Public Schools	943

Source: Tuscola Intermediate School District -Spring 2021 pupil count

Map 2: School Districts



In addition to the above listed public schools, Tuscola County is also home to several private schools as well. Those include the following:

- Christ the King Lutheran in Unionville
- Deford Christian Academy in Deford
- Juniata Christian School in Fremont Twp
- St. Luke's Lutheran School in Vassar
- St. Michael's Lutheran School in Richville
- St. Paul Lutheran School in Millington

- Trinity Lutheran School in Reese
- St. Elizabeth Catholic School in Reese (this school is just within Saginaw County but is serviced by the Tuscola County ISD.)

Table 3: Top Employers:

Rank	Employer	Location	Number of Employees	Product/Service
1	Walbro Engine Management	Cass City	398	Fuel System Components
2	Tuscola County	Caro	379	Governmental
3	Caro Regional Center	Caro	362	Medical
4	Tuscola Intermediate School District	Caro	260	Education
5	Hills & Dales General Hospital	Cass City	218	Medical
6	Caro Community Schools	Caro	175	Educational
7	McLaren Caro Region	Caro	145	Medical
8	Human Development Commission	Caro	140	Governmental Service
9	Millennium Steering	Cass City	131	Fuel System Rails
10	Walmart	Caro	116	Retail
11	Vassar School District	Vassar	111	Educational
12	Tuscola Behavioral Health Systems	Caro	110	Medical
13	TI Automotive	Caro	106	Fuel Pumps / Regulators
14	Michigan Sugar	Caro	100	Agriculture

Source: Tuscola County Economic Commission

Figure 5: Tuscola County Unemployment Rate

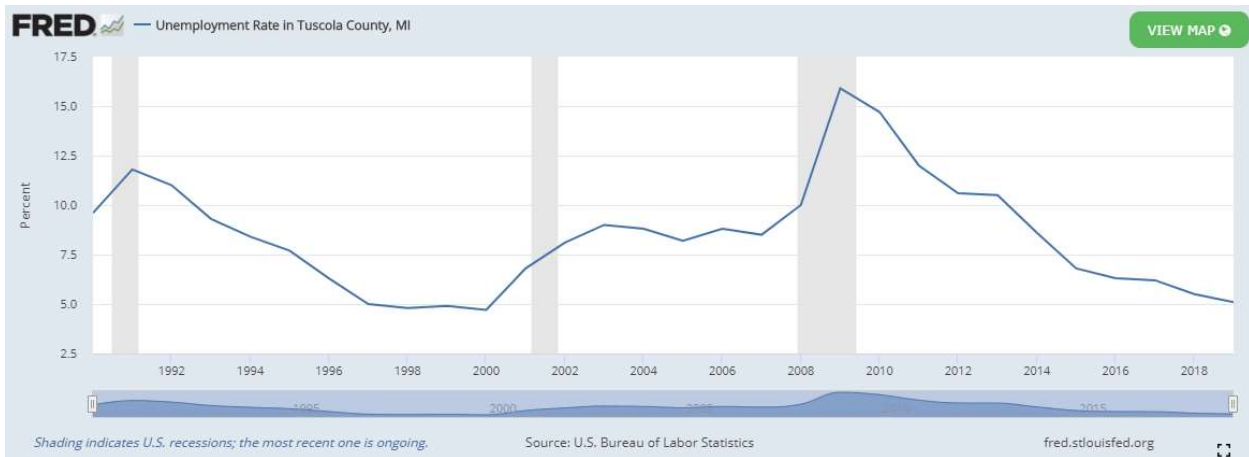
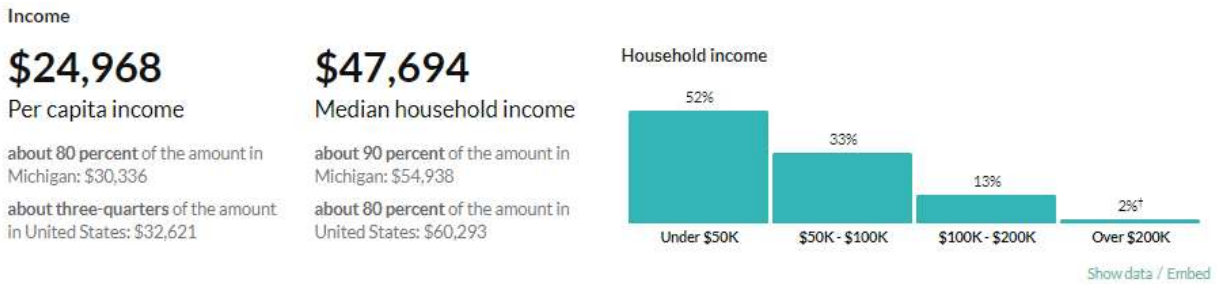


Figure 6: Median Household Income for Tuscola County

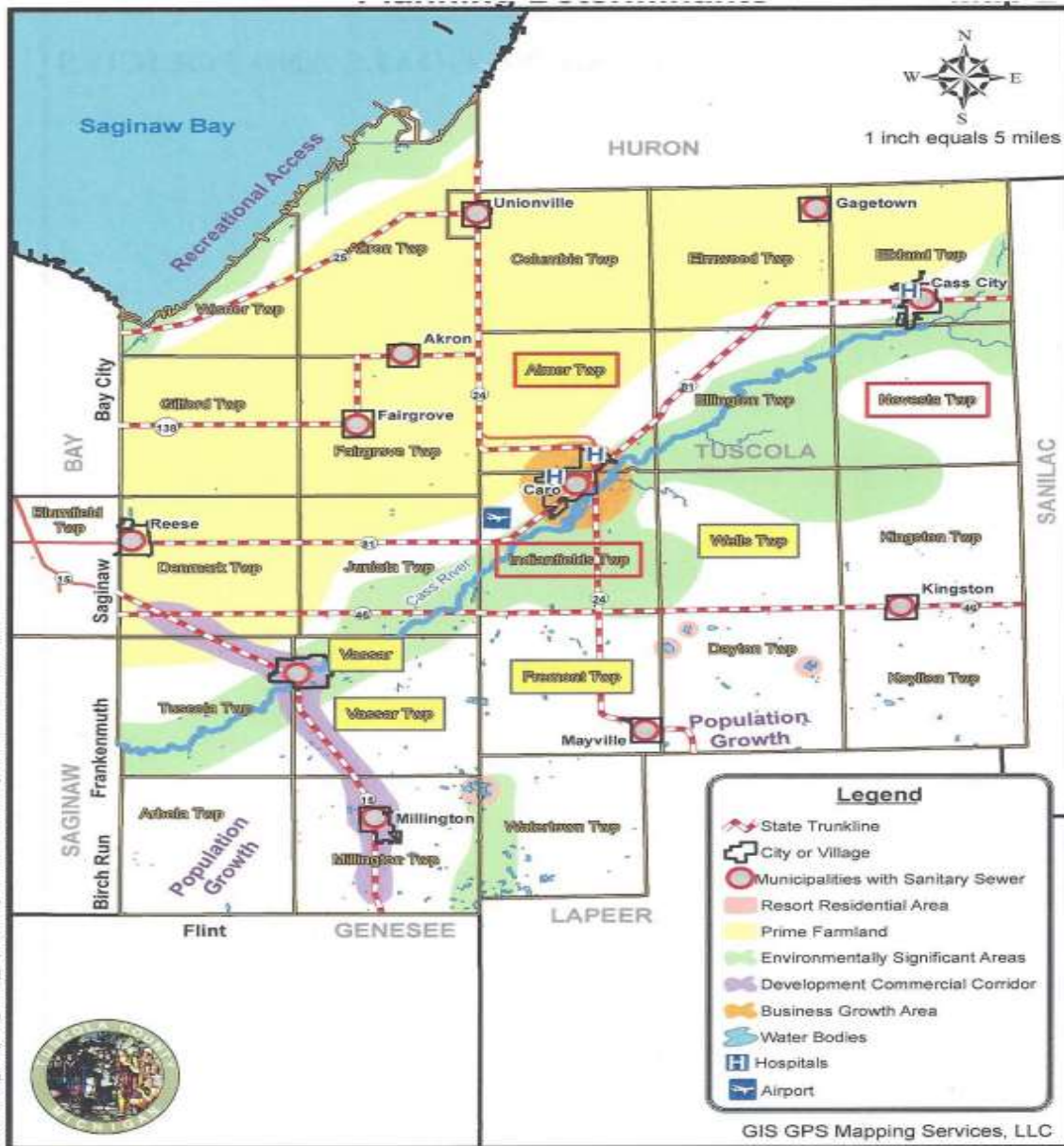


Citation: U.S. Census Bureau (2018). *American Community Survey 5-year estimates*. Retrieved from *Census Reporter Profile page for Tuscola County, MI* <<http://censusreporter.org/profiles/05000US26157-tuscola-county-mi/>>

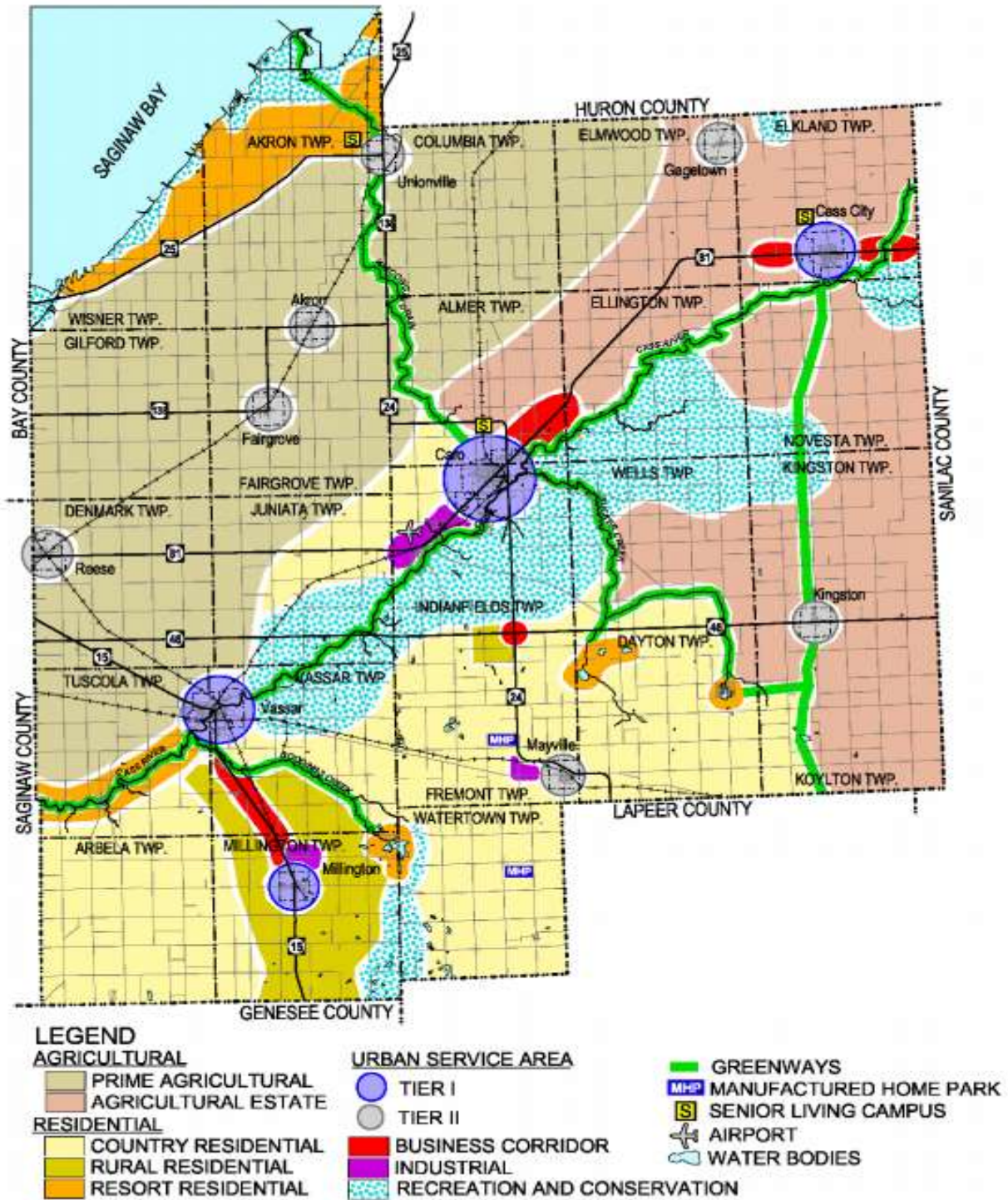
Existing and Future Land Use:

Land use planning is a key factor to consider when planning for an emergency. Guiding development to appropriate locations and prohibiting development in locations where predictable or obvious hazards may impact structures or people is one of the most important ways to mitigate hazards. The following five maps, reproduced from the Tuscola County Master Plan of 2013, show general existing land use using land coverage data, a general Development Plan and a composite Future Land Use Plan for the county, where information is available.

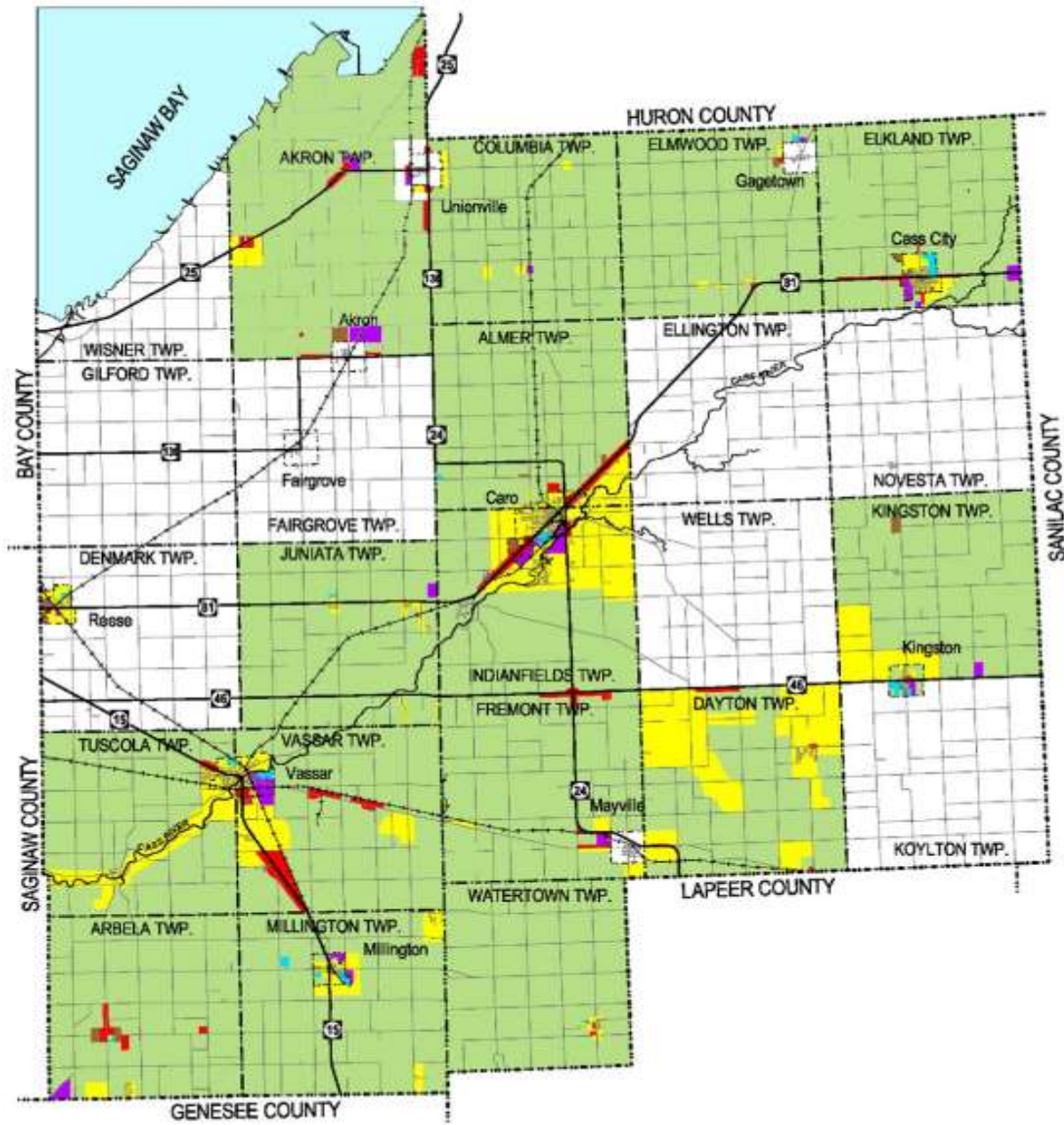
Map 3: Land Use Map



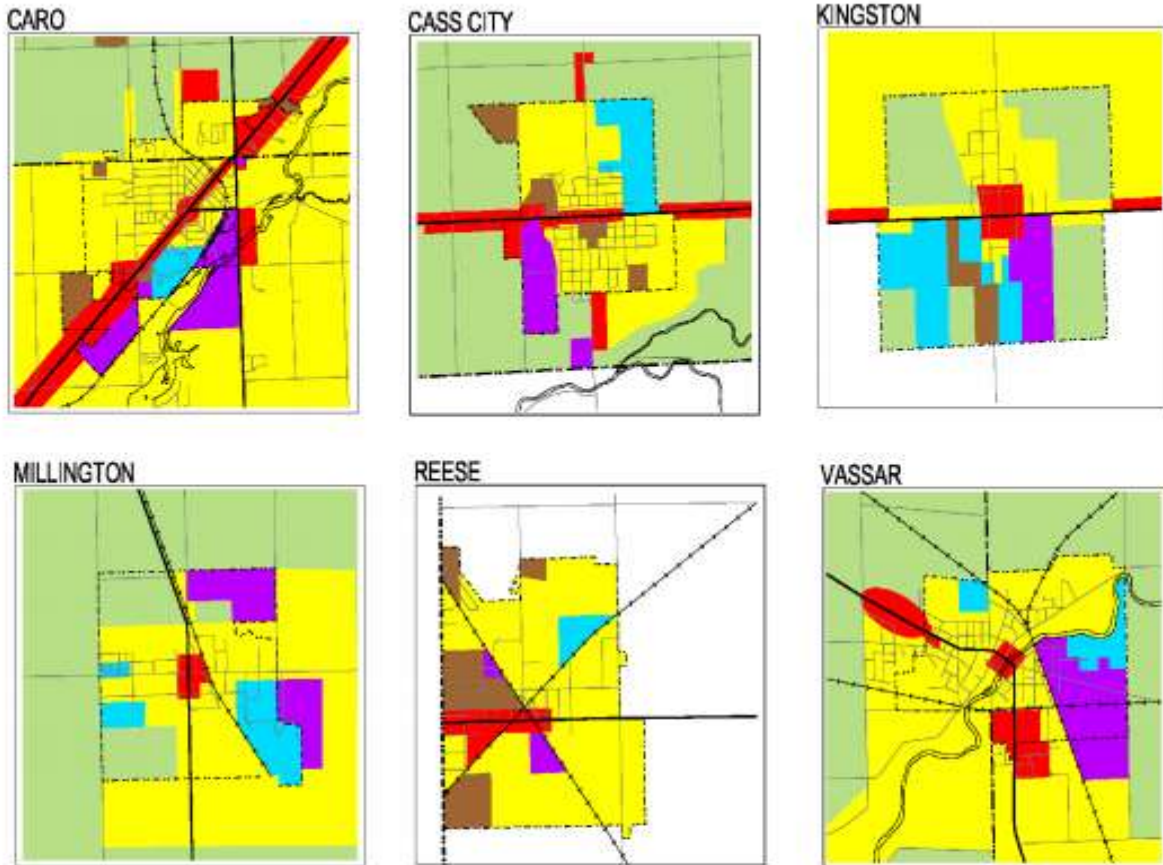
Map 4: General Development Plan Map











Map 5: Future Land Use Composite Map



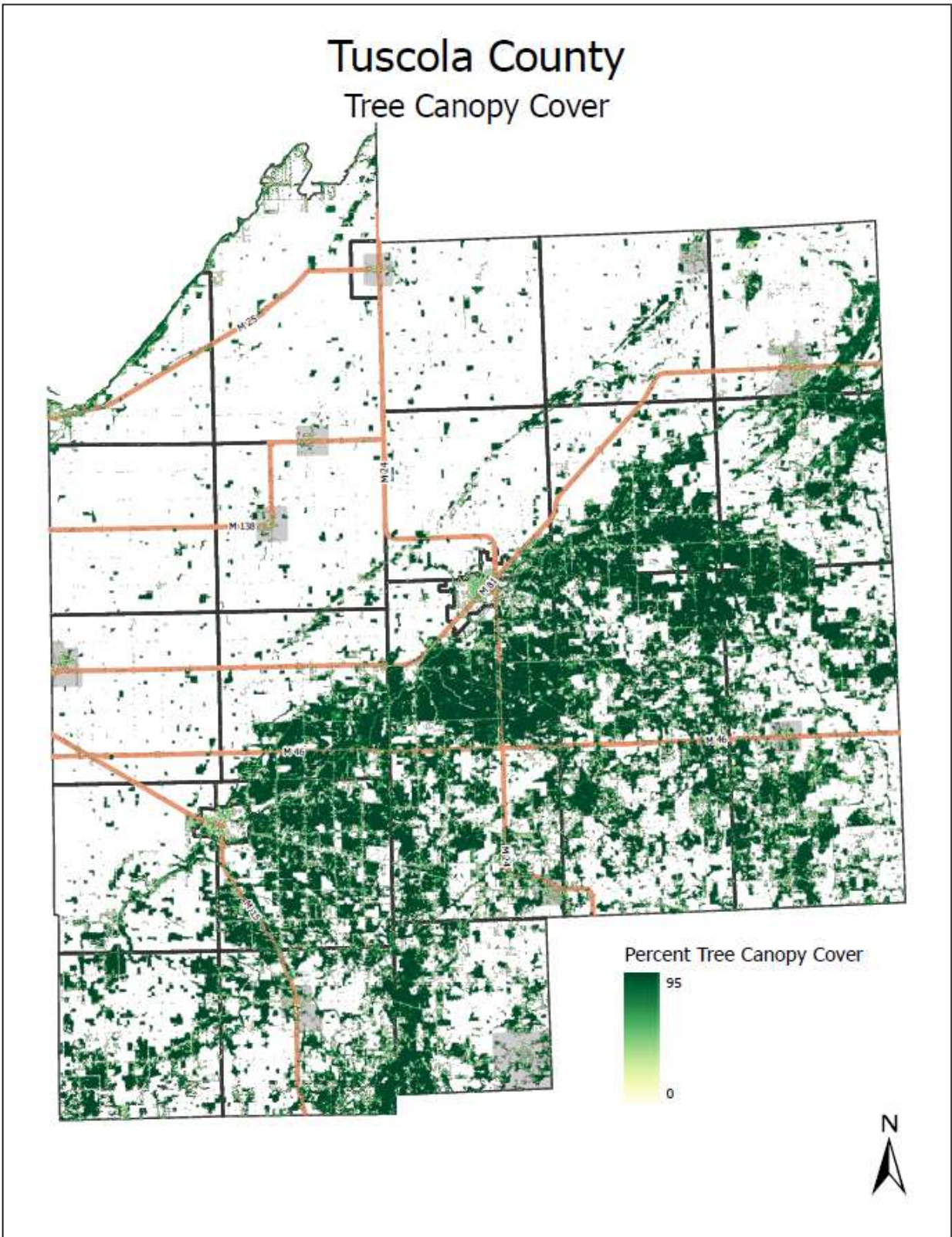
Map 6: Future Land Use Composite Map by local municipalities



LEGEND

- | | |
|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
|  AGRICULTURAL/RURAL |  INDUSTRIAL |
|  RESIDENTIAL/CONSERVATION |  PUBLIC/SEMI-PUBLIC/RECREATION |
|  LOW DENSITY RESIDENTIAL |  FUTURE LAND USE INFORMATION UNAVAILABLE |
|  HIGH DENSITY RESIDENTIAL | |
|  COMMERCIAL/OFFICE | |

Map 7: Tree Canopy Cover



TOPOGRAPHY:

Soils that are commonly associated with water and wetlands are shown on *Map 3* on page 20. Some of these areas have been drained and farmed since the late 1800's. Therefore, some of the soils that would be considered wetlands are now highly productive farmland. Due to the relatively flat topography, especially in the farmland sections of the county, the current drains and waterways are able to adequately divert surface water from run-off water away properly.

SOILS:

The Soil Survey of Tuscola County identifies the soils across the County. Additional information about the Soil Survey that was completed in Tuscola County in 1986 can be found at the following website:

https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/michigan/MI157/0/tuscola.pdf

The following soils are the most common found within the county:

- Essexville-Aquents-Tappen Association-This group composes about 4% of the county and is all poorly drained. Poorly drained soils are often defined by the Tuscola County Soil Survey as soils that remove water so slowly that the soil is saturated for extended periods during the growing season, often marked by standing water. This can result from one or all of the following: a high water table, the slow movement of water through the soil (seepage), and/or nearly continuous rainfall.
- Tappen Association-Soils in this class make up about 5% of the land area within the County. The Tappen series makes up 80% of the class and is recognized by its dark gray, calcareous loam surface layer about 11 inches thick. Soils comprising the other 20% are composed of four other series, which are characterized as poorly drained. This land is most suitable for cultivating crops including corn, wheat, beans and sugar beets. Building development is severely hindered due to the wetness and ponding in low areas.
- Tappen-Londo-Avoca Association-Soils within this group compose 25% of the County land area. The Tappen series accounts for 50% of this group. It is poorly drained and can usually be found on low, broad flats and in drainage ways. The Londo soils are somewhat poorly drained as well. Somewhat poorly drained soils are defined as water being removed from the soil slowly enough so that the soil is wet for significant periods during the growing season. Like poorly drained soils, attributing factors include shallow water table, extended periods of continuous rainfall, seepage, or a combination of all. Distinguished by its dark, grayish-brown loam surface layer, Londo soils tend to be about ten inches thick.

Avoca soils are somewhat poorly drained containing dark brown loamy fine sand about 11 inches thick. The Londo and Avoca groups can be found on flats and on low ridges

or knolls. Most areas under this class are well suited for cultivated crops. However wetness, compaction and wind erosion are major agricultural limitations. The soils described are poorly suited for sanitary facilities and building site developments.

- Metamora-Capac-Corunna Association-This group only composes 3% of the County. Each series comprises 18%, 22% and 30% respectively, with 30% of the soils in several other classes. Metamora soils are nearly level and gently undulating. Recognized by its very dark grayish brown sandy loam qualities, it is somewhat poorly drained.

Capac soils are similar to Metamora in slope and drainage character. Corunna soils are nearly level and poorly drained. They have a very dark grayish brown surface layer composed of sandy loam about ten inches in thickness. Those in mixed classes are somewhat poorly drained. Cultivated crop suitability is good yet removing excess water during wet periods is a major management concern. Suitability of the major soils is poor for both sanitary and building facilities with wetness being a major limitation.

- Wixom-Wolcott-Pipestone Association-This association makes up 8% of the county. The class is composed of 30% Wixom, 25% Wolcott and 15% Pipestone Series. The Wixom and Pipestone are typically found on broad flats and on low ridges. Wixom soils are found on nearly level and gently undulating slopes and are somewhat poorly drained. The soils of the Wolcott soil group are normally found in low, broad areas, depressions and drainage ways. They are very poorly drained. Very poorly drained soils are defined by free water remaining at or on the surface during most of the growing season. Pipestone soils are nearly level and gently undulating and are somewhat poorly drained.

The other 30% of the soils are well combined with somewhat poorly drained Capac and the poorly drained Belleville soils. Cultivated cropland tends to be primary use of this class with wetness being the key challenge to overcome. The major soils are poorly suited to sanitary facilities due to poor filtration, slow percolation and ponding. Building development is precluded due to wetness.

- Guelph-Londo-Tappen Association-Covering 12% of the County, this class is composed chiefly of Guelph series soils (60%). This series is nearly level to rolling and is moderately well drained or well drained. Soils with well-drained qualities allow water to be absorbed readily during most periods. Moderately well drained soils tend to absorb water slowly during some periods, yet are only wet for short periods during the growing season. Measures should be considered to overcome potential water erosion and slopes. However, building limitations are moderate for basements and moderate for septic absorption fields (greater for sloping areas).

Londo soils (20% of this group) are nearly level and somewhat poorly drained as earlier described. Tappen soils (10% of the group) are nearly level and poorly drained as mentioned before. The wetness of the Londo and Tappen is the primary concern for

farming. Both are poorly suited for sanitary facilities and building site development due to poor drainage. Guelph soil is rated fair to poor for these uses with permeability and slope being a concern during site-specific analysis.

- Perrin-Wasepi-Gilford Association-This association covers 10% of the County land area. Perrin soils (35% of class) are nearly level and gently undulating. They tend to be moderately well drained. Measures to prevent wind erosion, water erosion and seasonal drought should be considered. Wasepi (30% of class) are generally found on the lower side of slopes and on ridges. They are nearly level and somewhat poorly drained. Gilford (10% of class) are nearly level and very poorly drained.

The rest of the class (25%) is mixed with the well-drained Spinks and Boyer soils and the Londo, Meamora, Tappen and Wixom soils that are poorly drained. Most areas of this association are used as woodland and cropland. Some sand and gravel extractive operations are present as well. Cultivated crop suitability is fair with corn, bean and wheat often comprising the main crops. Building development on Perrin soils is fair to poor due to local wetness conditions. The other major classes preclude development due to poor drainage. All major soil series are severely limited for sanitary facilities, as poor filtration and wetness are typical.

- Pipestone-Granby-Chelsea Association- These series compose about 16% of the County. Pipestone (40%) soils tend to be somewhat poorly drained, as mentioned earlier. Granby soils (20%) are found on nearly level slopes and are typically poorly drained. This type can be visually identified by its black , loamy fine sand about 11 inches thick.

The other series of minor extent (24%) are somewhat poorly drained Wixom and very poorly drained Wolcott soils. Most areas of this association are used for cultivated crops, pasture or woodland. While the wetness of the Granby and Pipestone soils is the main farming limitation, the whole class is fairly suited for cultivation. Wind erosion, organic matter content and seasonal drought are added management concerns. While the Chelsea soils are well suited for building development, the other soil series are poorly suited. Sanitary facilities are limited with the poor filtering and wet characteristics of all the major soil groups involved.

- Marlette-Capac-Spinks Association-This soil association comprises 15% of the County. It is composed of Marlette (42%), Capac (15%) and Spink (12%) soil series. While the Marlette and Spinks are often located on high ridges and knolls and in broad, undulating areas, the Capac is normally found in lower areas. Marlette soils tend to be well drained and are found on steep undulating slopes. The surface layer is dark grayish brown composed of sandy loam. This series has only slight limitations for building yet has severe restrictions on sanitary uses due to slow percolation. It is also subject to water erosion.

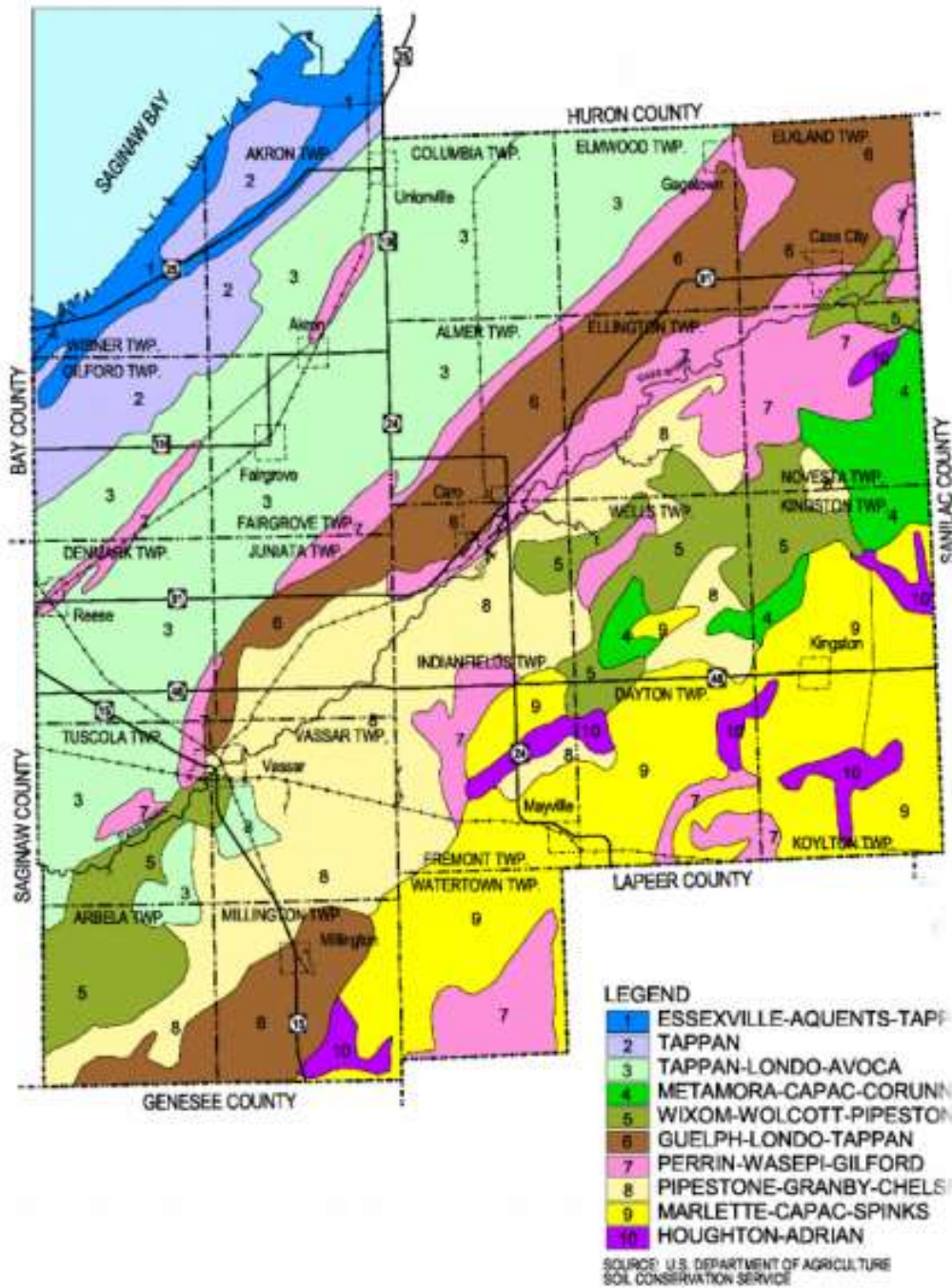
Capac soils were earlier described and are somewhat poorly drained. Methods for removing excess water are often needed. Spinks tends to be well drained with fine, loamy-sand surface layers about seven inches thick. Septic absorption varies from fair to very poor, depending on the site.

The other minor extents or other soil groups (31%) combine the well-drained Boyer and Metea soils, which are found on slopes similar to the Marlette and Spinks. Also, the poorly drained Metamora, Wixom and Wolcott soils are present and often found on low, broad flats and depressions of drainage ways. Wetness, slope, water erosion and wind erosion are farming management concerns. Building limitations include greater slopes, often shallow depth to water table and poor permeability. Generally, this association is suitable for cultivated crops, pasture or woodland.

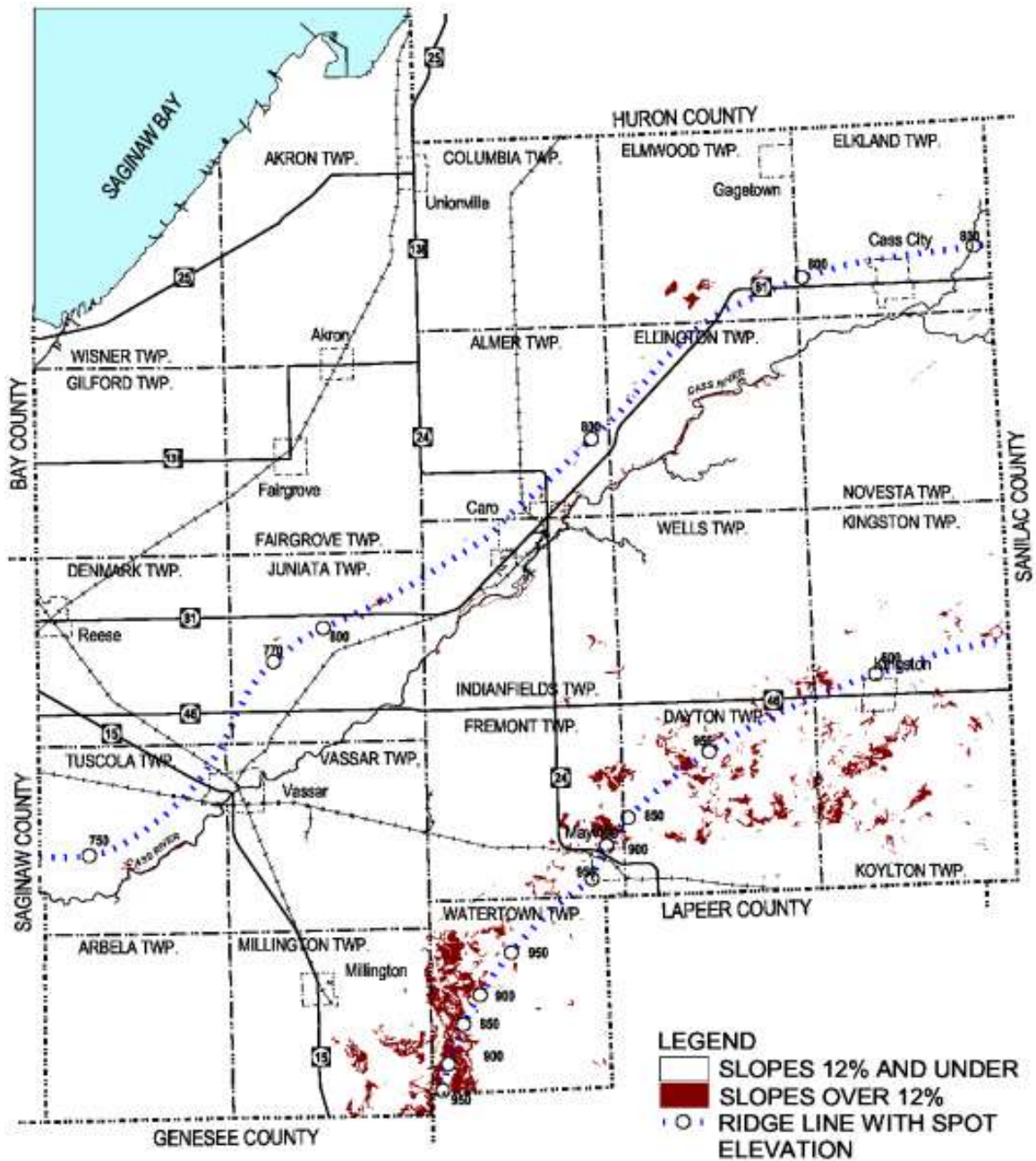
- Houghton-Adrian Association-Comprising 2% of the County's land area, this group is found in bogs and depressions located on the flood plains. The Houghton series makes up 30% of the group characterized by black muck extending to a depth of 51 inches. The Adrian series composes 30% and is made up of a shallow muck of only 11 inches. The rest of the class (40%) is a mixture of poorly drained Marlette, Capac, Pipestone and Wolcott soils. Most areas of this association are used as woodlands or wildlife habitat. The major soil series are generally unsuitable to cultivated crops, sanitary facilities and building development due to frequent ponding.

The Soil Association Map, *Map 8*, provides a general overview of the soils within the county, more detailed information can be found at the Soil Survey of Tuscola County link posted previously.

Map 8: Soil Association Map



Map 9: Topographical Map

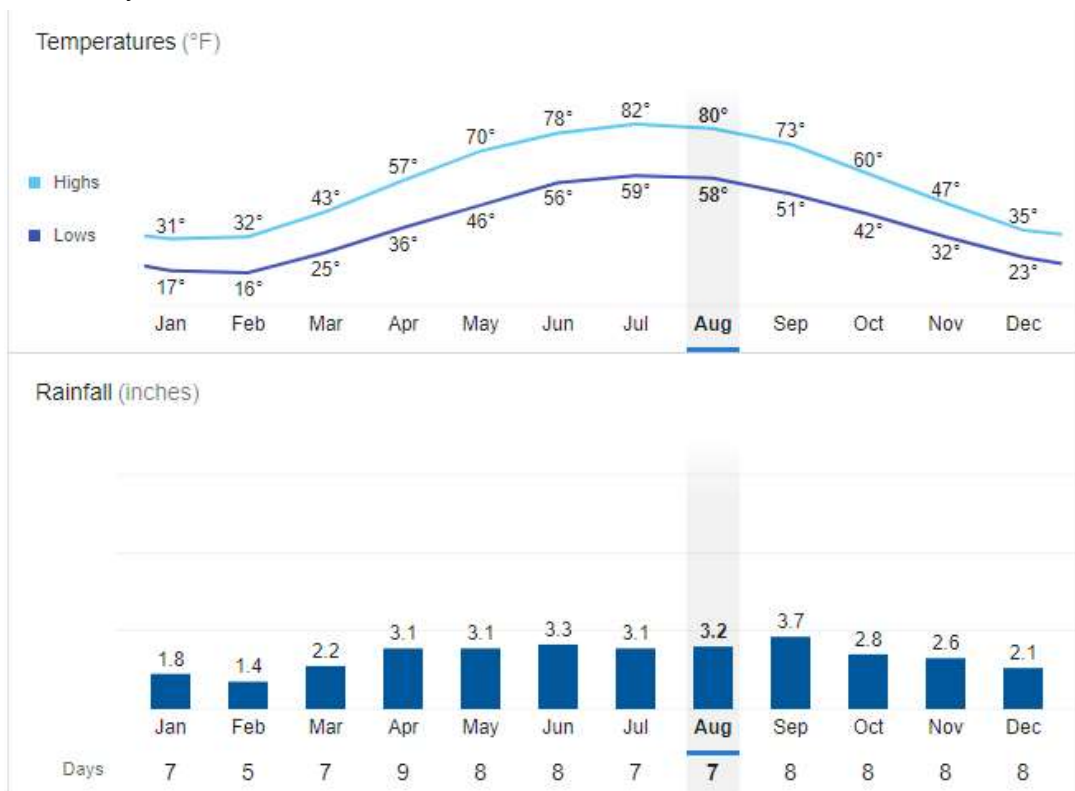


SOURCE: MICHIGAN RESOURCE INFORMATION SYSTEM (MIRIS), DEPARTMENT OF NATURAL RESOURCES (DNR), AND USGS QUADRANGLE TOPOGRAPHY MAP AS INTERPRET BY WADE-TRIM

CLIMATE:

Climate has a strong influence on the way of life and the activities of the people of Tuscola County. According to the Koppen Climate Classification System, Tuscola County is considered to have a humid continental type of climate. This climatic region is typified by large seasonal temperature differences, with warm to hot (and often humid) summers and cold (sometimes severely cold) winters. The following tables show the weather averages for Tuscola County:

Figure 7: County Weather Data





Water Resources & Wetlands:

Groundwater

Important factors in the evaluation of groundwater are the quantity and the quality of the water. The geologic and hydrologic features of the County provide residents with sufficient water quantities. However, potable water availability in certain areas is limited.

According to the Tuscola County Health Department, there are two areas of concern in the County that have water quality concerns. The first is in Wisner Township, northern Akron Township and northern Gilford Township. Here, concentrations of natural brine from the subsurface rock are very high. As a result, these townships have constructed municipal water supply lines from Bay County.

The second area of concern is located in the extreme eastern and northeastern portions of the County where a geological formation (Marshal Sandstone) has natural arsenic associations. The Villages of Gagetown and Cass City are within this area. The municipal wells in this area are tested on a regular basis and results for arsenic are within acceptable tolerances for safety.

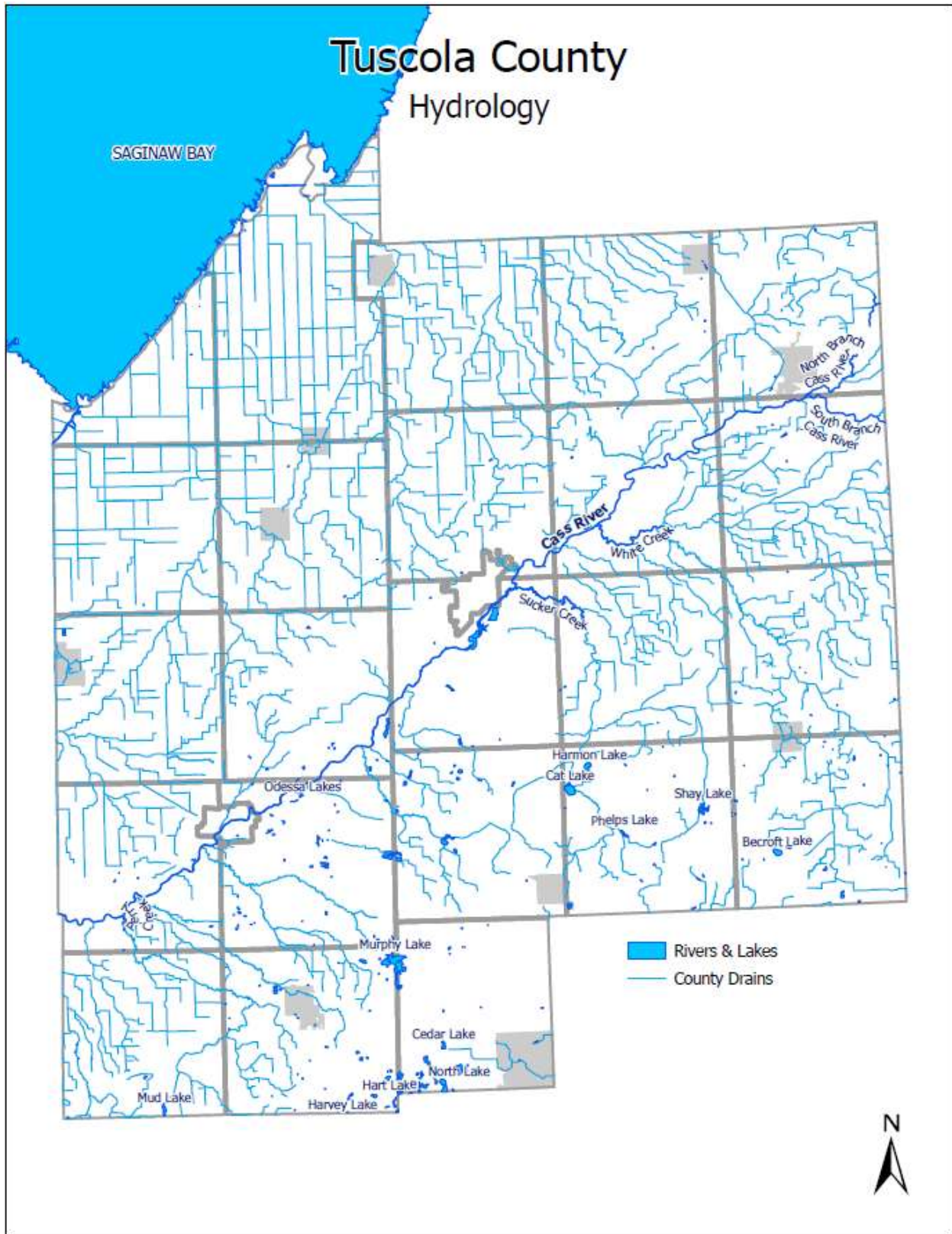
In 2007, the Village of Cass City completed construction of an arsenic treatment facility that exceeds federal requirements for removal of arsenic from their water.

The rest of the county is fortunate to have an adequate groundwater resource generally within 100 feet of the surface. The vulnerability of drinking water aquifers to surface contamination is moderate to relatively safe in the County. However, this discussion is limited to general planning purposes and not site-specific analysis. Local site reviews are always necessary when assessing the vulnerability of a particular location.

Surface Water

The majority of Tuscola County has storm water drainage systems, typically based upon topographically designated areas, or toward the natural flow of the water, known as watersheds.

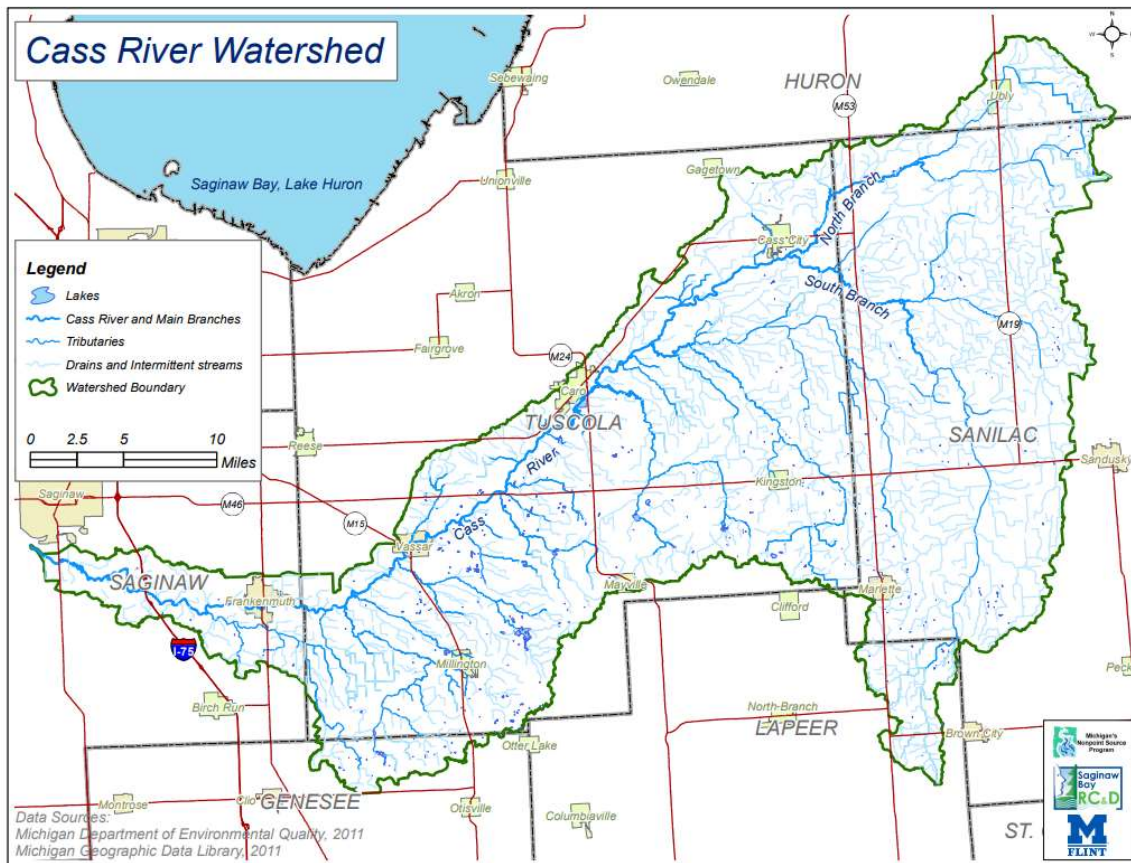
Map 10: Hydrology Base Map



Tuscola County is located within two major watersheds, the Cass River watershed and the Saginaw Bay watershed. A major regional water resource, the Cass River runs 55 miles through the center of the County, flowing from the northeast to the southwest. In total, the Cass River watershed drains 890 square miles in five counties.

The Cass River watershed is part of the Saginaw River System connecting, via the Shiawassee River to the Saginaw River, which in turn empties into the Saginaw Bay.

Map 11: Cass River Watershed



A glacial moraine ridge divides the Saginaw Bay and the Cass River watersheds. Surface water flowing north of the ridge is part of the Saginaw Bay watershed, whereas water flowing south of the ridge enters the Cass River watershed.

There are only a few lakes in the County, primarily located in the southern townships. They were formed in depressions left by irregular glacier meltings and scouring as the glacial ice sheets advanced and retreated. Water quality of these lakes has been acceptable for all types of recreation.

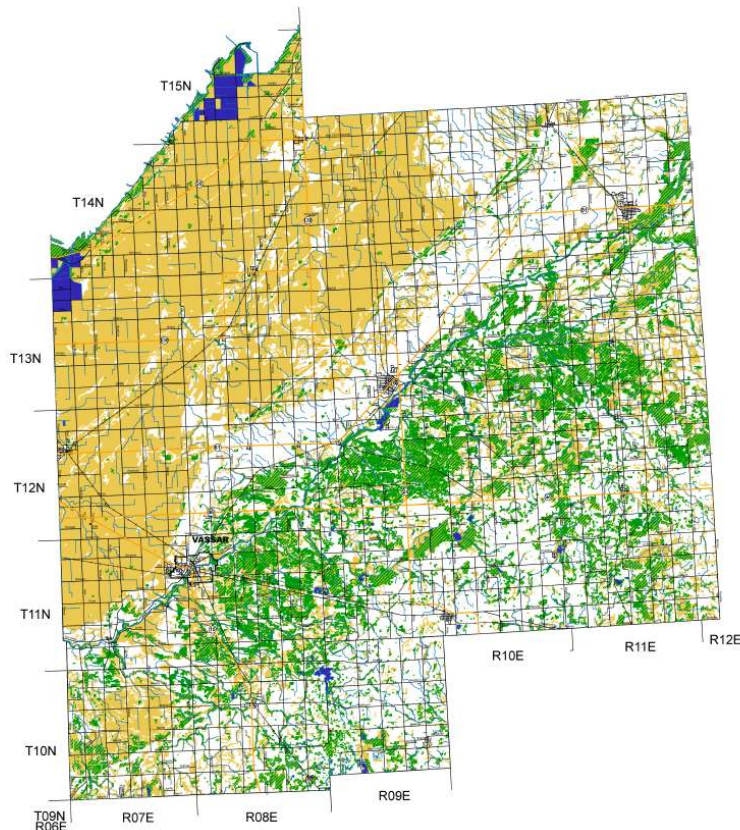
Wetlands

A portion of Tuscola County's landscape is made up of wetlands, predominantly along the Saginaw Bay and the southern portion of the county. These areas have several important functions, such as to filter out nutrients and sediments to maintain and enhance the purity and clarity of the lakes and streams and provide habitat for wildlife and provide relief areas when the county is suffering flooding.

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

Map 12: Wetlands

Tuscola County Final Wetland Inventory



Tuscola County Final Wetland Inventory

This Michigan Department of Environmental Quality (MDEQ) Wetland Inventory Map is intended to be used as a tool to assist in identifying potential wetland areas and provide only general and approximate locations of wetlands and wetland conditions. The MDEQ produced this map from the following data obtained from other agencies or organizations:

1. The National Wetland Inventory (NWI) conducted by the United States Fish and Wildlife Service through the National Wetland Inventory System (NWIS).
2. Land Cover as mapped by the Michigan Wetland Inventory System (MWIS) Michigan Department of Natural Resources through the Department of Natural Resources.
3. Data as reported by the United States Department of Agriculture, National Resources Conservation Service (NRCS).

This map is not intended to be used to determine the specific location and hydrological condition of wetlands or to regulate under the Clean Water Act (CWA), National Wetlands Act (NWA), Michigan and State Wetland Regulations. This map is not intended to be used for regulatory administration. A permit or approval from MDEQ is required for wetland activities in wetlands regulated under Part 303.

More information regarding this map, including how to obtain a copy, can be accessed at www.tuscolga.gov/development.



Legend

- Interstate Highways
- US Highways
- State Highways
- Railways
- Open Water
- Rivers
- Drains
- Wetlands as identified on NWI and MIRIS maps
- Soil areas which include wetland soils
- Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils
- County Boundary



Areas shown on wetland, wetland soils, or open water on this map are potential wetlands and require a permit or approval from MDEQ. This map is not intended to be used for regulatory administration. A permit or approval from MDEQ is required for wetland activities in wetlands regulated under Part 303.

Completed MDEQ, December 16, 2006

Transportation Characteristics:

Tuscola County has 1757 total miles of roadway within the county. The vast majority of these roads are maintained by the Tuscola County Road Commission. The Road Commission has four facilities dividing up the county, which include their main garage in Caro, and smaller facilities in Akron, Deford and Vassar. Those roads not maintained by the road commission are maintained by the local jurisdictions which they reside within.

Table 4: Road Classifications and Mileage

Road Type/Classification	Miles
State Trunk Lines	128
County Primary	353
Local Roads	1276
Total Miles	1757

Interstates

I-75, which runs north and south, is located within ten miles of Tuscola County. I-75 makes the major cities of Michigan and the Midwest more easily accessible to the residents of Tuscola County.

State Highways

Six State Highways run through Tuscola County, they include M-15, M-24, M-25, M-46, M-81 and M-138. All six of these routes provide direct access to locations throughout the State of Michigan.

Transit

Public transportation is not available countywide. It is available, however, in Almer and Indianfields Townships and the City of Caro and limited service to Cass City, Mayville and Vassar. This service is provided by the Caro Thumb Body Express and provides transportation to senior citizens, children, disabled, and the general public.

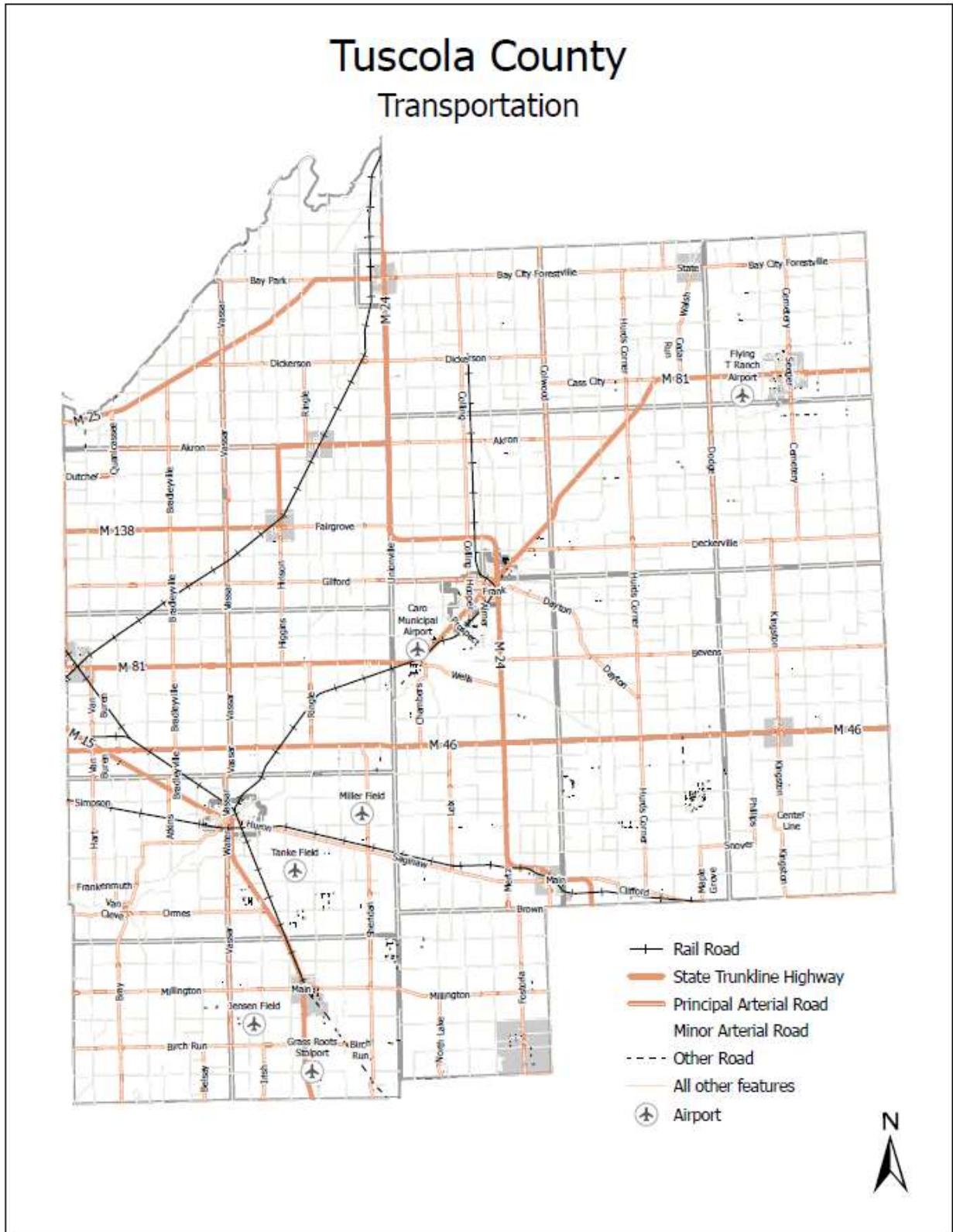
Rail

The Huron and Eastern Railway division of the Genesee and Wyoming, Inc. operates all rail lines within Tuscola County. Rail provides another means of transportation for the agricultural commodities that are produced within Tuscola County.

Air

Tuscola County has access to three airports. Most directly, it is served by the Tuscola Area Airport, which is located three miles outside of Caro. MBS International Airport and Flint Bishop International Airport are both within one hours drive from Tuscola County.

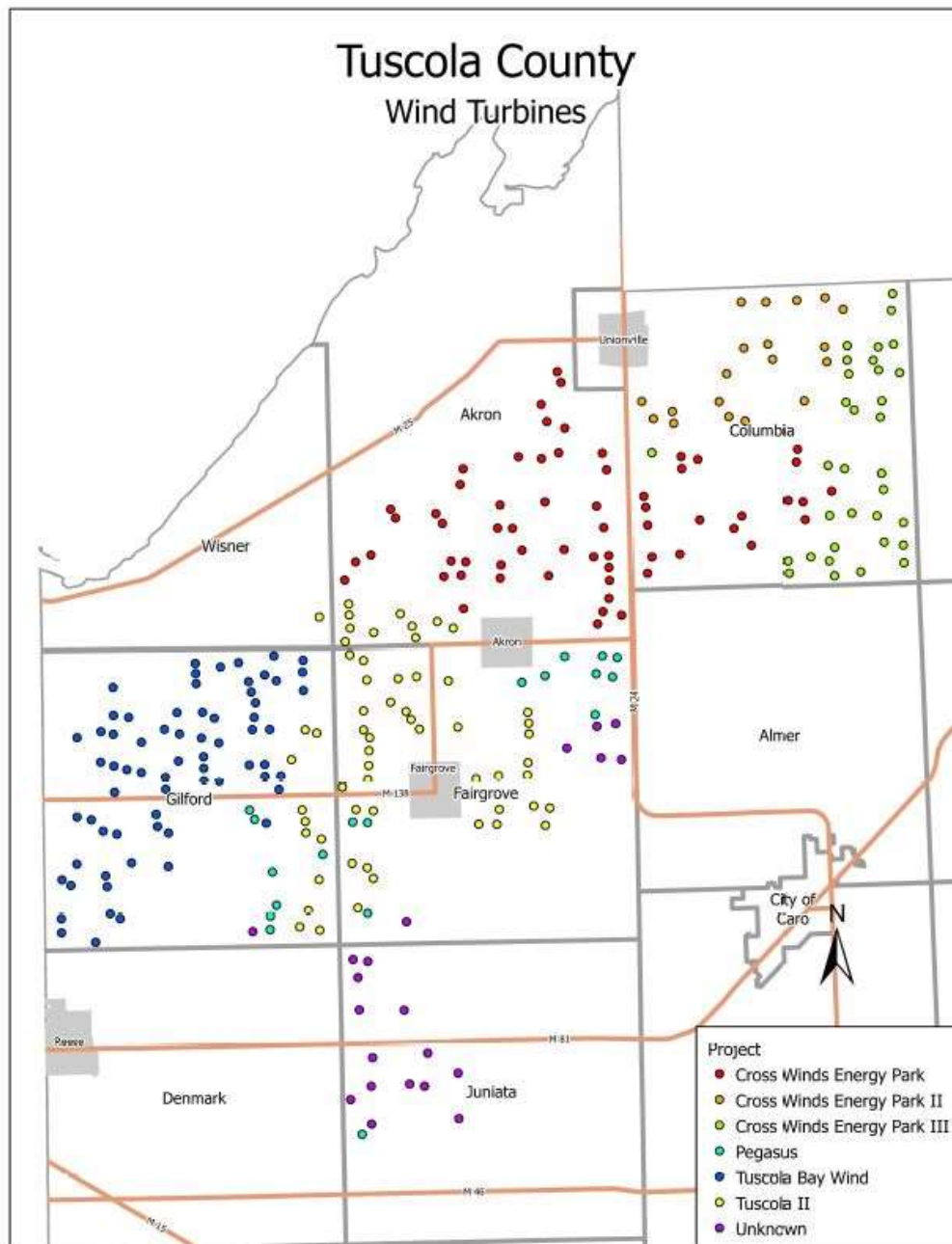
Map 13: Transportation Map



Windmills:

A relatively new addition to Tuscola County has been the addition of several energy producing wind turbines. These wind turbines are located in the northern sections of the county and are owned and operated by NextEra Energy, Inc and Consumers Energy. As of November 12, 2020 there are 281 wind turbines within the county.

Map 14: Windmill Location Map



Tuscola County GIS 11/12/20

Sites of Environmental Contamination:

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

Tuscola County has one hundred and ten (110) Baseline Environmental Assessment (BEA) Sites, seventy-four (74) Leaking Underground Storage Tanks and fifty-two (52) Sites of Environmental Contamination as of September 11, 2020 according to the EGLE Inventory of Facilities. This link, <https://www.egle.state.mi.us/FacilitiesInventoryQueries>, will take you to the webpage with the most up to date information.

Additional financial resources available to mitigate hazards:

Besides the local jurisdictions' use of local policies, zoning rules, and building code, additional sources can and have offered a means of fulfilling several mitigation strategies in Tuscola County. Some of those available resources can be obtained from the following:

Hazard Mitigation Grant Program: A grant program authorized under Section 404 of the Robert T. Stafford Disaster Relief & Emergency Assistance Act that provides funding for hazard mitigation projects that are cost-effective and complement existing post-disaster mitigation programs and activities by providing funding for beneficial mitigation measures that are not funded through other programs. Some examples of this program that have benefited Tuscola County include:

- Vassar Flood Mitigation Plan that was completed in 1998 at a cost of \$34,091.00.
- Vassar Flood Drainage Improvements that was completed in 2007 at a cost of \$2,910,253.00.

Flood Mitigation Assistance Program: A grant program created under the National Flood Insurance Reform Act of 1994 to provide mitigation planning and project grants to states and communities. The program is funded through flood insurance policy fees. The amount of funds available varies year to year.

Building Resilient Infrastructure & Communities (BRIC) Grant: Is a grant program that supports states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards.

The BRIC program guiding principles are supporting communities through capability and capacity-building; encouraging and enabling innovation, promoting partnerships, enabling large projects, maintaining flexibility, and providing consistency.

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Chapter 3: Community Services and Facilities

Community services and facilities play an important role in maintaining and improving quality of life. The location and level of some services, such as public water and public wastewater determine the types and intensities of development within a community. These services may be sufficient for the needs of the current population; however, a hazard event may require the construction of new services and facilities. This construction is costly and is best avoided through future planning.

Hospitals:

Tuscola County is home to two critical access hospitals within the county, both of which are designated as level IV trauma centers.

McLaren Caro Region located in the City of Caro and Hills and Dales General Hospital which is located in Cass City. Both hospitals are affiliated with major health care networks, McLaren Caro with McLaren Health Care and Hills and Dales with Covenant Healthcare. These affiliations have helped the citizens of Tuscola County by being able to provide specialized care within their own network of doctors.

In the event that causes trauma to its victims, Tuscola County is in close proximity to several major Trauma Centers that include the following:

- Ascension St. Mary's in Saginaw - Level II
- Covenant Healthcare in Saginaw - Level II / Level II Pediatric
- Hurley Medical Center in Flint - Level I / Level II Pediatric
- McLaren Bay in Bay City - Level III
- McLaren Flint - Level III

Public Safety:

- Law Enforcement - Tuscola County has twelve police agencies within the county. Of the twelve, the Tuscola County Sheriff's Office and the Michigan State Police provide police coverage to the entire county. The twelve Police Departments include the following:
 - Akron Police Department - Limited coverage to Village of Akron, Village of Fairgrove and Fairgrove Township
 - Caro Police Department - 24 hour coverage to the City of Caro
 - Cass City Police Department - 24 hour coverage to the Village of Cass City

- Gagetown Police Department - Limited coverage to the Village of Gagetown
- Kingston Police Department - Limited coverage to the Village of Kingston and Kingston Township
- Mayville Police Department - Limited coverage to the Village of Mayville
- Michigan State Police-Caro Post - Limited coverage to Huron County, Sanilac County and Tuscola County
- Millington Police Department - Limited coverage to the Village of Millington
- Reese Police Department - Limited coverage to the Village of Reese
- Tuscola County Sheriff's Office - 24 hour coverage to Tuscola County with contracted services to Arbela Township, Millington Township and Vassar Township.
- Vassar Police Department - 24 hour coverage to the City of Vassar
- Unionville Police Department - Limited coverage to the Village of Unionville
- Fire Departments - Tuscola County is home to thirteen fire departments but receives coverage from seventeen total departments. Of the thirteen departments located within Tuscola County, three also provide Medical First Responder services to their coverage areas. In addition, all thirteen fire departments have a Memorandum of Understanding to assist Emergency Medical Services with cardiac calls in their prospective service areas.

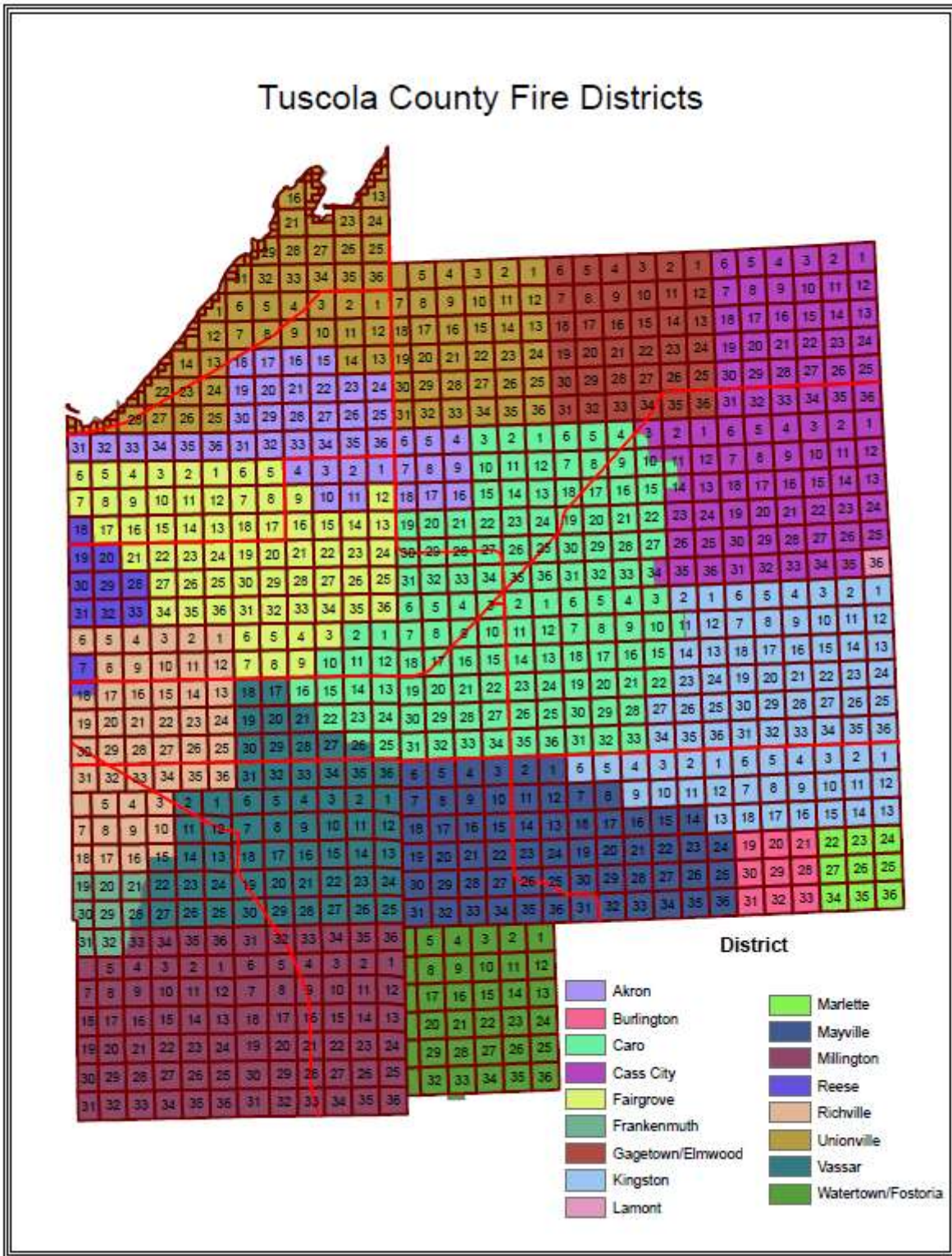
Map 15 details the department coverage areas and is located on the preceding page.

Those departments include the following:

- Akron-Columbia-Wisner-Unionville Fire *fire service only*
- Akron Fire *fire service only*
- Burlington Township Fire (Lapeer County) *fire service only*
- Caro Fire *fire service only*
- Elkland Township Fire *fire service only*
- Fairgrove Fire *fire service only*

- Frankenmuth Fire (Saginaw County) *fire service only*
- Gagetown Fire *fire service only*
- Kingston Fire *fire service and medical first responder service*
- Lamont Fire (Sanilac County) *fire service only*
- Mayville Fire *fire service only*
- Marlette Fire (Sanilac County) *fire services only*
- Millington Fire *fire service and medical first responder service*
- Reese Fire Rescue *fire service and medical first responder service*
- Richville Fire *fire service only*
- Vassar Fire *fire service only*
- Watertown Township Fire *fire service only*

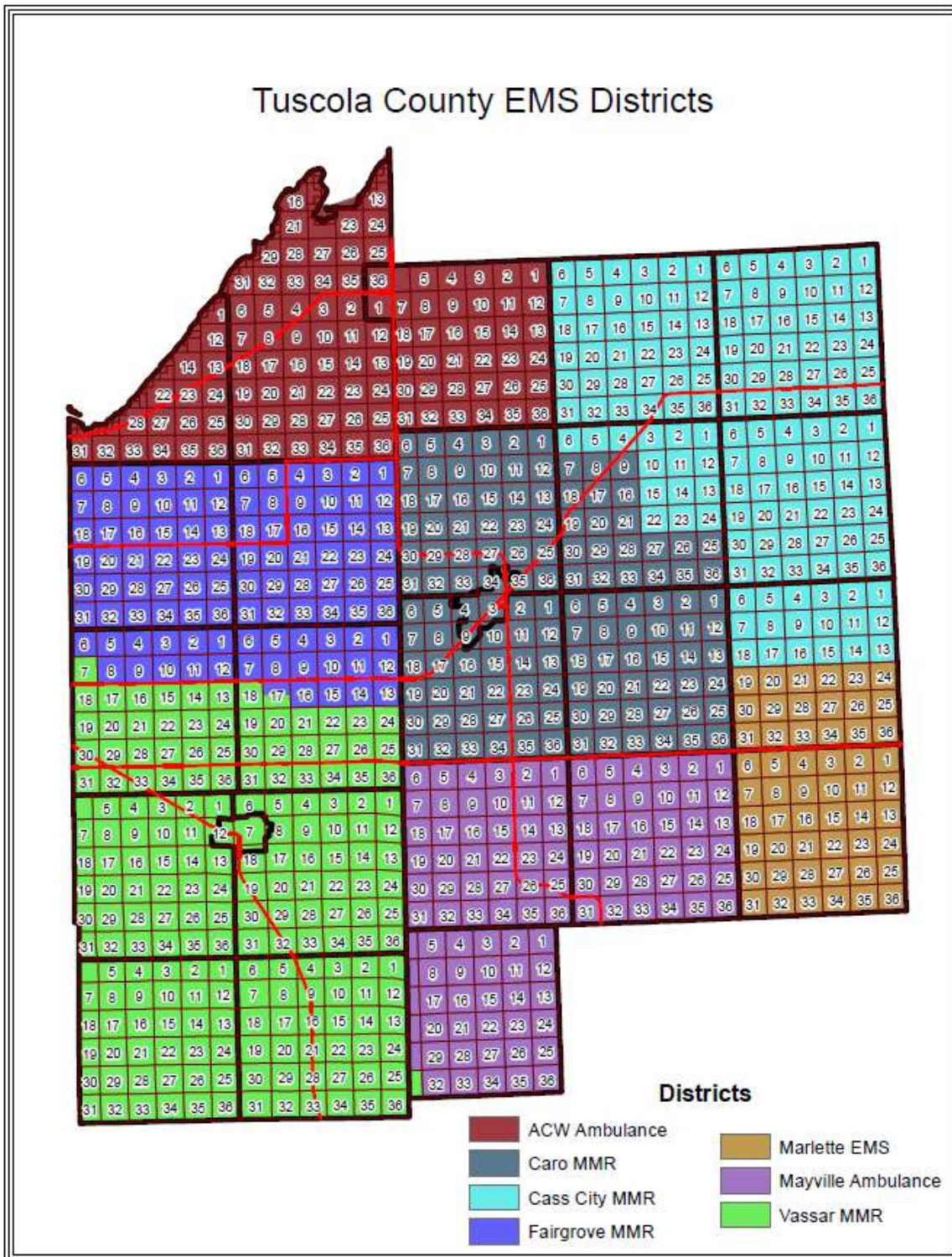
Map 15: Fire Department Coverage Map:



- Emergency Medical Services (Ambulance Services) - Tuscola County receives EMS coverage from four service providers. Map 16 on the preceding page details each service's coverage area.
 - ACW Ambulance - Basic Life Support Service
 - Marlette Ambulance - Advanced Life Support Service
 - Mayville Ambulance - Basic Life Support Service
 - Mobile Medical Response - Advanced Life Support Service

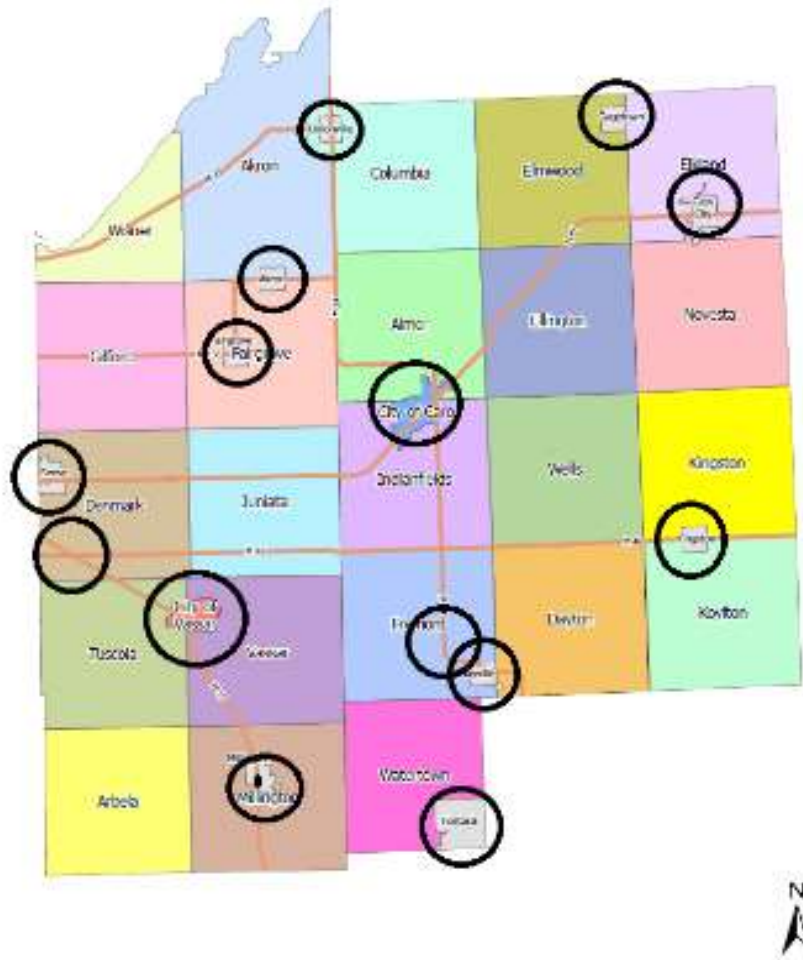
Additionally, with our relatively close proximity to the trauma centers located in Saginaw and Flint, Tuscola County is also serviced regularly by two air ambulance services, Flightcare which flies out of Ascension St Mary's and Lifenet which flies out of Covenant. These two services are utilized on a regular basis transporting trauma victims to higher levels of care quickly.

Map 16: Emergency Medical Services Coverage Map:



- Outdoor Warning Sirens - Tuscola County currently has 18 outdoor warning sirens throughout the county. Sirens are only intended to warn people who are outdoors and not intended to warn residents in their home. The sirens are owned and maintained by the municipality where the siren is located. Below is a list and map of the current sirens within the county:
 - Village of Akron
 - City of Caro (three sirens)
 - Village of Cass City
 - Denmark Township (Located in the unincorporated area of Richville)
 - Village of Fairgrove (new siren installed summer of 2017)
 - Fremont Township (capability added in summer of 2016)
 - Village of Gagetown (new siren installed fall of 2013)
 - Village of Kingston
 - Village of Mayville (new siren installed summer of 2021)
 - Village of Millington
 - Village of Reese
 - Village of Unionville
 - City of Vassar (three sirens) (two new sirens installed/system updated, summer of 2018)
 - Watertown Township (located in the unincorporated area of Fostoria)

Map 17: Outdoor Warning Sirens:

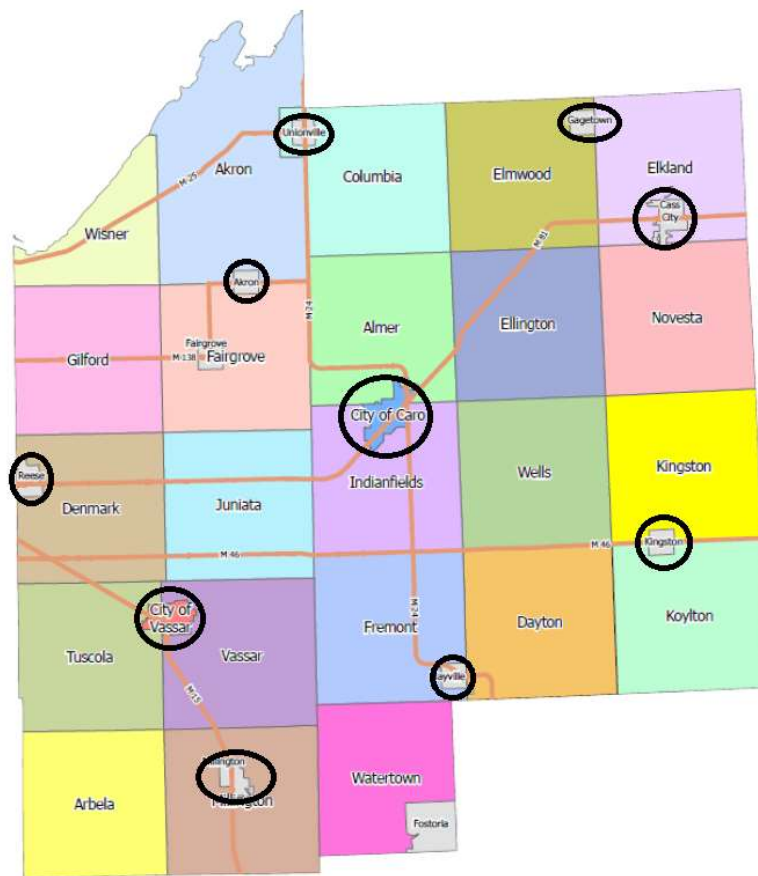


Municipal Services:

- Municipal Water Systems - The following municipalities have water systems to provide safe drinking water to their residents.
 - Village of Akron
 - Akron Township (portions near M-25)
 - City of Caro
 - Village of Cass City
 - Denmark Township (Portions including Unincorporated Richville)
 - Village of Gageton
 - Gilford Township (portions of east side of twp)
 - Indianfields Township (portions)

- Village of Kingston
- Village of Mayville
- Village of Millington
- Village of Reese
- Village of Unionville
- City of Vassar
- Wisner Township (portions near M-25)

Map 18: Municipal Water Systems



- Municipal Sewer Systems - The following municipalities offer sanitary sewer to their residents within the county:
 - Village of Akron
 - City of Caro
 - Village of Cass City
 - Denmark Twp (Unincorporated Richville area only)
 - Village of Fairgrove
 - Village of Gagetown
 - Village of Kingston
 - Village of Mayville
 - Village of Millington
 - Village of Reese
 - Village of Unionville
 - City of Vassar

Map 19: Sanitary Sewer System Locations



Private/Cooperative Utilities:

- Electricity - Tuscola County receives electrical services from primarily two providers:
 - DTE Electric Company
One Energy Plaza
Detroit, MI 48226
Customer Service: 800-477-4747
 - Thumb Electric Cooperative
2231 Main St.
P.O. Box 0157
Ubyly, MI 48475-0157
Customer Service: 800-327-0166
- Natural Gas - Like electrical service, Tuscola County receives its natural gas from two providers:
 - Consumers Energy Company
One Energy Plaza
Jackson, MI 49201-2276
Customer Service: 800-477-5050
 - SEMCO Energy Gas Company
1411 Third St., Suite A
Port Huron, MI 48060
Customer Service: 800-624-2019
- Telephone (landlines)
 - AT&T Ameritech
Customer Service: 855-780-6064
 - Frontier Communications
Customer Service: 800-921-8101
 - Spectrum
Customer Service: 855-707-7328
 - TDS Telecom
Customer Service: 888-233-0001

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Chapter 4: Hazard Identification

Tuscola County is vulnerable to a wide range of natural, technological and human-related hazards. Emergency Management officials are challenged with managing these threats to protect life and property. In order to be effective at mitigating, preparing for, responding to and recovering from all hazards, these types of hazards facing a county should be identified and understood. Hazard identification provides communities with a realistic base to plan for mitigation, preparedness, response and recovery activities.

NATURAL HAZARDS

These hazards are generally limited to those that would occur naturally because of the Earth's geological or meteorological conditions. With the exception of flooding, all natural disasters impact the entire county and each jurisdiction.

Three different sources were used to gather data from these events. First, the National Oceanic & Atmospheric Administration's National Centers for Environmental Information maintains records of these events. In the past 20 years, using the data from the NOAA's National Centers for Environmental Information, there have been 275 reported occurrences. Using their records for the last 20 years, historical damages and probabilities of natural hazards can be determined. Additional data can be found in Appendix 9: "FEMA "National Risk Index" for Tuscola County".

The second source of data is from the National Risk Index (NRI). This data is also listed for each hazard that the data is available for. The NRI, is a new, online mapping application from FEMA that identifies communities most at risk to 10 natural hazards. Additional information about the NRI can be found here: <https://hazards.fema.gov/nri/>

The third source of data was collected from the local "All Hazards" group that is made up of first responders and other key stakeholders who deal with local emergency planning and other incidents that affect Tuscola County. This data has been incorporated not only natural hazards but also the Technical Hazards/Adversarial-Human Related Hazards.

The table below lists the Natural Hazards that affect Tuscola County by using the historical data collected from the National Oceanic & Atmospheric Administration's - National Center for Environmental Information.

Table 5: Natural Hazards - Ranked by Historical Data

	Natural Hazard	Number of Occurrences since 01/01/2000	Number of days from 01/01/2000 to 5/31/2020	Probability of Occurrence per day	Total Deaths	Total Injuries	Total property & Crop Damage
1	Thunderstorms/ lightning	129	7457	.0172	0	0	\$344,950.00
2	Hail	55	7457	.0073	0	0	0
3	Heavy Snow	23	7457	.0030	0	0	0
4	Severe Wind ---- High Wind	16 --- 19	7457	.0021 --- .0025	0	0	\$477,000.00 --- \$11,855,000.00
5	Cold/Wind Chill	11	7457	.0014	0	10	\$25,000.00
6	Flood	10	7457	.0013	0	0	\$4,572,000.00
7	Heat	8	7457	.0010	0	1	0
8	Tornados	7	7457	.0009	0	1	\$1,600,000.00
9	Ice Storms	4	7457	.0005	0	0	\$3,020,000.00
10	Shoreline Flooding	3	7457	.0004	0	0	0
11	Blizzard	2	7457	.0002	0	0	1,000,000.00
12	Excessive Heat	2	7457	.0002	0	0	0
13	Drought	1	7457	.0001	0	0	0
14	Wildfire	1	7457	.0001	0	0	0
15	Frost/Freeze	1	7457	.0001	0	0	1,300,000.00
16	Flash Flood	1	7457	.0001	0	0	27,000.00
17	Earthquakes	0	7457	0	0	0	0
	Totals	275	7457		0	12	\$12,369,950.00

Source: NOAA National Center for Environmental Information

https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=ALL&beginDate_mm=01&beginDate_dd=01&beginDate_yyyy=2000&endDate_mm=05&endDate_dd=31&endDate_yyyy=2020&county=TUSCOLA%3A157&hailfilter=0,00&tornfilter=0&windfilter=00&sort=DT&submitbutton=Search&statefips=26%2CMICHIGAN#

Thunderstorms / Lightning / Hail:

Jurisdictions Most Vulnerable: All

Thunderstorms

Thunderstorms are caused by atmospheric imbalance and turbulence may result in thunder, heavy rains, strong winds, microbursts, high straight-line winds, tornados, surface hail, or lightning. Most thunderstorms produce only thunder, lightning, and rain. The National Weather Service considers a thunderstorm severe if it produces hail at least one inch in diameter, wind 58 mph or higher, or tornadoes.

Table 6: Thunderstorm Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	71
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	26
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 7: Thunderstorm Event List of Occurrences that resulted in property damages from 01/01/2000 to 06/30/2020

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	244.95K	0.00K
AKRON	TUSCOLA CO.	MI	05/29/2002	16:30	EST	Thunderstorm Wind	55 kts. E	0	0	35.00K	0.00K
CARO	TUSCOLA CO.	MI	06/08/2008	15:45	EST-5	Thunderstorm Wind	56 kts. EG	0	0	30.00K	0.00K
UNIONVILLE	TUSCOLA CO.	MI	06/08/2008	15:30	EST-5	Thunderstorm Wind	56 kts. EG	0	0	25.00K	0.00K
REESE	TUSCOLA CO.	MI	08/09/2000	06:10	EST	Thunderstorm Wind	55 kts. E	0	0	18.00K	0.00K
KINGSTON	TUSCOLA CO.	MI	05/30/2006	19:30	EST	Thunderstorm Wind	60 kts. EG	0	0	15.00K	0.00K
MILLINGTON	TUSCOLA CO.	MI	07/14/2000	14:54	EST	Thunderstorm Wind	54 kts. E	0	0	10.00K	0.00K
CASS CITY	TUSCOLA CO.	MI	08/23/2007	17:42	EST-5	Thunderstorm Wind	55 kts. EG	0	0	10.00K	0.00K
MAYVILLE	TUSCOLA CO.	MI	06/15/2008	22:40	EST-5	Thunderstorm Wind	53 kts. EG	0	0	10.00K	0.00K
MAYVILLE	TUSCOLA CO.	MI	09/21/2010	22:15	EST-5	Thunderstorm Wind	54 kts. EG	0	0	10.00K	0.00K
KINGSTON	TUSCOLA CO.	MI	09/21/2010	22:25	EST-5	Thunderstorm Wind	54 kts. EG	0	0	10.00K	0.00K
FAIRGROVE	TUSCOLA CO.	MI	08/29/2007	14:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	6.00K	0.00K
CARO	TUSCOLA CO.	MI	06/06/2008	18:32	EST-5	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K
EAST DAYTON	TUSCOLA CO.	MI	06/27/2010	19:01	EST-5	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K
QUANICASSEE	TUSCOLA CO.	MI	06/09/2011	00:08	EST-5	Thunderstorm Wind	61 kts. EG	0	0	5.00K	0.00K
UNIONVILLE	TUSCOLA CO.	MI	07/19/2013	13:52	EST-5	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K
CARO	TUSCOLA CO.	MI	07/19/2013	14:10	EST-5	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K
DEFORD	TUSCOLA CO.	MI	07/19/2013	14:11	EST-5	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K
KINGSTON	TUSCOLA CO.	MI	07/08/2016	17:00	EST-5	Thunderstorm Wind	65 kts. EG	0	0	5.00K	0.00K
MILLINGTON	TUSCOLA CO.	MI	10/01/2019	12:09	EST-5	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
MILLINGTON	TUSCOLA CO.	MI	09/21/2010	22:05	EST-5	Thunderstorm Wind	54 kts. EG	0	0	4.00K	0.00K
CASS CITY	TUSCOLA CO.	MI	07/14/2000	15:40	EST	Thunderstorm Wind	50 kts. E	0	0	3.00K	0.00K
AKRON	TUSCOLA CO.	MI	09/05/2014	15:05	EST-5	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
COLWOOD	TUSCOLA CO.	MI	08/02/2015	12:49	EST-5	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
CARO	TUSCOLA CO.	MI	06/15/2001	16:40	EST	Thunderstorm Wind	50 kts. E	0	0	2.00K	0.00K
ELMWOOD	TUSCOLA CO.	MI	07/25/2012	22:35	EST-5	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
FAIRGROVE	TUSCOLA CO.	MI	05/21/2013	17:09	EST-5	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
MAYVILLE	TUSCOLA CO.	MI	08/19/2015	15:29	EST-5	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
VASSAR	TUSCOLA CO.	MI	04/23/2001	16:40	EST	Thunderstorm Wind	50 kts. E	0	0	1.00K	0.00K
MAYVILLE	TUSCOLA CO.	MI	08/01/2008	14:45	EST-5	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
KINGSTON	TUSCOLA CO.	MI	08/19/2010	13:32	EST-5	Thunderstorm Wind	56 kts. EG	0	0	1.00K	0.00K
WATROUSVILLE	TUSCOLA CO.	MI	07/16/2008	19:32	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.50K	0.00K
TUSCOLA	TUSCOLA CO.	MI	07/16/2008	19:32	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.50K	0.00K
FAIRGROVE	TUSCOLA CO.	MI	05/20/2013	16:53	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.50K	0.00K
DEFORD	TUSCOLA CO.	MI	05/30/2006	19:00	EST	Thunderstorm Wind	54 kts. EG	0	0	0.25K	0.00K
CASS CITY	TUSCOLA CO.	MI	05/30/2006	18:28	EST	Thunderstorm Wind	52 kts. EG	0	0	0.20K	0.00K

Below is a brief description from NOAA of the Thunderstorm that occurred on May 29, 2002 which resulted in the highest reported property damage during the time from of January 1, 2000 and June 30, 2020:

Thunderstorm Historical Events:

On May 31, 1998, the Thumb counties of Huron, Tuscola, and Sanilac also experienced damaging winds. Numerous barns were deroofed in the west half of Huron County, and a pair of utility plants were damaged. A gazebo in Wagener Park, between Harbor Beach and White Rock, was destroyed. In Tuscola County, the wind was estimated in the 70 to 85 mph range by

the Michigan State Police at their Caro post. Property damage was extensive in the Caro area, including a tree that fell through the roof of the county building. Unionville was also hit hard, with several homes struck by falling trees. County officials estimated 70 mph winds in the Millington area. Windows were blown out a home in the extreme southeast corner of the county, just west of Marlette. Across the county line in Sanilac County, plate glass windows were blown out of downtown businesses in Brown City. Several mobile homes in the northwest part of the county suffered extensive damage. Numerous outbuildings were destroyed in Sanilac County, mainly in the western half. The steeple was torn off of a church in Melvin. Other communities that saw damage included New Greenleaf, Marlette, Peck, Deckerville, Shabonna, and Minden.

On May 29, 2002, scattered thunderstorms developed across southeast Michigan during the afternoon of the 29th. One storm strengthened along a lake breeze boundary in northern Tuscola County. A local newspaper reported that winds from this thunderstorm blew over a pole barn, uprooted a large tree, and damaged the chimney of a home.

Probability of Occurrence:

Tuscola County has had 71 reported severe thunderstorms since 2000. Reported property damages are \$244.95K since 2000. Overall in the last 20 years the average severe thunderstorm causes approximately \$3.49K per occurrence. Taking these numbers into account, it can be assumed that Tuscola County will continue to average approximately 3.5 events each year for the foreseeable future.

Lightning

Lightning is a random and unpredictable product of a thunderstorm's tremendous energy. The energy in the storm produces an intense electrical field similar to that of a giant battery. The positive charge is concentrated at the top inside the storm, and the negative charge is concentrated at the bottom. Lightning strikes when a thunderstorm's electrical potential (the difference between its positive and negative charges) becomes great enough to overcome the resistance of the surrounding air. Bridging that difference, lightning can jump from cloud to cloud, cloud to ground or even from the cloud to the air surrounding the thunderstorm. Lightning strikes can generate current levels of 30,000 to 40,000 amps, with air temperatures often superheated to higher than 50,000 degrees Fahrenheit (hotter than the surface of the sun), and speeds approaching one-third the speed of light.

In the United States, approximately 100,000 thunderstorms occur each year, and every one of those storms generate lightning. It is not uncommon for a single thunderstorm to produce hundreds or even thousands of lightning strikes, however to the vast majority of the general public, lightning is perceived as a minor hazard. That perception remains despite the fact that lightning damages many more structures, kills and injures more people in the United States per year, on average, than tornados and hurricanes. Annual lightning-related property damages are

conservatively estimated at several billions of dollars per year, and those losses are expected to continue to grow as the use of computers and other lightning sensitive electronic components becomes more prevalent. Statistics compiled by the National Oceanic & Atmospheric Association (NOAA) and the National Lightning Safety Institute revealed the following about fatalities, injuries and damage in the United States:

Location of Lightning Strikes:

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

Gender of Victims:

- 84% male
- 16% female

Months of Most Strikes:

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

Table 8: Lightning Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:	
Number of County/Zone areas affected:	1
Number of Days with Event:	1
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	1
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Lightning Historical Events:

August 26, 2006, a newspaper reported that a lightning strike had caused a house to burn down. Lightning struck the home on Saturday evening, the 26th, sparking electrical problems. The electrical problem caused the home to go up in flames 24 hours later, at 1830 EST on the 27th. Total property damages were estimated at \$100K.

Probability of Occurrence:

Tuscola County has had no reported lightning strikes within the county in the last ten years. The last reported lightning strike according to NOAA was on August 26, 2006 in the Akron Area. This lightning strike caused approximately \$100,000.00 in property damages. With that, the probability of a lightning strike in Tuscola County is possible but is extremely rare.

Hail

Hail occurs when a severe thunderstorm produces hail that falls to the ground. Hail is formed when the updrafts of the storm carry water droplets above the freezing level, where they form into round or irregular lumps of ice that range from the size of a pea to the size of a grapefruit. When the weight of the hail is no longer supported by the air, it falls to the ground and has the potential to batter crops, dent automobiles and injure people and wildlife. Sometimes, large hail appears before a tornado since it is formed in the area of a thunderstorm that tornadoes are most likely to form.

The 2019 Michigan Hazard Mitigation Plan advises that Michigan, on average, has approximately 191 hail storms a year with estimated damages of approximately \$16.6 million, no deaths and one reported injury. Since a majority of hail storms occur during the months of May through August, during the growing season, crops are highly susceptible to damage from hail.

Table 9: Hail Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	36
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	0
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 10: Hail Event List of Occurrences from 01/01/2000 to 06/30/2020

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
UNIONVILLE	TUSCOLA CO.	MI	05/12/2000	17:16	EST	Hail	1.75 in.	0	0	0.00K	0.00K
UNIONVILLE	TUSCOLA CO.	MI	07/13/2000	20:15	EST	Hail	0.88 in.	0	0	0.00K	0.00K
CARO	TUSCOLA CO.	MI	07/13/2000	20:50	EST	Hail	0.75 in.	0	0	0.00K	0.00K
VASSAR	TUSCOLA CO.	MI	08/09/2000	06:25	EST	Hail	1.00 in.	0	0	0.00K	0.00K
MAYVILLE	TUSCOLA CO.	MI	08/09/2000	06:40	EST	Hail	0.75 in.	0	0	0.00K	0.00K
FAIRGROVE	TUSCOLA CO.	MI	05/25/2001	18:45	EST	Hail	0.75 in.	0	0	0.00K	0.00K
MAYVILLE	TUSCOLA CO.	MI	09/07/2001	19:05	EST	Hail	0.75 in.	0	0	0.00K	0.00K
MILLINGTON	TUSCOLA CO.	MI	04/19/2002	01:30	EST	Hail	0.75 in.	0	0	0.00K	0.00K
AKRON	TUSCOLA CO.	MI	06/17/2002	16:59	EST	Hail	0.75 in.	0	0	0.00K	0.00K
CARO	TUSCOLA CO.	MI	06/17/2002	17:10	EST	Hail	0.75 in.	0	0	0.00K	0.00K
KINGSTON	TUSCOLA CO.	MI	06/17/2002	17:35	EST	Hail	0.75 in.	0	0	0.00K	0.00K
MILLINGTON	TUSCOLA CO.	MI	06/21/2002	11:36	EST	Hail	0.75 in.	0	0	0.00K	0.00K
REESE	TUSCOLA CO.	MI	07/22/2002	16:15	EST	Hail	0.75 in.	0	0	0.00K	0.00K
FAIRGROVE	TUSCOLA CO.	MI	08/13/2002	15:00	EST	Hail	1.00 in.	0	0	0.00K	0.00K
CARO	TUSCOLA CO.	MI	10/01/2002	16:40	EST	Hail	0.75 in.	0	0	0.00K	0.00K
MAYVILLE	TUSCOLA CO.	MI	05/05/2003	18:30	EST	Hail	1.00 in.	0	0	0.00K	0.00K
MAYVILLE	TUSCOLA CO.	MI	08/21/2003	18:43	EST	Hail	0.75 in.	0	0	0.00K	0.00K
KINGSTON	TUSCOLA CO.	MI	08/21/2003	18:55	EST	Hail	0.75 in.	0	0	0.00K	0.00K
CARO	TUSCOLA CO.	MI	05/23/2004	18:00	EST	Hail	0.75 in.	0	0	0.00K	0.00K
WATROUSVILLE	TUSCOLA CO.	MI	06/09/2004	12:12	EST	Hail	0.75 in.	0	0	0.00K	0.00K
MAYVILLE	TUSCOLA CO.	MI	07/17/2004	13:23	EST	Hail	0.75 in.	0	0	0.00K	0.00K
RICHVILLE	TUSCOLA CO.	MI	08/02/2004	17:20	EST	Hail	1.75 in.	0	0	0.00K	0.00K
CARO	TUSCOLA CO.	MI	05/29/2005	15:16	EST	Hail	0.88 in.	0	0	0.00K	0.00K
VASSAR	TUSCOLA CO.	MI	06/05/2005	15:28	EST	Hail	1.00 in.	0	0	0.00K	0.00K
FAIRGROVE	TUSCOLA CO.	MI	06/05/2005	18:15	EST	Hail	0.75 in.	0	0	0.00K	0.00K
CASS CITY	TUSCOLA CO.	MI	06/05/2005	18:34	EST	Hail	0.88 in.	0	0	0.00K	0.00K
KINGSTON	TUSCOLA CO.	MI	06/10/2005	18:08	EST	Hail	0.75 in.	0	0	0.00K	0.00K
FAIRGROVE	TUSCOLA CO.	MI	06/14/2005	14:36	EST	Hail	1.00 in.	0	0	0.00K	0.00K
REESE	TUSCOLA CO.	MI	03/31/2006	18:08	EST	Hail	1.00 in.	0	0	0.00K	0.00K
MILLINGTON	TUSCOLA CO.	MI	06/28/2006	13:40	EST	Hail	0.88 in.	0	0	0.00K	0.00K
MAYVILLE	TUSCOLA CO.	MI	06/28/2006	14:07	EST	Hail	0.75 in.	0	0	0.00K	0.00K
VASSAR	TUSCOLA CO.	MI	06/28/2006	15:41	EST	Hail	0.75 in.	0	0	0.00K	0.00K
CASS CITY	TUSCOLA CO.	MI	07/09/2007	15:13	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
DEFORD	TUSCOLA CO.	MI	07/26/2007	19:20	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
UNIONVILLE	TUSCOLA CO.	MI	08/23/2007	17:07	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
CASS CITY	TUSCOLA CO.	MI	08/23/2007	17:50	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K

DEFORD	TUSCOLA CO.	MI	07/26/2007	19:20	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
UNIONVILLE	TUSCOLA CO.	MI	08/23/2007	17:07	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
CASS CITY	TUSCOLA CO.	MI	08/23/2007	17:50	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
FAIRGROVE	TUSCOLA CO.	MI	04/11/2008	15:42	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
CARO MUNI ARPT	TUSCOLA CO.	MI	06/08/2008	15:42	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
VASSAR	TUSCOLA CO.	MI	06/22/2008	14:40	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
RICHVILLE	TUSCOLA CO.	MI	06/27/2008	15:16	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
CARO	TUSCOLA CO.	MI	07/22/2008	15:55	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
KINGSTON	TUSCOLA CO.	MI	07/22/2008	16:22	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
KINGSTON	TUSCOLA CO.	MI	07/22/2008	16:34	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
TUSCOLA	TUSCOLA CO.	MI	08/19/2010	16:55	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
MILLINGTON ARPT	TUSCOLA CO.	MI	03/15/2012	17:12	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
NORTH LAKE	TUSCOLA CO.	MI	03/15/2012	17:45	EST-5	Hail	2.00 in.	0	0	0.00K	0.00K
CARO MUNI ARPT	TUSCOLA CO.	MI	03/15/2012	17:45	EST-5	Hail	1.50 in.	0	0	0.00K	0.00K
CARO	TUSCOLA CO.	MI	03/15/2012	17:55	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
WAHJAMEGA	TUSCOLA CO.	MI	03/15/2012	19:30	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
UNIONVILLE	TUSCOLA CO.	MI	06/08/2015	12:29	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
WISNER	TUSCOLA CO.	MI	06/08/2015	12:36	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
FAIRGROVE	TUSCOLA CO.	MI	08/02/2015	15:30	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
WAHJAMEGA	TUSCOLA CO.	MI	08/02/2015	18:36	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
UNIONVILLE	TUSCOLA CO.	MI	07/08/2016	15:35	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
VASSAR	TUSCOLA CO.	MI	07/08/2016	16:30	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings.:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Hail	Very Low	Very Low	\$14,669.00
Lightning	Very Low	Relatively Low	\$37,283.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team’ who completed the survey on Natural Risks ranked thunderstorms and lightning as “High” for how vulnerable they perceived the threat to the County and hail was listed as “Moderate”. Complete survey results can be found in Appendix 4 of this document.

Local stakeholders also listed thunderstorms and lightning as having a high probability of occurring and moderate risk of occurring. Complete survey results can be found in Appendix 8 of this document.

Hail Historical Events:

July 6, 1994, a severe thunderstorm moved southeast across Tuscola County on the 6th, dropping large hail over the communities of Fairgrove and Caro. In Caro, a car dealership suffered damages in excess of \$100,000 to their stock of both used and new cars.

November 15, 1965, thunderstorms with hail, lightning, heavy rains, and high winds. Hailstones up to 1.5" in diameter broke most of the glass in several greenhouses and heavy rain semi-flooded the city streets in Vassar. Lightning induced a fire that destroyed a large barn and contents on a farm 8 miles east of Cass City. Power failure blackouts due to lightning hitting transformers were reported at St. Louis, Alma and Caro Michigan.

Probability of Occurrence:

Tuscola County, in the last 20 years, has experienced 36 hail events. According to NOAA there has been no reported damages for any of these events. But according to the Michigan Hazard Mitigation Plan, April 2019 edition, as a state we average \$16,600,000.00 in damages every year. With these numbers, hail events within the county are not uncommon and we can expect to suffer through at least one hail event per year with the potential of significant damages.

Possible Mitigation Activities (for all three types of events):

As indicated in the Michigan Hazard Analysis, lightning prevention or protection, in an absolute sense, is impossible. However, the consequences of lightning strikes can be diminished (in terms of deaths, injuries, and property damage) through the implementation of such measures as:

- Weather spotter training
- Increased coverage and use of NOAA Weather Radio and public early warning systems and networks.
- Tree trimming and maintenance along utility lines.
- Buried/protected power and utility lines in high susceptibility areas
- Use of surge protectors
- Enhanced early warning of lightning conditions by the National Weather Service
- Enhanced public education of thunderstorm and lightning hazards through Severe Weather Awareness Week and other appropriate avenues;
- Lightning protection for all critical structures using the systematic lightning hazard mitigation approach advocated by the National Lightning Safety Institute (NLSI);
- Widespread use of local lightning detection systems at such locations as golf courses, pools, sports fields and stadiums, and other outdoor venues; and
- Enhanced emergency planning for all large outdoor gatherings (e.g., sporting events, concerts, campgrounds, fairs, festivals, etc.) that includes provisions for early detection, monitoring, and warning of approaching thunderstorms that could produce lightning.

Heavy Snow/Blizzard:

Jurisdictions Most Vulnerable: All

Snowstorms are periods of rapid snow accumulation, usually between 4 to 7 inches with wind speeds less than 35 mph. Snowstorms have the potential to reduce visibility, cause property damage, loss of life, and infrastructure failure. Lake-effect snow occurs when the cold air from the high latitudes of North America move across the warm Great Lakes. The heat and moisture from the Great Lakes rises into the cold air where it cools and condenses into snow clouds. The prevailing wind direction and inland moving snow clouds determine which areas will receive lake-effect snow.

Information from the 2019 Michigan Hazard Plan advises that Michigan, on average, has 360 snowstorm events statewide during the course of the year. Out of these storms, we suffer 0.1 deaths, 0.1 injuries and \$1,900,000.00 in average annual property and crop damages.

Table 11: Heavy Snow Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	25
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	0
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 12: Heavy Snow Event List of Occurrences from 01/01/2000 to 06/30/2020

Location	County/Zone	St.	Date	Time	TZ	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/12/2000	17:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/13/2000	06:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	04/07/2000	16:30	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	10/07/2000	01:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/05/2000	01:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/11/2000	12:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/13/2000	16:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/17/2000	01:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	03/04/2003	16:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/24/2003	17:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/14/2004	06:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/20/2005	00:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/15/2005	18:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/21/2006	05:00	EST	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/03/2008	22:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/09/2010	16:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	03/22/2011	18:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/05/2014	00:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	03/31/2015	00:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/09/2016	01:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/24/2016	08:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	03/01/2016	07:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	03/07/2018	21:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	11/25/2018	23:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/15/2021	21:00	EST-5	Heavy Snow		0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Table 13: Blizzard Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	3
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	0
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 14: Blizzard Event List of Occurrences from 01/01/2000 to 06/30/2020

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/12/2000	00:30	EST	Blizzard		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/22/2005	18:00	EST	Blizzard		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/02/2011	00:00	EST-5	Blizzard		0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Looking further into these events, it was found that each occurrence did not target a specific area or jurisdiction within Tuscola County. Each snow event was a countywide event and affected everyone including neighboring counties.

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Winter Weather	Relatively Low	Relatively Low	\$25,225.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team’ who completed the survey on Natural Risks ranked Heavy Snow and Blizzards as “Moderate” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Local stakeholders also listed Heavy Snow & Blizzards as having a “Moderate” probability of occurring. Complete survey results can be found in Appendix 8 of this document.

Heavy Snow/Blizzard Historical Events:

March 19, 1996, The biggest snowstorm of the season for much of the area hit on the first day of spring. Low pressure tracked northeast from the Gulf of Mexico to western Pennsylvania, with rain spreading north across southeast Michigan during the evening on the 19th. The rain changed to snow before midnight, then continued into the afternoon on the 20th. An accumulation of 8.4 inches were measured at Flint, with 6.9 inches at Ann Arbor and 5.8 inches at Detroit. Strong winds created drifts as high as 3 feet in some areas. The combination of strong winds and heavy wet snow resulted in power outages to 173,000 homes and businesses in southeast Michigan. In Detroit, the power outages were blamed for keeping many schools closed for 3 days.

January 9, 1997, a low pressure tracked northeast from the Ohio valley across extreme southeast Michigan on the 9th. The result was snow across all of southeast Michigan, with the heaviest amounts falling from the Flint area north through the upper thumb and Saginaw valley. Some accumulations on the 9th included 10 inches at the Tri Cities airport near Saginaw, 8.5 inches at Cass City, 8 inches in Vassar and Owosso and 7 inches at Flint's Bishop airport. Farther south across the Detroit Metropolitan area, accumulations ranged from 2 to 6 inches. Unusually heavy lake effect snow followed the storm on the 10th, bringing an additional 1 to 4 inches of snow to most areas. Numerous auto accidents and school closings were reported.

November 26, 1997, a Low pressure tracked northeast across Ohio late on the 26th through early morning on the 27th. Rain changed to snow over the Saginaw Valley and Flint area during the evening on the 26th, and snow continued until around daybreak on the 27th. Accumulations were mostly from 3 to 6 inches, with a maximum of 6 inches reported at Saint Charles, in Saginaw county. The combination of the heavy wet snow, and the fact that many trees had not yet lost their leaves, resulted in widespread tree damage and downed power lines. Around 40000 homes lost power on the 27th. Measurable snow fell as far south as the northern suburbs of Detroit.

Probability of Occurrence:

Tuscola County has had 25 heavy snow events since 2000. In addition, we have also had 3 blizzards that affected the whole county since 2000 with no reported damages. Tuscola County will continue to average one significant winter storm occurring each year with minimal expected property damages.

Possible Mitigation Activities:

- Increased coverage and use of NOAA weather radios.
- Tree trimming and maintenance along utility lines
- Buries and protected utility lines
- Establishing heating centers/shelters for vulnerable populations

Severe Wind (High & Strong):

Jurisdictions Most Vulnerable: All

Severe winds spawned by thunderstorms or other storm events have devastating effects on Michigan in terms of loss of life, injuries, crop damages and property damage. Severe wind events are characterized by wind velocities of 58 miles per hour or greater, with gusts sometimes exceeding hurricane velocity which is 74 mph.

Straight line winds, called derechos, can be just as extreme as that of a tornado, since the damage from straight line winds is more widespread and usually affects a larger area. In addition to property damages, there is a risk for infrastructure damage from downed power lines due to falling limbs and trees. Large scale power outages with hundreds of thousands of customers affected are common during straight line wind events.

Table 15: Strong Wind Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	4
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	4
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 16: Strong Wind Event List of Occurrences from 01/01/2000 to 06/30/2020

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	477.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	11/15/2005	21:00	EST	Strong Wind	48 kts. EG	0	0	450.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	04/16/2007	11:00	EST-5	Strong Wind	43 kts. EG	0	0	20.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	09/07/2010	18:00	EST-5	Strong Wind	39 kts. EG	0	0	5.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	10/15/2011	09:00	EST-5	Strong Wind	39 kts. EG	0	0	2.00K	0.00K
Totals:								0	0	477.00K	0.00K

Table 17: High Wind Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	19
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	13
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 18: High Wind Event List of Occurrences from 01/01/2000 to 06/30/2020

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	11.855M	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	03/08/2017	10:00	EST-5	High Wind	56 kts. EG	0	0	7.000M	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/19/2013	23:00	EST-5	High Wind	53 kts. MG	0	0	1.000M	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	11/17/2013	16:00	EST-5	High Wind	50 kts. EG	0	0	1.000M	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	05/04/2018	11:00	EST-5	High Wind	52 kts. EG	0	0	850.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	11/12/2003	17:00	EST	High Wind	52 kts. EG	0	0	800.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/24/2019	09:00	EST-5	High Wind	52 kts. EG	0	0	500.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/28/2008	04:00	EST-5	High Wind	56 kts. EG	0	0	250.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	10/30/2004	11:30	EST	High Wind	54 kts. EG	0	0	200.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	11/15/2020	11:00	EST-5	High Wind	52 kts. EG	0	0	200.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/23/2007	07:00	EST-5	High Wind	50 kts. EG	0	0	35.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	03/09/2002	15:00	EST	High Wind	61 kts. E	0	0	10.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	10/27/2010	16:00	EST-5	High Wind	52 kts. EG	0	0	5.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	10/19/2011	15:00	EST-5	High Wind	52 kts. EG	0	0	5.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	10/16/2001	16:00	EST	High Wind	40 kts. E	0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/01/2002	09:00	EST	High Wind	40 kts. M	0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	03/05/2004	10:52	EST	High Wind	50 kts. EG	0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	04/19/2004	10:45	EST	High Wind	52 kts. EG	0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	11/06/2005	10:00	EST	High Wind	52 kts. EG	0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/30/2008	00:00	EST-5	High Wind	50 kts. MG	0	0	0.00K	0.00K
Totals:								0	0	11.855M	0.00K

Further investigation of these “Strong Wind” and “High Wind Events” found that several of the recent events, especially with the larger property damage reports, were not exclusive to Tuscola County but affected the entire region.

Strong Wind/High Wind Historical Events:

March 8, 2017, a non thunderstorm event took place over the state on Wednesday, March 8, 2017, as high winds brought wind gusts in excess of 60 mph! The high winds took out power lines and trees, along with numerous reports of structural damage to buildings. There were also reports of brush fires and tractor-trailers flipped over around the area. Due to the extensive damage, many areas were without power for several days. Approximately 800,000 DTE customers and approximately 300,000 Consumers Energy customers were affected. The highest wind gust reported across Southeast Michigan was 68 mph at both Saginaw and Detroit Metro Airport.

January 19, 2013, an intense Arctic Front swept through southeast Michigan around Midnight of January 19th, with westerly winds gusting around 60 mph across much of the area during the early morning hours of January 20th. Dozens of trees and power lines were downed across individual counties, leading to power outages in excess of 120,000 DTE customers during the peak of the winds.

*Here are some of the higher wind gusts and times reported:
Caro...61 MPH...1214 AM. Flint...59 MPH...247 AM. Lapeer...52 MPH...233 AM.*

November 12, 2003, a strong low pressure system moved across the straits on the evening of the 12th, moving into Ontario overnight as it deepened to 974 mb. Strong cold advection and a tight pressure gradient over Lower Michigan produced wind gusts between 50 and 60 MPH across all of Southeast Michigan. In addition, there were even a few wind gusts reported between 60 and 88 mph. The highest wind gust was reported by a spotter in Dexter who recorded an 88 mph gust. An estimated 250,000 customers lost power in southeast Michigan, as widespread trees and power lines were blown down.

February 24, 2019, a low pressure system quickly intensified over the weekend of February 23-24th, as it crossed the Great Lakes region. This system brought blizzard warnings to western portions of the Great Lakes to high winds across the rest of the region. A well-mixed boundary layer led to high winds over the region, with gusts around 60 mph range. Widespread downed tree limbs with sporadic structural damage reported. One such report was roof damage at Adrian College. Downed power lines led to close to 200,000 customers without power across southeast Michigan, with some outages lasting into Monday. Here are some of the higher wind gusts reported: Saginaw... 61 mph Flint... 55 mph Lapeer... 53 mph.

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Strong Wind	Relatively Moderate	Relatively Moderate	\$678,564.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team” who completed the survey on Natural Risks ranked Severe Wind as “High” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Local stakeholders also listed Severe Wind as having a “High” probability of occurring. Complete survey results can be found in Appendix 8 of this document.

Probability of Occurrence:

Tuscola County has had 23 wind events (strong & high) in the last 20 years, with a property loss of just over 12 million dollars. Using the numbers provided by the NOAA, the average wind event

causes approximately \$536,173.91 in damages per event. Using the past events for the last twenty years, it is highly probable that Tuscola County will suffer one wind event per year causing significant damages..

Possible Mitigation Activities:

- Increased coverage and use of NOAA weather radios
- Public early warning systems and networks
- Trimming of trees along electrical transmission lines and other infrastructure such as roadways.
- Updating of electrical transmission lines that are old and inadequate.
- Burying of above ground electrical transmission lines in areas that are susceptible to high wind damage.
- Building roofs that are properly and securely anchored to the wall structure
- Construction of concrete safe rooms in homes and shelter areas in mobile home parks, fairgrounds, shopping malls, mobile home parks, and other vulnerable locations.

Cold/Wind Chill:

Jurisdictions Most Vulnerable: All

Prolonged periods of very low temperatures that are often accompanied by other extreme weather conditions such as heavy snowfall or high winds. Extreme cold temperatures primarily affect the most vulnerable residents such as the elderly, children, impoverished or those in poor health.

The 2019 Michigan Hazard Mitigation Plan states that in the United States, approximately 700 people die each year as a result of cold temperature related causes. Most of these deaths occur due to illnesses or disease that are negatively impacted by the severe cold weather. On average, Michigan suffers 35 extreme cold weather events with 1 death, 9.4 injuries and approximately \$6.4 million in property and crop damages.

Table 19: Cold/Wind Chill Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	6
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	1
Number of Days with Event and Property Damage:	1
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 20: Cold/Wind Chill Event List of Occurrences from 01/01/2000 to 06/30/2020

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:							0	10	25.00K	0.00K	
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/03/2007	16:00	EST-5	Cold/wind Chill	0	10	25.00K	0.00K	
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/10/2003	08:00	EST	Cold/wind Chill	0	0	0.00K	0.00K	
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/06/2014	15:00	EST-5	Cold/wind Chill	0	0	0.00K	0.00K	
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/28/2014	00:00	EST-5	Cold/wind Chill	0	0	0.00K	0.00K	
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/01/2018	00:00	EST-5	Cold/wind Chill	0	0	0.00K	0.00K	
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/29/2019	18:00	EST-5	Cold/wind Chill	0	0	0.00K	0.00K	
Totals:							0	10	25.00K	0.00K	

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Cold Wave	Relatively Moderate	Relatively Moderate	\$264,746.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team” who completed the survey on Natural Risks ranked Frost/Freeze as “Moderate” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Local stakeholders also listed Frost/Freeze as having a “High” probability of occurring. Complete survey results can be found in Appendix 8 of this document.

Cold/Wind Chill Historical Events:

Further investigation into each of these “Cold/Wind Chill Events” affected the region or a large portion of the state. None of the events targeted just Tuscola County.

January 29, 2019, an arctic air outbreak into the Midwest at the end of January 2019 brought extreme low temperatures and dangerous wind chills for several days. Numerous low temperature records were set across the area. The arctic front moved through Southeast Michigan on Tuesday, January 29 and temperatures fell to below zero by early Wednesday morning. In fact, the high temperatures for Wednesday in Detroit and Flint were recorded at midnight as temps remained below zero all day into Thursday. Detroit spent 36 consecutive hours below 0 - this was the longest such streak since Jan. 1994 (66 hours). Flint also spent 36 hours below 0. A tightened pressure gradient over the region and excellent mixing led to winds gusting over 35 mph at times from Tuesday night through Wednesday evening. The result was wind chills near or below -35 for numerous hours. Two deaths were attributed to the cold in Wayne County.

February 3, 2007, a bitter cold air mass blasted into the region on Saturday, February the 3rd and persisted through Tuesday, February the 6th. Temperatures through this period were 20 to 25 degrees below normal. Daytime temps struggled to reach 10 degrees while subzero temperatures occurred all 3 nights. Flint set 2 temperature records and was held to a daytime temperature less than 5 degrees for the first time in over 10 years. Winds of 15 to 25 MPH gusts as high as 35 MPH at times. After factoring in the winds, apparent temperatures ranged from 15 below to 25 below through nearly the entire event. Almost every school district in Southeast Michigan canceled school on Monday and most did the same on Tuesday, citing conditions too dangerous for the kids either walking to school or waiting outside for the bus. Area hospitals reported numerous cases of patients suffering from cold related illnesses. Most of the cases involved frostbite. At least one fatality was blamed on the cold weather. Frozen pipes and water main breaks occurred throughout all of Southeast Michigan, leaving many residents and business owners out in the cold. Area homeless shelters were filled to capacity. There were also many cases of fire sprinkler lines freezing and breaking, leading to flooding. AAA Michigan reported over 20,000 vehicle service calls due to the cold air, the most in nearly 10 years. Total damages were roughly estimated at \$425K, including electrical and mechanical damages to vehicles and property damages caused by flooding. Here are the official maximum and minimum temperatures observed at Detroit, Flint, and Saginaw, from the 4th through the 6th: Detroit: 8/-2 on the 4th, 12/-4 on the 5th, 12/-3 on the 6th. Flint: 4/-5 on the 4th, 9/-7 on the 5th, 11/-5 on the 6th. Saginaw: 5/-7 on the 4th, 10/-7 on the 5th, 10/-6 on the 6th.

February 1, 1996, the coldest weather of the winter season occurred across southeast Michigan during the first week of February. At Flint, the low temperature was zero or lower every day from January 31st through February 6th, reaching a low of -11 on the 3rd. In Detroit, the lowest

temperature was -7, also on the 3rd. An elderly man died of hypothermia on the 2d after wandering away from a nursing home in Detroit.

Probability of Occurrence:

Because of our climate changes, cold weather is nothing new for Tuscola County. Using the data from the NOAA, we have had only 6 wind chill events since 2000, with one event causing \$25,000.00 in property damages. While these extreme cold events appear to be uncommon, it should still be expected that we have one cold/wind chill event every 3.5 years with minimal property damage expected.

Possible Mitigation Activities:

- Identification of at-risk persons, with emphasis on homebound individuals that have limited mobility or health issues.
- Establishment and maintenance of heating and cooling centers and temporary shelters for the most seriously affected individuals.
- Continued improvement/update of critical infrastructure such as water infrastructure.

Flood:

Jurisdictions Most Vulnerable: Areas/Communities that are in close proximity to rivers and major drains which include the following municipalities:

- Almer Township
- City of Caro
- Fremont Township
- Indianfields Township
- Juniata Township
- Millington Township
- Novesta Township
- Tuscola Township
- Vassar Township
- City of Vassar

Flooding is the overflowing of rivers, streams, drains and lakes due to excess rainfall, rapid snowmelt or ice. Flooding of land adjoining the normal course of a stream or river has been a natural occurrence since the beginning of recorded history. Development within these floodplains plus the additional developments and construction of parking lots, streets and structures have changed how excessive rain waters had been dealt with by nature.

Flooding, even though it was not the most frequently occurring natural hazard for Tuscola County, is one of the county's main hazards of concern. In 1986, Tuscola County experienced a

major, 100 year flooding event along the Cass River. In response to this event, the City of Vassar which has had a long history of flooding issues, completed a large hazard mitigation project to lessen the impact of flooding in July 2007. This project was completed in large part to a FEMA Hazard Mitigation Grant.

Since the previous Hazard Mitigation Plan update that was completed in 2016, Tuscola County suffered significant rain/flooding events in the southern end of the county on May 25, 2019. This flooding was caused by an unusual rain event that left several areas of the county with a significant rain total of over 5 inches. As a result of this rain/flooding event, Tuscola County suffered over \$4,000,000.00 in damages, mostly to county roads.

National Flood Insurance Program

In 1968, Congress created the National Flood Insurance Program (NFIP) to reduce the impact of flooding on private and public structures by providing affordable insurance. The program is administered by FEMA and requires participating communities to adopt and enforce floodplain management ordinances that meet or exceed the NFIP minimum requirements. In addition, if communities participate in the Community Rating System (CRS), residents and business owners can receive reduced flood insurance premiums.

In Tuscola County there are 14 local units of government within Tuscola County that participate in the National Flood Insurance Program (NFIP). Conversely, 5 local units of government are listed as non-participants. A complete list of local governmental unit participation can be found in Table #1 of this document.

As listed in Chapter 2, many local jurisdictions have been participating in the NFIP for years. There are some communities that were "sanctioned," which typically means that they had not officially recognized an updated NFIP floodplain map within a certain period of time. By meeting the NFIP requirements, many of these communities might become full participants again. Gilford Township has taken recent steps to achieve this. It is also an activity recommended for other jurisdictions to consider implementing.

Maps of the current floodplain maps that are effective as of April 3, 2012 are displayed in Appendix 10 in this document or in the FEMA link below. In Addition, floodplain maps are now available on the county GIS system as well (link provided below) .

FEMA:

<https://www.fema.gov/national-flood-hazard-layer-nfhl>

Tuscola County GIS:

<https://www.tuscolacounty.org/gis/>

Another important resource is the Flood Insurance Rate maps which are also available online from FEMA at <http://msc.fema.gov/>

Tuscola County also has fifteen single family residential properties that are listed as on the NFIP repetitive loss list which has changed from the 2016 plan. Of those properties twelve are located within the City of Vassar (three of these properties have been mitigated), one in Tuscola Township and five in Wisner Township.

Table 21: Flooding Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:	
Number of County/Zone areas affected:	2
Number of Days with Event:	10
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	7
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 22: Flooding Event List of Occurrences from 01/01/2000 to 06/30/2020

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	4.572M	0.00K
REESE	TUSCOLA CO.	MI	05/25/2019	06:00	EST-5	Flood		0	0	4.200M	0.00K
UNIONVILLE	TUSCOLA CO.	MI	04/10/2013	00:00	EST-5	Flood		0	0	250.00K	0.00K
QUANICASSEE	TUSCOLA CO.	MI	09/14/2008	14:00	EST-5	Flood		0	0	75.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/10/2001	13:00	EST	Flood		0	0	30.00K	0.00K
CARO	TUSCOLA CO.	MI	03/13/2006	04:00	EST	Flood		0	0	10.00K	0.00K
VASSAR	TUSCOLA CO.	MI	03/11/2006	06:00	EST	Flood		0	0	5.00K	0.00K
QUANICASSEE	TUSCOLA CO.	MI	11/01/2019	00:00	EST-5	Flood		0	0	2.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	03/06/2004	02:40	EST	Flood		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	05/23/2004	03:00	EST	Flood		0	0	0.00K	0.00K
WATROUSVILLE	TUSCOLA CO.	MI	04/28/2011	05:00	EST-5	Flood		0	0	0.00K	0.00K
Totals:								0	0	4.572M	0.00K

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Riverine Flooding	Relatively Low	Relatively Low	\$386,530.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team” who completed the survey on Natural Risks ranked Flooding as “Moderate” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Local stakeholders also listed Flooding as having a “Moderate” probability of occurring. Complete survey results can be found in Appendix 8 of this document.

Flooding Historical Events:

The “Great” Flood of 1986: https://www.weather.gov/dtx/se_flood_Sept1986

May 25, 2019, thunderstorms produced heavy rain, with 1 to 4 inches reported, generally along and north of I-69. Locations across southeast Saginaw and southwest Tuscola counties saw the heaviest rain, just over 4 inches which caused significant flooding, resulting in at least 4.5 million dollars of damage. Numerous roads around Frankenmuth were flooded, but most of the road washouts and damage occurred across the county line in southwest Tuscola county.

May 21, 1996, heavy rains brought the Cass river at Vassar above its 14.0 foot flood stage at 0700 EST on the 21st. The river crested at 18.4 feet at 0900 EST on the 22d, and went back below flood stage at 1600 EST on the 23rd.

April 10, 2013, A frontal boundary stalled over Michigan dropping 3 to 6 inches of rain. This resulted in the flooding of some rivers, streams and low-lying areas. Dozens of roads were closed across the following counties: Midland, Bay, Saginaw, Tuscola, Lapeer, and St. Clair. Several roads were also reported to be damaged. Hundreds of basements were flooded, with some property damage also reported.

Here are some of the higher 5 day rainfall totals between April 7th and 12th. NWS cooperative weather station reports: Lapeer 2w (Lapeer county): 5.04 inches Midland (Midland county): 4.96 inches Lexington (Sanilac county): 4.91 inches Owosso (Shiawassee county): 4.74 inches Auburn 2ne (Bay county): 4.58 inches Merrill, 2e (Saginaw county): 4.57 inches Port Huron (St. Clair county): 4.07 inches Vassar (Tuscola county): 3.90 inches Port Austin wwtp (Huron county): 3.61 inches Mt. Clemens (Macomb county): 3.39 inches Goodrich (Genesee county): 3.03 inches.

Probability of Occurrence:

In the last 20 years, Tuscola County has suffered 10 significant flooding events. Of those events, seven resulted in property damages with one event alone having approximately \$4.2 million in damages.

Because of Tuscola County's long history of flooding, especially in the Vassar Area and along the Cass River, flooding continues to be a significant area of concern. Looking at the historical data, the probability of occurrence is significant, with a flood occurring roughly every 2.5 years with the likelihood of property damages being high.

Possible Mitigation Activities:

- Flood warning systems
- Monitoring of water levels with stream gauges and trained monitors
<https://water.weather.gov/ahps2/river.php?wfo=dtx&wfoid=18774&riverid=203663&pt%5B%5D=144013&pt%5B%5D=144213&pt%5B%5D=143804&allpoints=144013%2C144213%2C143804%2C142228&data%5B%5D=hydrograph>
- Enforcement of basic building code requirements related to flood mitigation.
- National Flood Insurance Program participation by local units of government
- Improving Land Use Planning and Land Development Policies
- Removal and/or mitigation of repetitive flood structures
- Floodproofing of structures (controlled flooding of structures to balance water forces and discourage structural collapse during floods)
- Construction of elevated or alternative roads that are unaffected by flooding, or making roads more flood-resistant through better drainage and/or stabilization/armouring of vulnerable shoulders and embankments.
- Employing techniques of erosion control within the watershed area (proper bank stabilization, techniques such as planting of vegetation on slopes, creation of terraces on hillsides, use of riprap boulders and geotextile fabric, etc)
- Protection or restoration of wetlands and natural water retention areas

Extreme Heat:

Jurisdictions Most Vulnerable: All

Prolonged periods of very high temperatures are often accompanied by other extreme weather conditions such as high humidity and drought. Extreme heat primarily affects the most vulnerable population, such as the elderly, children, impoverished individuals and those in poor health.

The 2019 Michigan Hazard Mitigation Plan advises that nationally, there are 175 deaths a year from extreme heat. Some of the major threats from extreme heat are heatstroke and heat exhaustion. It is also hazardous to livestock and agricultural crops, causes water shortages, elevates fire hazards, exacerbates respiratory problems, prompts excessive energy demands and causes infrastructure failures. The 2019 Michigan Hazard Mitigation Plan further advises

that Michigan averages 11 annual extreme heat events per year with 0.4 annual deaths and 41 injuries.

Table 23: Extreme Heat Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:	
Number of County/Zone areas affected:	1
Number of Days with Event:	2
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	0
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 24: Extreme Heat Event List of Occurrences from 01/01/2010 to 06/30/2020

Location	County/Zone	St.	Date	Time	TZ.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	03/08/2000	12:00	EST	Excessive Heat		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	07/17/2011	12:00	EST-5	Excessive Heat		0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Further investigation into each of these “Extreme Heat Events” affected the region or a large portion of the state. None of the events targeted just Tuscola County.

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Heat Wave	Relatively Low	Relatively Low	\$102,398.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team” who completed the survey on Natural Risks ranked Heat Wave as “Low” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Local stakeholders also listed Heat Wave as having a “Moderate” probability of occurring. Complete survey results can be found in Appendix 8 of this document.

Extreme Heat Historical Events:

February 11, 1999, a high pressure was located over the southeast United States, while a potent low pressure system was located in the upper Mississippi Valley. In between, strong southwest winds brought unusually warm air into the Great Lakes. This resulted in the warmest February day in southeast Michigan history.

In Detroit, the temperature rose to 70 degrees. This broke the all-time February record in Detroit (old record was 68 degrees on Feb 26, 1944), and was the earliest 70-degree day in Detroit history by almost a full month.

In Flint, the high for the day was 68 degrees. This was not only the warmest February day in Flint history, but it smashed the old record by 5 degrees (63 degrees on Feb 23, 1984). Even more remarkable was that the 68 degrees obliterated the old record for February 11th by an astonishing 26 degrees!

July 4, 1999, Hot and extremely humid weather rolled into southeast Michigan for the Fourth of July holiday weekend. High temperatures climbed into the 90s across the area, with dew points well into the 70s. This resulted in triple-digit heat indices across southeast Michigan on both the 4th and 5th. The heat index exceeded 105 in and near Detroit. This resulted in numerous heat-related illnesses, as people overdid outdoor activities during the holiday weekend. Numerous hospitals in metro Detroit reported cases of heat stroke, heat exhaustion, dehydration, and severe sunburn. However, unlike many other parts of the country, no fatalities were reported.

March 8, 2000, an unusual late-winter warm spell began February 22, and continued through March 9. Normal high temperatures during this time are in the 35 to 40 degree range. However, during this 17-day stretch, Detroit failed to reach 50 degrees just once, and Flint only three times. There were six days in the 60s or higher in both Flint and Detroit, and five such days in Saginaw. The warm weather produced five new record highs in Flint, and three in Detroit.

The heat wave culminated on March 8th, with both Flint and Detroit reaching 80 degrees. This was the earliest 80 degree day ever for both cities. Previously, the earliest 80 degree in Detroit was March 22 1938, while in Flint it was April 2 1965. The 80 degrees at Flint was the warmest March day ever, beating several 79 degree days, most recently March 30 1998.

The weather was not only warm, but dry. This contributed to several brush fires toward the end of the warm spell. Genesee, Saginaw, St Clair, and Washtenaw Counties, each saw fires burn up to 10 acres of land.

July 17, 2011, a mid July heat wave helped cap off the warmest month on record at Detroit. Three direct deaths were reported due to the heat wave, as heat indices were above 100 degrees. Here are the high temperatures recorded for Detroit and Flint during the period of July 17th-22nd: Flint, 95, 94, 94, 95, 99, 84. Detroit, 92, 96, 94, 96, 100, 95.

Probability of Occurrence:

Even though there are only two listed occurrences of extreme heat occurring in the county, there have been several days during the summer months that could be categorized as extreme heat. Taking this into consideration, Tuscola County would likely average a couple of days that would be considered “extreme heat” during a typical summer season.

Possible Mitigation Activities:

- Identification of at-risk persons, with emphasis on homebound individuals that have limited mobility or health issues.
- Establishment and maintenance of heating and cooling centers and temporary shelters for the most seriously affected individuals.

Tornadoes:

Jurisdictions Most Vulnerable: All

A tornado is a violently rotating column of air that extends from a thunderstorm to the ground, and can occur anytime during the day and year but are most common in the warm summer months. Tornadoes are high-profile hazards that can cause catastrophic damage to either limited or an extensive area.

The funnel cloud can have winds that reach up to 300 miles per hour with an interior air pressure that is 10-20% below the surrounding atmosphere’s pressure. The length of a tornado path is approximately 16 miles, but there have been tracks reported up to 200 miles. Tornado path widths are generally less than one-quarter mile wide. These storms are the most violent of the atmospheric storms since they have the potential to destroy buildings, uproot trees, hurl objects and cause loss of life. According to the NOAA and the National Weather Service’s Storm Prediction Center, tornadoes cause approximately 60 deaths and hundreds of millions of dollars in property damages each year.

Since 1969, Tuscola County has suffered 20 confirmed tornadoes causing approximately \$2,742,000 in property damages, zero deaths and 2 reported injuries. Further breakdown of tornadoes within the county are listed below.

Figure 8: Enhanced Fujita Scale of Tornado Intensity

EF Rating	Wind Speeds	Expected Damage		
EF-0	65-85 mph	'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.		
EF-1	86-110 mph	'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.		
EF-2	111-135 mph	'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.		
EF-3	136-165 mph	'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.		
EF-4	166-200 mph	'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.		
EF-5	> 200 mph	'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.		

Table 25: Tornado Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	6
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	1
Number of Days with Event and Property Damage:	5
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 26: Tornado Event List of Occurrences from 01/01/2000 to 06/30/2020

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	1	1.606M	0.00K
TUSCOLA	TUSCOLA CO.	MI	06/22/2015	21:03	EST-5	Tornado	EF2	0	0	550.00K	0.00K
MILLINGTON	TUSCOLA CO.	MI	10/19/2007	00:16	EST-5	Tornado	EF1	0	1	500.00K	0.00K
DEFORD	TUSCOLA CO.	MI	10/19/2007	00:45	EST-5	Tornado	EF1	0	0	400.00K	0.00K
AKRON	TUSCOLA CO.	MI	11/12/2003	17:05	EST	Tornado	F1	0	0	100.00K	0.00K
QUANICASSEE	TUSCOLA CO.	MI	10/24/2001	19:43	EST	Tornado	F0	0	0	50.00K	0.00K
MILLINGTON	TUSCOLA CO.	MI	05/22/2004	15:45	EST	Tornado	F1	0	0	5.00K	0.00K
DEFORD	TUSCOLA CO.	MI	06/22/2015	21:07	EST-5	Tornado	EF0	0	0	1.00K	0.00K
KINGSTON	TUSCOLA CO.	MI	08/17/2017	20:10	EST-5	Tornado	EF0	0	0	0.00K	0.00K
Totals:								0	1	1.606M	0.00K

Map 20: Tornado Paths from 1950-2017 in Tuscola County

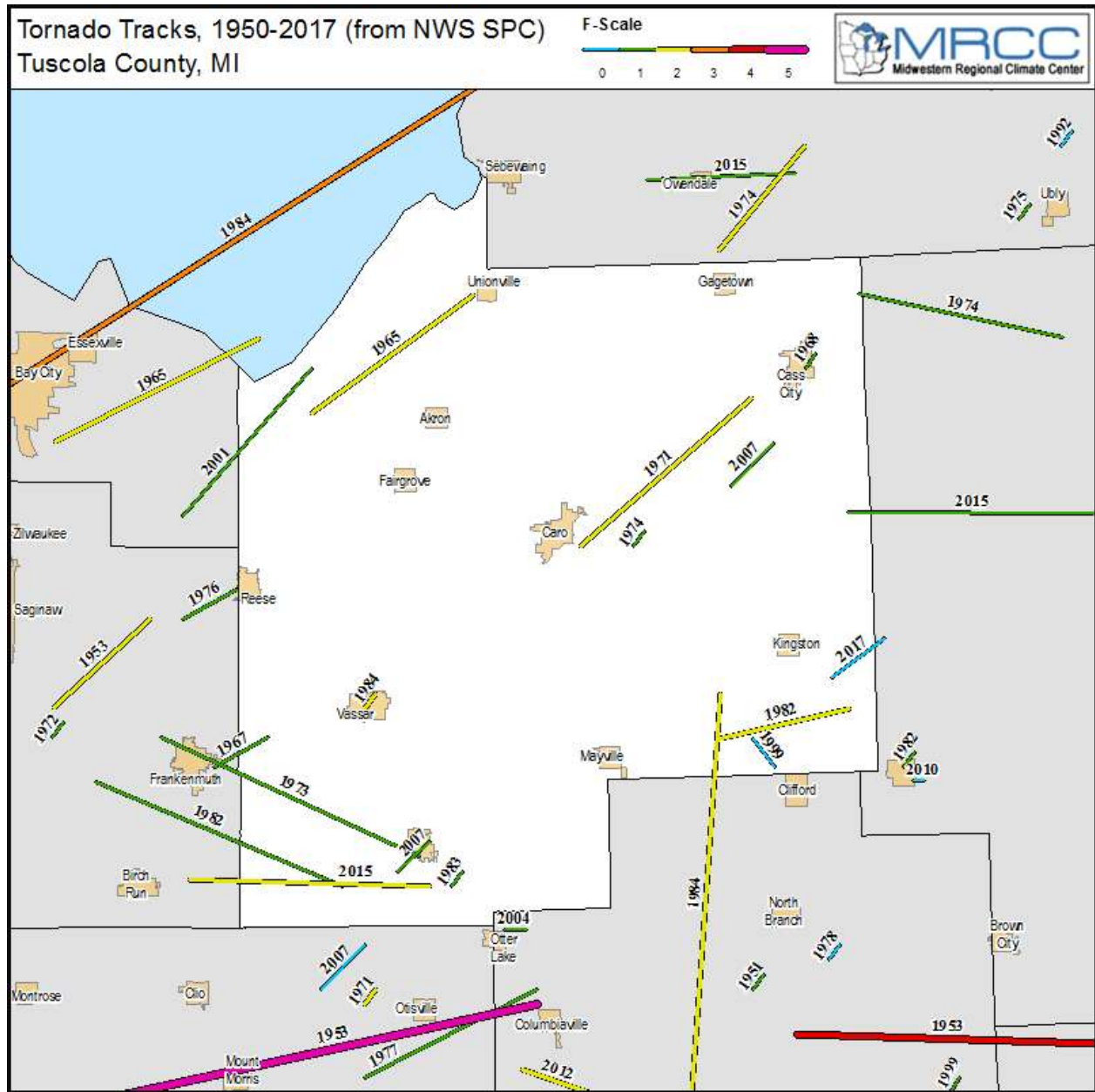
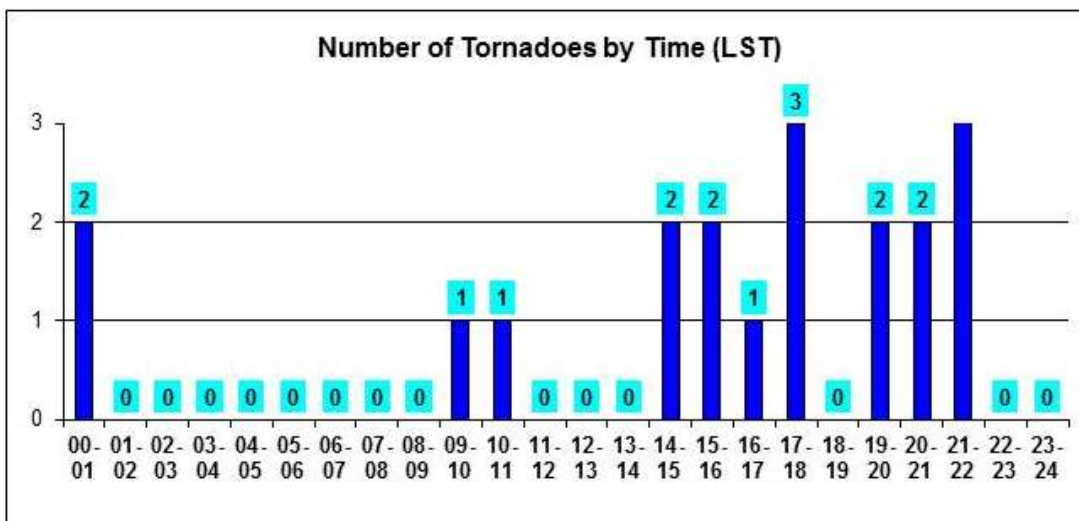
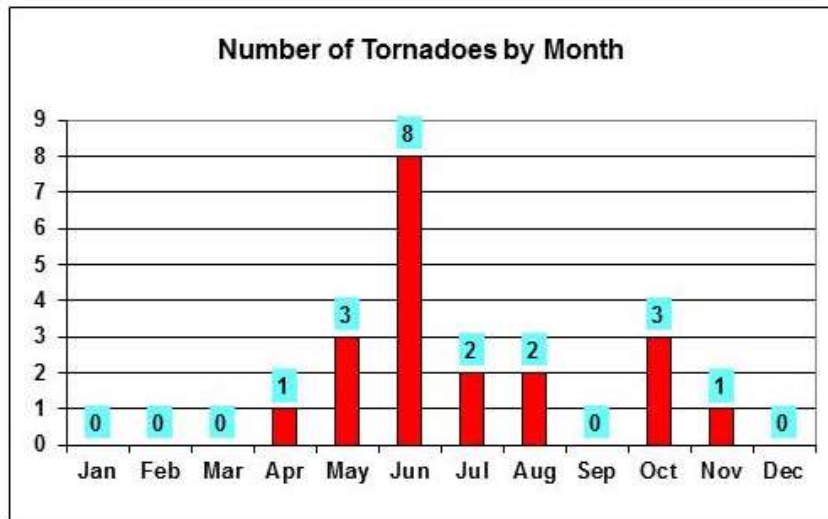


Figure 9: Tornado Events by month & time from 01/01/1969



Source: NOAA National Center for Environmental Information

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Tornado	Relatively Low	Relatively Low	\$418,209.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team” who completed the survey on Natural Risks ranked Tornado as “Moderate” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Local stakeholders also listed Severe Wind as having a “Moderate” probability of occurring. Complete survey results can be found in Appendix 8 of this document.

Tornado Historical Events:

June 22, 2015, a tornado touched down just west of Pine Ridge RV Campground in far southeast Saginaw county and tracked generally east along Birch Run Road, lifting near Mcpherson Road in Tuscola County 2 miles south of Millington. Trees were blown down and shingles were observed off houses. The tornado peaked in intensity near Buell and Belsay Roads, with estimated wind speeds up to 115 mph. Major structure damage occurred to one house, with another home suffering damage to roof and wall. Two minor injuries occurred at the campground. The total path length of the tornado ended up being around 11.2 miles, with 2.4 miles occurring in Saginaw County.

October 19, 2017, a tornado touched down at 0016EST, just southwest of the town of Millington, near the intersection of Barnes and Fulmer roads. It tracked northeastward and was on the ground for 2 miles before lifting near Main street and Caine Road in Millington. This tornado was rated a strong EF1 with winds estimated around 105 mph. A modular home was completely destroyed, another home received substantial damage after being battered by debris from the destroyed modular home and a framed house lost a section of its roof. Miraculously, a 14-month-old baby, sleeping in a crib in the modular home, received only minor cuts and bruises after being tossed 25 feet and buried under about 4 feet of beams, rafters, and other debris from the demolished home. Total property damages were estimated at \$500K. The average path width was 30 yards.

October 19, 2007, a tornado spun up at 0045EST two miles west of Deford. It began near Deckerville and Dodge roads and tracked northeastward for 3 miles before lifting. The most significant damage was rated EF1 with winds estimated at 95 MPH. A garage was destroyed, several houses sustained roof damage, and a fifth-wheel was tossed into a pond on top of a truck that had already been tossed into the pond. A man sleeping in the fifth-wheel received no injuries. Numerous trees were also snapped off or uprooted. Total property damages were estimated at \$400K. The average path width was 100 yards.

April 11, 1965, a tornado first struck about 10 miles southwest of Unionville and moved north eastward into Unionville. Numerous farm buildings were demolished and destroyed. Farm equipment and trucks were damaged. Firehall station and a lumber yard were destroyed in Unionville by the high tornadic winds.

Probability of Occurrence:

According to NOAA, there have been 8 reported tornadoes in Tuscola County since 2000 with reported property damage of approximately \$1,600,000.00. Using this data, it would appear that Tuscola County will suffer a tornado every 2.5 years with an estimated property damage of \$200,000.00 per occurrence..

Possible Mitigation Activities:

- Increased coverage and use of NOAA weather radios
- Continued public education covering early detection, tracking and warnings that relate to tornadoes.
- Promotion of “Safe Space” concepts within mobile home parks, campgrounds, homes, schools, commercial buildings and governmental structures that would provide a place of refuge during severe weather events.
- Anchoring of mobile homes to offer protection from both high winds and tornado events.
- Widespread use and expansion of outdoor weather sirens
- Promotion of notification systems such as RAVE that are used to provide additional warning of impending weather and other critical events.

Ice Storms:

Jurisdictions Most Vulnerable: All

Ice storms are storms that generate sufficient quantities of ice that result in hazardous conditions and/or property damage. Ice storms occur when cold rain freezes on contact with the surface and coats the ground, trees, buildings and overhead utilities with ice. Oftentimes ice storms are accompanied by snowfall, which sometimes causes extensive damage, treacherous conditions and power loss.

The 2019 Michigan Hazard Mitigation Plan advises that Michigan averages 16 annual ice and sleet storms with an average of 0.2 annual deaths, 0.5 annual injuries and \$11,400,000.00 in average annual property and crop damages.

Table 27: Ice Storm Events Summary Information: 01/01/2000 to 06/30/2020

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	6
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	2
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 28: Ice Storm Event List of Occurrences from 01/01/2000 to 06/30/2020

Location	County/Zone	St.	Date	Time	L.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	3.020M	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/07/2001	23:00	EST	Ice Storm		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	04/03/2003	22:00	EST	Ice Storm		0	0	20.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	02/14/2005	18:00	EST	Ice Storm		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/01/2006	01:00	EST-5	Ice Storm		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	12/21/2013	17:00	EST-5	Ice Storm		0	0	3.000M	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/11/2020	10:00	EST-5	Ice Storm		0	0	0.00K	0.00K
Totals:								0	0	3.020M	0.00K

Further investigation into each of these “Ice Storm Events” affected the region or a large portion of the state. None of the events targeted just Tuscola County.

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Ice Storm	Relatively Low	Relatively Low	\$78,527.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team” who completed the survey on Natural Risks ranked Ice Storm as “Moderate” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Ice Storm Historical Events:

December 21, 2013, a winter storm impacted a large swath of the country from the southern Plains through the Midwest and into the Northeast on the last weekend before Christmas. This storm occurred as a deep upper-level trough over the Desert Southwest lifted northeastward, while a surface low pressure system moved from Texas into the Ohio Valley. This low moved along a very sharp frontal boundary. This front at the surface actually briefly penetrated far southeastern Michigan Friday night. The temperature at Lambertville, on the Ohio border, rose into the mid-50s, while Monroe, just 15 miles away, stayed in the mid-30s. On Saturday, copious Gulf moisture was brought northward ahead of the approaching surface low. This warm, moist air was forced to ascend at the front over Ohio, spreading precipitation from south to north over southeast Michigan from the late morning into the afternoon. An anticyclone over Ontario provided a supply of low-level cold air, causing the surface temperature to be near or below freezing for much of southeast Michigan. The result was a swath of freezing rain roughly between M-59 to M-46 which continued into Saturday night and early Sunday. The I-69 corridor was especially hard-hit, with ice accumulations of half an inch to three quarters of an inch, causing over 200,000 homes and businesses to lose power. Numerous trees and wires were downed, and a state of emergency was declared in Shiawassee County due to unsafe traveling conditions. South of M-59, much of the precipitation occurred as rain, with some locations receiving over 1.50 rain. North of M-46, much of the precipitation occurred as snow, with up to 4 inches reported.

April 3, 2003, An arctic frontal boundary moved south of the state by the morning of April 3, 2003. This front dropped temperatures to the freezing mark generally along and north of a Brighton to St Clair Shores line. Then, a series of low pressure systems move across the front. This allowed very warm and moist air to lift north overtop of the sub-freezing temperatures near the ground. The first wave of precipitation moved across eastern Michigan late in the evening on April 3rd and continued through the morning of April 4th. Thunderstorms brought heavy freezing rain to the area during this time period. Spotter reports indicated up to 3 inches of freezing rain occurred in some places. Sleet was also reported across much of the Saginaw Valley. By the afternoon of April 4th, ice accumulations of one quarter to three quarters of an inch were reported across the area. The Saginaw Valley even had one to two inches of sleet accumulations in addition to the ice. After a break in the precipitation during the afternoon of the 4th, a second round of thunderstorms brought freezing rain and sleet to the area during the evening of April 4th, finally ending early in the morning of April 5th. By the morning of the 5th, ice accumulations ranged from one half to one inch. Sleet had also accumulated up to two inches in and around Flint and the Saginaw Valley. Since the road and ground surfaces were warmed due to very warm weather the later half of March, most of the ice accumulations occurred on elevated surfaces, like trees and power lines.

The ice accumulations led to considerable tree damage and widespread power outages across the entire area. Locations hardest hit, with around an inch of ice reported on the trees, were across northern Oakland County, northern Macomb County, and throughout Lapeer, St Clair,

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

March 13, 1997, Low pressure tracked from the central Plains northeast across southeast lower Michigan late on the 13th through the 14th. The storm brought widespread precipitation to southeast Michigan from late on the 13th through midday on the 14th. North of Detroit, nearly all of the precipitation fell in the form of freezing rain, with small amounts of snow and sleet noted in a few spots. From Detroit and Ann Arbor south to the state-line, the freezing rain changed to rain, but not before heavy ice accumulations occurred. Total precipitation amounts ranged from 1.5 to nearly 2.5 inches from Detroit and Ann Arbor south to the Ohio state-line. From the northern suburbs of Detroit north to Flint and Port Huron, amounts ranged from 0.8 to 1.5 inches. North of that area, amounts ranged from 0.40 to 0.80 inches.

In the Detroit Metropolitan area, the ice storm resulted in power outages to over 425,000 homes and businesses; the 3rd largest outage in history, and the worst ever for an ice storm. Several thousand residents were without power for as long as 4 days. In addition to powerlines, falling trees damaged dozens of cars and houses throughout the area. Most schools were closed, and there were numerous auto accidents.

Probability of Occurrence:

Since 2000, the NOAA reports that there have been six reported ice storms with a reported property damage estimate listed at \$3,000,000.00. Using the past history, we can assume that Tuscola County will have an ice storm every 3 years with an estimated property damage of \$503,333.33 per occurrence.

Possible Mitigation Activities:

The following items should be considered for mitigation of the possible effects of ice storms in Tuscola County:

- Increased coverage and use of NOAA weather radios.
- Continued tree trimming around electrical infrastructure and key infrastructure such as roadways.
- Generators to supply back up power to key critical infrastructure such as water systems, sewer systems and other infrastructure deemed necessary.
- Development and maintenance of warming shelters that have backup generators
- Home and public building design and maintenance to prevent roof and wall damage from 'ice dams'.

Shoreline Flooding:

Jurisdictions Most Vulnerable: Saginaw Bay Shoreline (Akron & Wisner Twps) and immediate area

Michigan has over 3,200 miles of coastline of which 18 miles are within Tuscola County's shoreline along the Saginaw Bay. Winds, waves, water levels and human activities constantly affect the communities along the shoreline. Shoreline flooding and erosion are natural processes, occurring at high, average and even low Great Lake water levels. However during periods of high water, flooding and erosion are more obvious, causing serious damage to homes and businesses, roads, water and wastewater treatment facilities and other structures in coastal communities. Long-term and seasonal variations in precipitation and evaporation rates primarily control the Great Lakes water levels and their fluctuations.

Besides the current high water affecting the shoreline in 2019-2020, a similar event also occurred in 1986 when the Great Lakes had record water levels..

Table 29: Shoreline Flooding Events Summary Information: 01/01/2000 to 06/30/2021

Summary Info:	
Number of County/Zone areas affected:	1
Number of Days with Event:	3
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	0
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 30: Shoreline Flooding Event List of Occurrences from 01/01/2010 to 06/30/2020

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	10/16/2019	22:00	EST-5	Lakeshore Flood		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	10/31/2019	06:00	EST-5	Lakeshore Flood		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	01/11/2020	17:30	EST-5	Lakeshore Flood		0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

All of the listed events in the table above affected predominantly the area of Quanicassee. Most of the Saginaw Bay shoreline in Tuscola County is state owned with small pockets of residential areas and marinas.

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Coastal Flooding	No Rating	No expected annual losses	\$0.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team” who completed the survey on Natural Risks ranked Shoreline Flooding as “Moderate” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Local stakeholders also listed Shoeline Flooding as having a “not likely” probability of occurring. Complete survey results can be found in Appendix 8 of this document.

Shoreline Flooding Historical Events:

November 16, 2019, strong and prolonged northwest winds around 35 mph generated large waves over Saginaw Bay and southern Lake Huron. These higher waves and elevated water levels caused significant lakeshore flooding. Flooding to homes and roads were reported in Harbor Beach, Caseville, and Sebawaing. Erosion of the shoreline occurred at Port Crescent State Park. Finally, significant erosion and damage to seawalls reported in Lakeport.

November 31, 2019, high water levels over Lake Huron and northeast to north winds of 30-40 MPH produced large waves resulting in lakeshore flooding across Bay, Tuscola, and Huron Counties. The water level at Essexville peaked at 71.3 inches above chart datum. Shoreline erosion was reported at Port Hope.

January 11, 2020, A winter storm tracking through southeast Michigan brought heavy rain and freezing rain, with about a quarter of an inch of ice from US-10 south to about M-57. Many accidents and spin outs occurred across the Tri-Cities region and Flint vicinity due to the icy roads. In addition, strong northeast winds lead to high water levels and large waves causing significant lakeshore flooding and erosion along Bay, Tuscola, and Huron county shorelines, as well as Sanalic and St. Clair. The water level at Essexville reached 79.5 inches above LWD, a new record high since records began in August 1977. Finally, 2 to 4 inches of heavy rain along and south of the I-69 corridor lead to areas of flooded basements and 1 to 2 feet of water on low lying roads and fields.

Probability of Occurrence:

Shoreline flooding is not something that occurs on a regular basis, but was prevalent in 2020 due to record high levels in the Great Lakes. Since 2000, the NOAA has reported that there have been three reported shoreline flooding events that have affected Tuscola County.

Possible Mitigation Activities:

- Floodplain/coastal zone management - planning acceptable uses for areas prone to flooding (comprehensive planning, zoning, open space requirements, subdivision regulations, land use, and capital improvements planning.)
- Intergovernmental agreement with the Michigan Department of Energy, Labor & Economic Growth directing building inspectors to withhold building permits in high-risk areas until the state permit is issued.
- Education of landowners in the regulations that govern high-risk properties prior to the start of construction.

- Dry floodproofing of structures within known flood areas (strengthening walls, sealing openings, use of waterproof compounds or plastic sheeting on walls.)
- Wet floodproofing of structures (controlled flooding of structures to balance water forces and discourage structural collapse during floods.)
- Elevation of flood-prone structures above the 100 year flood level.
- Construction of elevated or alternative roads that are unaffected by flooding, or making roads more flood-resistant through better drainage and/or stabilization/armouring of vulnerable shoulders and embankments.
- Employing techniques of erosion control within the watershed area (proper bank stabilization, techniques such as planting of vegetation on slopes, creation of terraces on hillsides, use of riprap boulders and geotextile fabric, etc)
- Protection or restoration of wetlands and natural water retention areas
- Structural projects to channel water away from people and property (dikes, levees, floodwalls) or to increase drainage or absorption capabilities (spillways, water detention and retention basins, relief dams, drain widening/dredging, or rerouting, debris detention basins, logjam and debris removal, extra culverts, bridge modifications, dike setbacks, flood gates and pumps, wetland protection and restoration)
- Monitoring of water levels with stream gauges and trained monitors
<https://water.weather.gov/ahps2/river.php?wfo=dtx&wfoid=18774&riverid=203663&pt%5B%5D=144013&pt%5B%5D=144213&pt%5B%5D=143804&allpoints=144013%2C144213%2C143804%2C142228&data%5B%5D=hydrograph>
- Enforcement of basic building code requirements related to flood mitigation.

Drought:

Jurisdictions Most Vulnerable: All

Drought is the prolonged period without participation. It can have a number of adverse effects. Agriculture, which is prevalent in Tuscola County, can suffer, particularly during the planting and growing seasons. Forests can be stressed, leading to higher fire risks. Lake levels can drop significantly, stressing aquatic life and waterfowl and affecting navigation and recreation usage. If the drought is prolonged, groundwater levels and well production can be affected.

Table 31: Drought Events Summary Information: 01/01/2000 to 06/30/2021

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	2
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	0
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 32: Drought Event List of Occurrences from 01/01/2000 to 06/30/2021

Location	County/Zone	St.	Date	Time	I.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	07/01/2001	00:00	EST	Drought		0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	09/01/2002	00:00	EST	Drought		0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Further investigation into each of these “Drought Events” affected the region or a large portion of the state. None of the events targeted just Tuscola County.

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Drought	No Rating	No expected annual losses	\$0.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team” who completed the survey on Natural Risks ranked Drought as “Low” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Drought Historical Events:

July 1, 2001, An upper level high pressure ridge dominated the weather pattern across southeast Michigan beginning late June and continuing through the month of July. This ridge

prevented the development of widespread thunderstorms, and prevented rainfall from moving into the region from the west. While there were occasional isolated thunderstorms, much of the region suffered a pronounced dry spell. The lack of rainfall put a hardship on the area's water supply and measures were taken to curb usage. This included prohibiting outdoor watering in many communities in Macomb, Washtenaw, Genesee, Oakland, and Wayne counties.

During the five week period ending July 28th, Detroit Metro Airport officially reported only 0.32 inches of rainfall. This became Detroit's 11th driest month on record. With 1.59 inches, this was Flint's 10th driest month on record. In contrast to July, April through early June saw slightly above normal precipitation. This wet spring delayed planting of crops and resulted in shallower than normal rooting systems for crops already established. By mid summer, however, the upper air pattern changed and rainfall waned. In terms of timing, the drought impacted many summer crops during moisture-sensitive growth stages of greatest water need, leading to moisture stress which peaked by mid August. It was estimated that yields of corn, dry beans and soybeans were 1/3 from normal. Rain returned to the region in mid and late August. Too late, however, to reverse the negative effects from mid summer. At the date of this publishing, an estimated dollar amount of damage to area crops is unknown.

September 1, 2002, the month of September turned out to be like much of the summer of 2002 was, hot and dry. The dry weather was especially severe from the northern suburbs of Detroit to the Tri Cities and thumb. The monthly rainfall total of 0.29 inches recorded at Flint Bishop airport was the lowest ever recorded for September, making the month the driest September on record for the city of Flint. The 0.39 inches recorded in Saginaw made it the second driest September on record. Flint, Saginaw and Detroit metro airport received less than .05 inches of precipitation during the first half of the month. The dryness was only worsened by the heat. Several record highs were set throughout eastern Michigan during the month of September. After an extremely hot and dry July and August, the weather of September 2002 only exasperated drought conditions. During the first half of the month, hundreds of communities across the area were under water restrictions. Hardest hit from the drought was the agricultural industry. September yields across most of the area were estimated at under 50 percent and many counties across eastern Michigan were declared agricultural disaster areas. At the time of this publication, an estimate of monetary damages due to crop loss was not available.

Probability of Occurrence:

According to the data in the Michigan Hazard Mitigation Plan (April 2019 edition, the State of Michigan averages three drought events per year with a property and crop loss of approximately seven million dollars. According to the National Storm Events Database, Tuscola County has suffered only two recorded droughts since January 1, 2000 with no reported losses for the county. Despite the lack of official designation, that has not precluded areas from suffering from lack of precipitation, which has an impact on agriculture.

Division 7: Arenac, Bay, Huron, Saginaw, Sanilac, and Tuscola Counties. The most extreme drought was in April 1931, when the Palmer index hit a record low of -6.25. Lengthy drought incidents took place in 1930-1931 (17 months), 1934-1935 (16 months), 1936-1937 (11 months), 1963-1965 (18 months), 1976-1977 (8 months), and 1998-1999 (12 months).

Possible Mitigation Activities:

- Storage of water for use in drought events (especially for human needs during periods of extreme temperatures, and for responding to structural fire and wildfire events.)
- Encouragement of water-saving measures by consumers (including landscaping, irrigation, farming, and low-priority lawn maintenance and non-essential auto washing.)
- Designs and plans for water delivery systems that include a consideration of drought events.

Wildfire/Grass Fire:

Jurisdictions Most Vulnerable: All

Tuscola County is home to a large agricultural base in predominantly the northern half of the county, while the southern half is mostly wooded. These two different environments have made them susceptible to both wildfires and grass/field fires.

A wildfire or grass fire is a fire that is uncontrolled that threatens life and property in either a rural or wooded area. Grass and wildland fires can occur when conditions are favorable, such as during drought or during harvest season when natural vegetation would be drier and subject to combustibility.

According to the data in the Michigan Hazard Mitigation Plan (April 2019 edition), Michigan on average has one wildfire event per year with an average loss of one million dollars in property of crops.

Table 33: Wildfire Events Summary Information: 01/01/2000 to 06/30/2021

Summary Info:

Number of County/Zone areas affected:	1
Number of Days with Event:	1
Number of Days with Event and Death:	0
Number of Days with Event and Death or Injury:	0
Number of Days with Event and Property Damage:	0
Number of Days with Event and Crop Damage:	0
Number of Event Types reported:	1

Table 34: Wildfire Event List of Occurrences from 01/01/2000 to 06/30/2021

Location	County/Zone	St.	Date	Time	LZ	Type	Mag	Dth	Inj	PrD	CrD
Totals:								0	0	0.00K	0.00K
TUSCOLA (ZONE)	TUSCOLA (ZONE)	MI	04/18/2012	15:00	EST-5	Wildfire		0	0	0.00K	0.00K
Totals:								0	0	0.00K	0.00K

Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Wildfire	Very Low	Very Low	\$210.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team” who completed the survey on Natural Risks ranked Wildfire as “Low” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Wildfire/Grass Fire Historical Events:

April 18, 2012, dry conditions and southerly winds of 15 to 20 mph allowed a wildfire to spread and burn over 300 acres of marsh near the Saginaw Bay at the Quanicassee River.

Dozens of firefighters battled a marsh fire which ended up burning approximately 335 acres of state land located along Saginaw Bay. No structures or homes were lost.

Probability of Occurrence:

Tuscola County has only one reported event that occurred on April 18, 2012 when a 300 acre marsh fire burned in the Quanicassee area along the Saginaw Bay. Besides this one recorded event, it is not uncommon for the area fire departments to have several grass/field fires that are only a few acres in size, in the spring time and again during harvest time of certain crops that are extremely dry and combustible. Property damage for these fires is relatively low, unless farm equipment, which is oftentimes the cause, is consumed in the fire.

This information is also confirmed with the Michigan Department of Natural Resource data that was provided for the 2019 Michigan Hazard Analysis document. According to the Michigan Hazard Analysis document, between January 1, 1996 and April 30, 2017, Tuscola County had only one recorded wildfire with no reported damages.

Possible Mitigation Activities:

- Safe disposal of yard and house waste rather than through open burning.
- Use of structural fire mitigation systems such as interior and exterior sprinklers, smoke detectors, and fire extinguishers.
- Arson prevention activities, including the reduction of blight.
- Public notification of fire weather and fire warnings.
- Prescribed burns and fuel management
- Creation of fuel breaks
- Keeping roads and driveways accessible to vehicles and fire equipment
- Safe use and maintenance/cleaning for fireplaces and chimneys
- Proper maintenance and storage of motorized equipment that could catch on fire
- Have adequate water supplies for emergency fire-fighting (in accordance with NFPA standards)

- Developing fire hazard assessments to aid community and property owners in determining their risk and vulnerability to wildfires.

EARTHQUAKES:

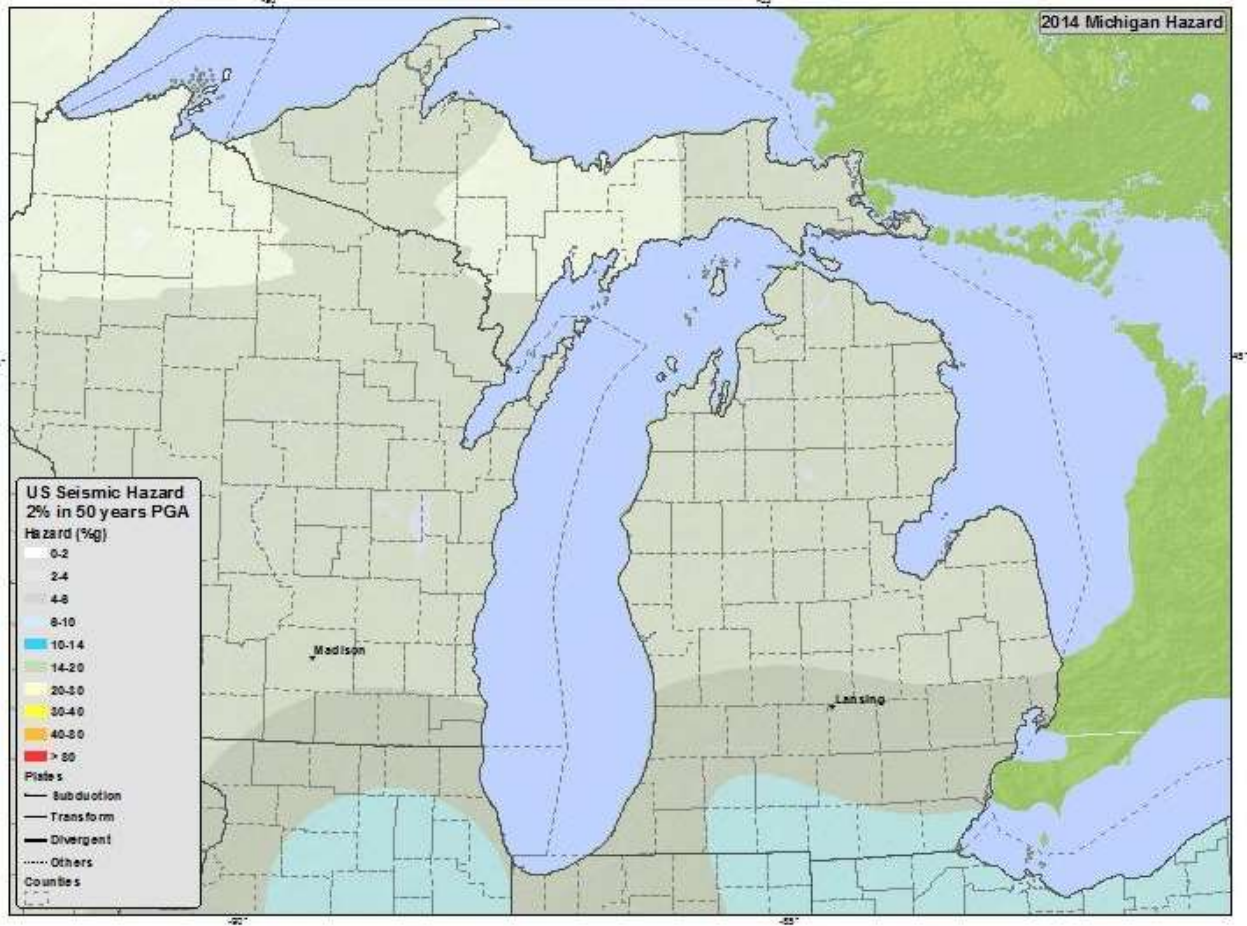
Jurisdictions Most Vulnerable: None

An earthquake takes place when two blocks of the earth suddenly slip past one another. The surface where they slip is called the fault. The largest, main earthquake is called the mainshock. Mainshocks are sometimes preceded by foreshocks. Foreshocks are smaller earthquakes that take place in the same location as the large earthquakes prior to it happening. Aftershocks always follow the mainshock. Aftershocks can occur for an extended period of time after an earthquake.

The first reports of earthquake tremors in areas of Michigan were in the early 1800s. These tremors were from the New Madrid earthquake which was centered in Missouri. Most earthquake activity felt in Michigan is from earthquakes centered elsewhere.

According to the United States Geological Survey, Tuscola County has had no reported earthquakes since 1947. In the map below, the 2014 USGS Seismic Hazard Map shows that Tuscola County has a 2-4% of beings susceptible to an earthquake

Map 23: United States Geological Survey 2014 Seismic Hazard Map



Additional Risk Information:

Viewing the National Risk Index (NRI) for additional information about these types of events, Tuscola County has the following rankings:

Event	Risk Index Ranking	Expected Annual Loss Rating	Expected Annual Loss Values
Earthquake	Very Low	Very Low	\$14,310.00

The complete National Risk Index results for Tuscola County can be found in Appendix 9.

At the local level, those members of the “All Hazards Team” who completed the survey on Natural Risks ranked Earthquake as “Low” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 4 of this document.

Probability of Occurrence:

Because there are no faults in Michigan and past history shows little in seismic history, the chances of an earthquake in Tuscola County is very low.

Potential Mitigation Activities:

- Adopt and enforce appropriate building codes.
- Use of safe interior designs and furniture arrangements.
- Harden critical infrastructure systems to meet seismic design standards for ‘lifelines’.

Technological Hazards:

Technological Hazards are hazards that are created by people, as opposed to naturally occurring events.

Below is a list of the most common Technological Hazards for Tuscola County:

- Air-Land-Water Transportation Accidents
- Structure Fires
- Transportation Hazardous Materials Incidents
- Fixed Site Hazardous Materials Incidents
- Infrastructure Failures
- Dam Failures
- Oil & Gas Well Incidents
- Oil and Gas Pipeline Accidents
- Scrap Tire Fire

Air-Land-Water Transportation Accidents:

Jurisdictions Most Vulnerable: All

Transportation accidents are defined as an accident involving air, land or water based commercial passenger carriers resulting in death or serious injury. Vulnerable areas would include communities with or in close proximity of airports offering commercial passenger service, communities with railroad tracks providing commercial rail passenger service, communities with passenger bus or local transit bus services, communities with school bus services and communities with commercial marine passenger transportation service. A serious event involving any of the above mentioned modes of transportation could result in a mass casualty incident, requiring immediate life-saving response.

Air Transportation Accident

There are four circumstances that can result in an air transportation accident:

1. An airliner colliding with another aircraft in the air
2. An airliner crashing while in the cruise phase of a flight due to mechanical problems, sabotage or other cause.
3. An airliner crashing while in the takeoff or landing phase of a flight,
4. Two or more airliners colliding with one another on the ground during staging or taxi operations.

When responding to any of these type of air transportation accidents, emergency personnel may be confronted with several problems, such as; suppressing fires, rescuing and providing emergency first aid for survivors, establishing mortuary facilities for the victims, detecting the presence of explosive or radioactive materials and providing crash site security, crowd and traffic control and protection of evidence.

Air Transportation Accident Historical Events:

April 17, 2021, a Cessna aircraft developed engine problems near the Caro Area Airport and had to make an emergency landing on Graf Rd . The pilot, the lone occupant, refused medical treatment.

August 5, 2011 an "Ultralight" plane crashed in Gilford Township after losing engine power. The pilot, the lone occupant, suffered minor injuries as a result of the crash.

June 27, 2003, an "Ultralight" plane crashed shortly after takeoff from the Caro Area Airport. The pilot, the lone occupant, was killed as a result of the crash.

June 30, 1990, a small plane crashed near a private property landing strip in Millington Twp. Four people sustained injuries from the crash and were taken to area hospitals in Saginaw for treatment.

Land Transportation Accident

In Michigan, a land transportation accident could involve a commercial intercity bus, a local public transit bus, a school bus or an intercity passenger train. Although these modes of land transportation have a good safety record, accidents do occur. Typically, bus accidents are caused by the bus slipping off the roadway in inclement weather, or colliding with another vehicle. Intercity passenger train accidents usually involve a collision with a vehicle attempting to cross the railroad tracks before the train arrives at the crossing. Unless the train accident results in a major derailment, serious injuries are usually kept to a minimum. Bus accidents, on

the other hand, can be quite serious, especially if the bus has tipped over. Numerous injuries are a very real possibility in these types of situations.

Land Transportation Accident Historical Events:

Tuscola County has several traffic crashes (land transportation accidents) and these types of incidents are very common. According to <https://www.michigantrafficcrashfacts.org/>, Tuscola County has had the following amount of traffic crashes: 2016=1715, 2017=1738, 2018=1706, 2019=1931, and 2020=1660.

Water Transportation Accidents

A water transportation accident could have significant life safety consequences. Most vessels operate on a seasonal basis (typically May through November) and vessel sizes may vary. Although the vessels have an excellent safety record and must pass rigorous standards, the potential for an accident is always present.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Air/Land/Water Transportation Accidents as “High” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Air/Land/Water Transportation Accidents as having a “High” probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

While not all of the above items are present in Tuscola County, we are still in relatively close proximity for these specific types of accidents, such as major airports. Because of this, we must always be prepared of the chance of anyone of these events from occurring in Tuscola County

Possible Mitigation Activities:

- Continued traffic enforcement for areas deemed to have high probability of traffic related crashes.
- Public education about safe driving practices and unsafe driving consequences

Structure Fires:

Jurisdictions Most Vulnerable: All

Structure fires occur when a fire ignites one or more structures of residential, commercial, industrial, institutional or other types. These fires are considered to be the most common hazard with most incidents being limited in scale and not having the ability to threaten or harm an entire community. However, fires in facilities, such as hotels, entertainment venues, schools and hospitals pose a great risk due to the large number of persons involved.

According to the National Fire Protection Association, the US had 481,500 structure fires in 2019 with 2980 civilian fire deaths and 13900 civilian fire injuries. In Michigan, the U.S. Fire Administration advises that on average fire fatality rate is 5.3 civilian deaths/14.5 fire injuries per 1000 fires (using statistical data from 2018).

In 2019, Michigan suffered 90 fire fatalities in 75 fires for the year. In 2020, Michigan had an increase in fire fatalities rising to 122 fire fatalities in 101 fires.

Although not common in Tuscola County, we do suffer fire fatalities with the most recent being at a residential fire on February 6, 2021 in Vassar Township.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Structure Fires as “Moderate” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Air/Land/Water Transportation Accidents as having a “High” probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

The chances of structure fires in Tuscola County are consistent with the rest of the State of Michigan. Because of current building practices and materials being used, fires burn faster and hotter than they have in the past reducing the time occupants have to be alerted for and escaping from residential fires. Another contributing factor is the reduction of firefighters in the county which has a negative impact on fire suppression capabilities.

Possible Mitigation Activities:

- Public education about fires
- Building codes and local ordinances enforcing the safe construction of buildings

- Designs that include the use of firewalls and sprinkler systems (especially in tall buildings, dormitories, attached structures, and special facilities)
- Landlords and families can install and maintain smoke detectors and fire extinguishers.
- Proper installation and maintenance of heating systems
- Safe use and maintenance/cleaning of fireplaces and chimneys
- Safe installation, maintenance and use of electrical outlets and wiring.
- Measures to reduce urban blight and associated arson.
- Proper maintenance of power lines and efficient response to fallen power lines.
- Transportation planning that provides roads, overpasses, etc to maximize access and improve emergency response times to all inhabited or developed areas of the community.
- Enforced fireworks regulations.

Transportation Hazardous Material Incidents:

Jurisdictions Most Vulnerable: All

A transportation hazardous material incident is an uncontrolled release of hazardous materials during transport that pose a risk to health, safety, property and the environment. All modes of transportation (e.g. highway, railroad, marine, air and pipeline) carry thousands of hazardous material shipments on a daily basis through local communities. A transportation accident involving any of these hazardous material shipments could cause a local emergency that would affect the immediate vicinity of the accident site or a portion of the surrounding community. The Pipeline and Hazardous Materials Safety Administration of the U.S. The Department of Transportation regulates over 1 million daily shipments of hazardous materials in the United States. Michigan has had numerous hazardous material transportation incidents that affected the immediate area. For the most part, these types of incidents are handled by local and state emergency responders and hazardous material response teams. Larger incidents, however, pose a whole new set of problems and concerns for the affected community. Large-scale or serious hazardous material transportation incidents that involve a widespread release of harmful material can adversely impact the life safety and/or health and well-being of those in the immediate area of the accident site, as well as those who come in contact with the spill of airborne plume. In addition, damage to property and the environment can be severe as well. Statistics show that almost all hazardous material transportation incidents are the result of an accident or other human error. Rarely are they caused by mechanical failure of the carrying vessel.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Transportation Hazardous

Material Incidents as “Moderate” or medium for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Transportation Hazardous Material Incidents as having a “Moderate” or medium probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

Due to the numerous state trunk lines (M-24/M-25/M-46/M-81/M-138), rail lines, petroleum pipelines such as Enbridge Line 5 and facilities such as POET and other Agricultural businesses the chances of hazardous material transportation accidents is great.

There have been many major hazardous material transport events that occurred in the county happened:

- April 4, 2014 when a tractor trailer hauling 11,000 gallons of ethanol crashed and subsequently burned in Denmark Township. Several local & state agencies and private firms were involved with this incident and the subsequent clean up efforts.
- February 8, 2018 a truck hauling ferric chloride solution developed a leak on M-24 while heading to the City of Caro Waste Water Treatment Plant. Caro Fire along with several other agencies and private firms responded and assisted with decontamination and clean up efforts.
- October 1, 2019 when a Huron & Eastern train derailed in Akron spilling several hundred gallons of diesel fuel. Again several state agencies and private firms were involved in the subsequent response and the environmental cleanup from the spill.

Possible Mitigation Activities:

- Improved design, routing, and traffic control at problem roadways.
- Railroad inspections, maintenance and improved designs at problem railway.roadway intersections (at grade crossings, rural signs/signals for RR crossings.)
- Proper planning, design, maintenance of, and enhancements to designated truck routes.

Fixed Site Hazardous Material Incidents:

Jurisdictions Most Vulnerable: All

Fixed site hazardous material incidents occur when there is an uncontrolled release of hazardous materials from a fixed site that poses risks to health, safety, property and the environment. Due to technological advances, hazardous materials are present in quantities of

concern in business and industries, agriculture, hospitals, utilities and other facilities. These materials include corrosives, explosives, flammable materials, radioactive materials, poisons, oxidizers and dangerous gasses.

Federal and state agencies regulate hazardous materials and many communities have response plans and procedures in place to assist with these types of incidents. However, release can still occur despite the precautions taken to ensure careful handling during the manufacture, transport, storage, use and disposal of hazardous materials.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Fixed Site Hazardous Material Incidents as “Moderate” or medium for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document. Local stakeholders also listed Fixed Site Hazardous Material Incidents as having a “Moderate” or medium probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

Tuscola County is home to several businesses that deal with and use hazardous materials on a daily basis including many agricultural based operations. Because of these factors, a hazardous material incident at a fixed site is highly probable.

Table 35: SARA Title III Sites in Tuscola County

SARA Site ID	Facility Name	Street Address	City	LEPC	24 Hour Emergency Phone	Plan Complete
3447	CO-OPERATIVE ELEVATOR GAGETOWN PLANT	6680 GAGE ST	GAGETOWN	TUSCOLA COUNTY LEPC	989-550-8919	YES
3458	MILLINGTON ELEVATOR & SUPPLY	8457 ELEVATOR STREET	MILLINGTON	TUSCOLA COUNTY LEPC	9898712171	YES
3464	WALBRO ENGINE MANAGEMENT	6242 GARFIELD AVE	CASS CITY	TUSCOLA COUNTY LEPC	9898727211	YES
3466	AT&T - M25191	3075 CHURCH ST	UNIONVILLE	TUSCOLA COUNTY LEPC	2144642626	YES
3468	AT&T - M25535	1979 RIVER ST	REESE	TUSCOLA COUNTY LEPC	2144642626	YES
4962	THUMB WELDING SUPPLIES INC	5107 KELLY RD	CASS CITY	TUSCOLA COUNTY LEPC	9898722934	YES
9899	Richville	3269 S. Van Buren	Richville	TUSCOLA COUNTY LEPC	9896527028	YES
10710	CASS CITY WWTP	3998 DOERR RD.	CASS CITY	TUSCOLA COUNTY LEPC	9898723153	YES
11309	CARO WASTEWATER TREATMENT PLANT	724 COLUMBIA AVE	CARO	TUSCOLA COUNTY LEPC	9896732840	YES
13370	CARO FACILITY	819 PENINSULAR STREET	CARO	TUSCOLA COUNTY LEPC	9896860161x205	YES
15020	AT&T - M25530	6121 FULTON	MAYVILLE	TUSCOLA COUNTY LEPC	2144642626	YES
16699	MICHIGAN ETHANOL LLC dba POET Biorefining-Caro	1551 EMPIRE DR	CARO	TUSCOLA COUNTY LEPC	9896721222	YES
22271	DFA - Cass City	4105 North Division Street	Cass City	TUSCOLA COUNTY LEPC	4178292852	YES

Infrastructure Failures:

Jurisdictions Most Vulnerable: All

Michigan’s citizens are dependent on the public and private utility infrastructure to provide essential life supporting services such as electric power, heating and cooling, 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. For example, when power is lost during periods of extreme heat or cold, people can die in their homes if immediate mitigative action is not taken. When water or wastewater treatment systems in a community are inoperable, serious public health problems arise that must be addressed immediately to prevent

outbreaks of disease. When storm drainage systems fail due to damage or capacity overload, serious flooding can occur.

Since Michigan's infrastructure is aging, it is affecting maintenance funding and user demand. Additionally, Michigan's codes and standards for the design, construction and operation of public and private utility infrastructure require a minimum level of structural integrity and operational performance, which is not adequate to protect infrastructure during a disaster. In 2018, the State of Michigan established the Michigan Infrastructure Council to develop a 30 year statewide strategic framework to address the need for infrastructure improvements in Michigan. For more information, see the Michigan Infrastructure Council's website: <https://www.michigan.gov/mic>

Additional Risk Information:

At the local level, those members of the "All Hazards Team" who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Infrastructure Failures as "Moderate" or medium for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Infrastructure Failures as having a "Moderate" or medium probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

Many cases of infrastructure failure in Tuscola County are the result of utility failures caused by weather related events. Temporary loss of electrical power because of severe weather is not uncommon, but the duration of these outages vary so widely, accurate loss of power outages in terms of frequency can only be estimated based on the frequency of severe weather events. Because large storms could cause more severe damage to infrastructure, it is important that facilities that require power for essential and life-sustaining services maintain long-lasting power back-ups.

Potential Mitigation Activities:

- Continued public outreach on utility safety
- Continued rigorous tree trimming projects along critical infrastructure such as roadways and utility lines
- The building of redundancy such as backup generators, and alternative ways of communication.

Dam Failures:

Jurisdictions Most Vulnerable:

- City of Caro
- City of Vassar
- Indianfields Township
- Juniata Township
- Tuscola Township
- Vassar Township

A dam controls the flow of water for agriculture, flood-control, artificial lakes, municipal water supplies and energy generation. A dam failure occurs when an impoundment either collapses or fails, resulting in flash flooding downstream or water pouring over the top of the dam. This failure may be due to poor operation, lack of maintenance or vandalism. Dam failures can result in loss of life and extensive damage to property and natural resources since they occur unexpectedly.

According to EGLE, there are 2,500 dams in Michigan with 813 regulated by Part 307, Inland Lake Levels and 235 regulated by Part 315, Dam Safety of The Natural Resources & Environmental Protection Act, 1994 PA 451, as amended. The dams regulated by Part 307 have a court issued order that establishes the level at which the lake is to be maintained; while the dams regulated by Part 315 are over 6 feet in height and over 5 acres are impounded during the design flood. Since 1888, EGLE reports that there have been approximately 302 dam failures in Michigan with an estimated average annual property and crop damage of \$300,000.00. This estimated damage does not include the recent dam failures that impacted Gladwin, Midland and Saginaw Counties on May 18, 2020.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Dams as “Moderate” or medium for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Transportation Hazardous Material Incidents as having a “Low” probability of occurring. Complete survey results can be found in Appendix 6 of this document.

There is a new federal grant, the High-Hazard Potential Dams (HHPD) Program, but it only makes funds available for specific, qualifying, designated high-hazard dams, which are not present in Tuscola County.

Probability of Occurrence:

Tuscola County has only seven dams listed on the National Inventory of Dams that are maintained by the U.S. Army Corps of Engineers. If one of these dams were to fail, under most circumstances, the damage would be localized to the general area around the dam itself. The largest structure in Tuscola County is the Caro Dam which already has significant damage with the failure of one of the flood control gates which has failed in the open position.

Table 36: Tuscola County National Inventory of Dams List

Name	Location	Regulatory Agency	Dam Type	Year Completed	Hazard Potential	Last Inspection Date
Caro Dam	Cass River	State	Private	1928	Low	11/19/2015
Fish Point Pond "C" Dam	Fish Point State Game Area	State	State	1963	Low	12/12/2014
Murphy Lake Level Control Structure	Goodings Creek	State/Legal Lake Level	County	2022	Low	Final Inspection still pending 5/24/22
North Gaede Marsh Dam	Tributary to Lake huron	State	State	unknown	Low	12/12/2014
Peter's Dam	Evergreen Lake	State	Private	1986	Low	5/28/2015
Shay Lake Level Control Structure	Sucker Creek Drain	State/Legal Lake Level	County	2002	Low	07/09/2020
Name	Location	Regulatory Agency	Dam Type	Year Completed	Hazard Potential	Last Inspection Date
South Gaede Marsh Dam	Fish Point State Game Area	State	State	unknown	Low	12/12/2014

National Inventory of Dams, U.S. Army Corp of Engineers

Oil & Gas Well Incidents:

Jurisdictions Most Vulnerable:

- Akron Township
- Almer Township
- Arbela Township
- Elkland Township
- Elmwood Township
- Millington Township
- Watertown Township
- Wisner Township

Oil and gas well accidents occur when there is an uncontrolled release of oil, natural gas or the by-product of hydrogen sulfide from production wells. To date, approximately 60,000 oil and gas related wells have been drilled in the State of Michigan. Currently, there are oil and natural gas wells located in 63 counties in the Lower Peninsula, which includes approximately 40 in Tuscola County.

As of 2012, Michigan wells have produced approximately 1.4 billion barrels of crude oil and 6 trillion cubic feet of gas. Despite being highly regulated and having a fine safety record, the threat of oil and gas well accidental releases, fires and explosions still exist.

Michigan is both a major consumer and producer of natural gas and petroleum products. According to the Michigan Public Service Commission (MPSC), approximately 20% of the natural gas consumed in Michigan is produced within the state. The remaining 80% is imported by six interstate pipeline companies that have access to the major natural gas producing regions in North America. Michigan has the largest underground natural gas storage capacity of any state, and cycles more natural gas through its storage system than any other state. Michigan ranks 13th in the nation in production of natural gas, and consumes 760 billion cubic feet per year. These figures underscore the fact that vast quantities of natural gas are extracted from, transported through, and stored in the State, making many areas vulnerable to petroleum and natural gas emergencies. Michigan's gas and petroleum networks are highly developed and extensive.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Oil & Gas Well Incidents as “Low” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Transportation Hazardous Material Incidents as having a “Low” probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

Because we have a limited number of oil wells within the county, we are slightly susceptible to the potential of suffering an oil or gas well accident.

Potential Mitigation Activities

- Using buffer strips to segregate wells, storage tanks, and other production facilities from transportation routes and adjacent land uses, in accordance with state regulations, and consistent with level of risk.
- Adherence to all regulations and best industry practices, especially for relatively new techniques of hydraulic fracturing, in order to preserve Michigan’s environmental quality and public confidence in the industry.

Oil & Gas Pipeline Incidents:

Jurisdictions Most Vulnerable:

- Denmark Township
- Tuscola Township
- Vassar Township
- Fremont Township
- Watertown Township
- Juniata Township
- Indianfields Township
- Wells Township
- Kingston Township
- Village of Reese
- City of Vassar

Though often overlooked, petroleum and natural gas pipelines pose a real threat in many Michigan communities. 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. Many structures are located right next to pipelines and thus may be at risk. Pipelines also can cross through rivers, streams and wetlands, thus posing the possibility of extensive environmental damage in the event of a major failure.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Oil & Gas Pipeline Incidents as “Low” for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Transportation Hazardous Material Incidents as having a “Low” probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

There are two major gas pipelines in Tuscola County, one that runs centrally through the county that is owned by Consumers Energy, and another that cuts across the bottom of the county that is owned by Enbridge Energy, commonly known as “Line 5”.

Enbridge’s Line 5 pipeline is a highly controversial subject with Governor Wittmer & Attorney General Nessel attempting to shut the line down because of environmental concerns. Because of the on-going controversy, Tuscola County had a protest that involved tampering with a gate valve site just outside of Vassar on October 19, 2021.

Both pipelines transport large quantities of natural gas and other petroleum products. The National Pipeline Mapping System Website (<https://www.npms.phmsa.dot.gov/GeneralPublic.aspx>) lists that Tuscola County has 68.21 miles of gas transmission pipeline and 19.95 miles of pipeline that handle hazardous liquids. Because of this, there is a potential for a large-scale incident involving pipelines in Tuscola County.

Map 25: State of Michigan Pipeline Map



<https://www.watershedcouncil.org/pipelines-in-michigan.html>

Potential Mitigation Actions:

- Locating pipelines away from dense development, critical facilities, special needs populations, and environmentally vulnerable areas whenever possible.
- Increasing public awareness and widespread use of the “Miss Dig” utility damage prevention service (800-482-7171)
- Proper pipeline design, construction, maintenance, and inspection.

Scrap Tire Fires:

Jurisdictions Most Vulnerable: All

Scrap tires end up in landfills or recycling facilities, some of which have more than several hundred thousands of used tires. The tires provide fuel for fires since the shape of the tire allows air to flow into the interior of the pile of tires, which renders standard firefighting practices

nearly useless. The Rubber Manufacturers Association reports that a fire can convert a standard passenger vehicle tire into about two gallons of oily residue. Scrap tire fires impact the air, soil and water quality since the burning tires release hazardous compounds into the air, and the tire's oily residue can seep into the ground and water system. Sometimes, the burning oil can spread the fire to adjacent areas and burn for several months. These fires can cause an area to become a Superfund site.⁵³

Additional Risk Information:

At the local level, those members of the "All Hazards Team" who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Scrap Tire Fires as "Low" for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Transportation Hazardous Material Incidents as having a "Low" probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

Tuscola County has no licensed scrap tire haulers at this time, in the 2016 edition of this plan there was one licensed tire hauler in the county who has since let their license expire. Tuscola County Recycling in conjunction with Mosquito Control holds annual tire collection drives in various locations in the county during the year. This drive helps to cut down the illegal dumping of tires within the county. With that, there is a low probability of a scrap tire fire in the county.

On January 23, 2021, there was a documented tire fire that occurred in Wells Township that was extinguished by the Kingston Fire Department and the Mayville Fire Department. The incident was turned over to the Michigan Department of Environmental, Great Lakes and Energy (EGLE) for further investigation. This was the last registered "scrap tire fire" in Tuscola County.

According to the Michigan Hazard Mitigation Plan (April 2019 edition) it is expected that on a yearly basis, there will be one scrap tire fire in the state of Michigan.

Possible Mitigation Actions:

- Policies for regulated disposal and management of scrap tires, and enforcement of regulations related to them.
- Proper siting of tire storage and processing facilities (land use planning that recognizes scrap tire sites as a real hazard and environmental threat.)

Adversarial / Human Related Hazards:

Adversarial / Human related hazards are hazards that are created by people with ill intent or can cause harm to a vast number of people.

Below is a list of the most commonly occurring or highest probability of occurring hazards for Tuscola County:

- Pandemic / Public Health Emergency
- Cyber Security
- Active Assailant Event
- Civil Disturbance

Pandemic / Public Health Emergency:

Jurisdictions Most Vulnerable: All

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

There have been several pandemics over the course of the last several years. For example, in 2003, there was an outbreak of acute respiratory syndrome (SARS). This virus resulted in over 8000 infections and a 10% mortality rate worldwide. In 2009, there was a new strain of H1N1 which resulted in 300,000 deaths worldwide.

More recently, on March 11, 2020, the WHO declared the SARS-CoV-2 (Covid-19) outbreak as a pandemic. The new coronavirus had not been previously identified in humans. As of May 24, 2022, Tuscola County has had 13,437 confirmed Covid-19 cases with 277 deaths.

In Tuscola County, the Health Department works with local, state and federal partners to prepare for and respond to public health threats. In addition, the health department has several plans in place for dealing with such emergencies.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Pandemic/Public Health Emergency as “Moderate” or medium for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Pandemic/Public Health Emergency as having a “Moderate” or medium probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

With the previous history and the Coronavirus Epidemic that began in 2020, there is a high probability that Tuscola County will continue to experience the chance of future pandemics and public health events.

Potential Mitigation Activities:

- Immunization programs to vaccinate against communicable diseases.
- Improving ventilation techniques in areas, facilities, or vehicles that are prone to crowding, or that may involve exposure to contagion or noxious atmospheres.
- Radon detection and abatement activities to reduce concentrations of radon in homes and buildings.
- Maintaining community water and sewer infrastructure at acceptable operating standards.
- Providing back-up generators for water and wastewater treatment facilities to maintain acceptable operating levels during power failures.
- Demolition and clearance of vacant condemned structures to prevent rodent infestation.
- Free or reduced-expense community clinics and school health services.
- Proper location, installation, cleaning, monitoring, and maintenance of septic tanks.
- Separation of storm and sanitary sewer systems.

Cyber Security:

Jurisdictions Most Vulnerable: All

Cyber security is the practice of defending computers, servers, mobile devices, electronic systems, networks and data from malicious attacks. With the increased dependence on computers in every facet of our lives, attacks on computers and their functionality have become a very common occurrence.

The global cyber threat continues to evolve at a rapid pace, with a rising number of data breaches each year. A report by RiskBased Security revealed that a shocking 7.9 billion records have been exposed by data breaches in the first nine months of 2019 alone. This figure is more than double the number of records exposed in the same period in 2018.

The main focus of these attacks is focused primarily on medical services, retailers and public entities.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Cyber Security as “Moderate” or medium for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Cyber Security as having a “Moderate” or medium probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

The probability of this occurring is extremely high and in all reality is occurring everyday to not only governmental entities but also several commercial entities as well. Tuscola County and our partners, both public and private, must continue in taking the necessary steps to prevent intrusions into operating networks and systems.

Potential Mitigation Activities:

- Continued public outreach and education about the warning signs of a cyber attack
- Continued monitoring and advancement of cyber security detection and monitoring
- Building of redundancy and backup of critical information storage

Active Assailant Event:

Jurisdictions Most Vulnerable: All

Active Assailant Events are relatively a new phenomenon that has unfortunately gained in popularity since the Columbine High School incident that occurred on April 20, 1999. The FBI reports that from 2000 to 2018 there have been 277 active shooter incidents in the United States with 2430 casualties, of which, there were 884 deaths and 1546 wounded.

Besides active shooter events, there has been an increase in unconventional weapons, such as the use of vehicles, in attacks on civilians in public spaces.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Active Assailant Event as “High” or for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Active Assailant Events as having a “Moderate” or medium probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

Though the chances of an active assailant event are relatively low, it must be something that we, as a county, should be prepared to deal with. Tuscola County has had a history of threats, most of which were made against schools within the county with either the threat of violence or bomb threats.

On June 20, 2010 a letter containing several threats against the Tuscola County Courthouse was found. The threats in this letter had a negative effect on the courthouse’s operation for the next several days as additional security was present.

Potential Mitigation Actions:

- Continued investment in security devices such as cameras and door locking devices
- Training for first responders and civilians
- Continued investment and training in first aid supplies and first aid / Stop the Bleed Training

Civil Disturbance:

Jurisdictions Most Vulnerable: All

A civil disturbance is an incident which disrupts a community and requires intervention to maintain public safety. Examples are demonstrations, riots, strikes, public nuisances, and criminal activities.

In the United States, protesters and anarchists tend to practice civil disturbance at large, scheduled peaceful gatherings such as marches or world and global meetings. Their activities can involve disruption of events, resistance, and rejection of control and authority. Modern groups are well-organized, using command centers, tactical communications, and the internet for planning and operations. Control of the incident requires police forces trained and experienced in the Incident Command System and riot control. Effects of civil disturbance can include injury to participants and spectators and property damage.

The last decade has seen increased rioting and looting in the United States following sporting events. Generally, populations of more than 100,000 are vulnerable to civil disturbances.

In 2020 there have been several instances of civil disturbances in the United States, such examples have been the result from the death of Michael Brown in Ferguson Missouri and the Black Lives Matter movement. Additional civil unrest volatility has come as a result of the 2020 Presidential Election and the Coronavirus Pandemic.

Additional Risk Information:

At the local level, those members of the “All Hazards Team” who completed the survey on Technical Hazards/Adversarial - Human Related Hazards ranked Civil Disturbance as “Moderate” or medium for how vulnerable they perceived the threat is to the County. Complete survey results can be found in Appendix 6 of this document.

Local stakeholders also listed Civil Disturbance as having a “Moderate” or medium probability of occurring. Complete survey results can be found in Appendix 6 of this document.

Probability of Occurrence:

Although the chances of civil disturbances seems relatively low in Tuscola County, there have been previous incidents and movements that have occurred here. On Saturday, September 28, 1997 the Ku Klux Klan held a rally in the City of Caro. Several police agencies were involved with this event which was relatively peaceful. On June 5, 2020, Black Lives Matter protests were held in the City of Caro and the City of Vassar simultaneously. Again, several police agencies were involved in the security for these events which were held peacefully. Because of the previous history and the volatile state our country is in politically, there is a chance of additional protests that have a chance of turning violent in the county.

Potential Mitigation Activities:

- Structure and property insurance in risky areas, combined with anti-arson practices.

- Design requirements for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, etc. that take into consideration emergency and security needs.
- Use of laminate glass and other hazard-resistant, durable construction techniques in public buildings and critical facilities.

Vulnerability Risk Analysis and Ranking:

One of the surveys completed for this project was to get the All Hazard Team’s opinion on the ranking of the different hazards that could impact Tuscola County. In an effort to make the survey more manageable, they were broken into categories with the first one being Natural Hazards, then Technical Hazards and adversarial/Human Related Hazards. The results below were the averages of the responses to the surveys. (The initial surveys along with their complete results of these surveys are found in Appendix Number 2 & Number 3)

Table 37: Hazard Vulnerability Risk Analysis and Ranking based on stakeholder opinion

Natural Hazards	Risk Assessment Ranking	Vulnerability Assessment	Ability to Mitigate Actions	2016 Ranking	Overall Priority
Severe Wind	1st	High	0-25% / 25-50% (tie)	4	High Priority
Thunderstorms/ Lightning	2nd	High	0-25%	2	Medium Priority
Heavy Snow	3rd	Moderate	0-25% / 25-50% (tie)	1	Medium Priority
Ice Storms	4th	Moderate	25-50%	3	Medium Priority
Hail	5th	Moderate	0-25%	11	Low Priority
Tornadoes	6th	Moderate	25-50%	9	High Priority
Shoreline Flooding	7th	Moderate	25-50%	17	Medium Priority
Flood	8th	Moderate	0-25%	10	Medium Priority
Blizzard	9th	Moderate	0-25%	N/R	Medium Priority
Extreme Heat	10th	Low	0-25%	5	Low Priority
Drought	11th	Low	0-25%	7	Low Priority
Cold/Wind Chill	12th	Moderate	0-25%	5	Low Priority
Wildfire	13th	Low	0-25%	15	Low Priority
Earthquake	14th	Low	0-25%	28	Low Priority
Structure Fires	1st	High	25-50%	6	High Priority
Air/Land/Water Transportation Accidents	2nd	High	0-25%	24	High Priority
Pandemic/Public Health Emergency	3rd	High	25-50%	13	High Priority

Technical/Adversarial/ Human Related Hazards	Technical/Adversarial/ Human Related Risk Assessment Ranking	Vulnerability Assessment	Ability to Mitigate Actions	2016 Ranking	Overall Priority
Transportation Hazardous Material Incident	4th	Medium	25-50%	18	Medium Priority
Active Assailant Event	5th	Medium	25-50% & 50-75% (tie)	N/R	Medium Priority
Infrastructure Failure	6th	Medium	25-50%	12	Medium Priority
Cyber Security	7th	High	50-75%	N/R	High Priority
Fixed Site Hazardous Material Incident	8th	Medium	25-50%	N/R	Medium Priority
Civil Disturbance	9th	Medium	25-50%	21	Medium Priority
Dam Failure	10th	Low	0-25%	31	Low Priority
Oil & Gas Well Incident	11th	Low	25-50%	27	Low Priority
Oil & Gas Pipeline Incidents	12th	Low	0-25%	23	Low Priority
Scrap Tire Fire	13th	Low	0-25%	30	Low Priority

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Chapter 5: Overall Goals and Actions

Goals:

This plan was developed to mitigate the hazards Tuscola County faces and to reduce the negative effects that they have on the residents and physical components of the county. Local units of government and individuals can often have a great impact on reducing risks. In many instances, the County's role must be limited to encouragement and technical assistance. Most importantly, the County, through its many Board and Commissions, can serve as a role model by incorporating hazard mitigation into all of its ongoing activities.

After careful review, the Tuscola County all hazards team developed the following goals, mitigation actions, and action plans. These goals and actions are intended to guide decision-making and promote implementation of mitigation strategies by boards, commissions, and agencies throughout Tuscola County. Other units of government, businesses, and individuals are encouraged to implement accordingly. The goals are:

- Protect the lives, health, and safety of the citizens of Tuscola County from potential hazards as described in this plan.
- Protect critical infrastructure and facilities
- Reduce or eliminate the effects of hazards
- Continue public education and preparedness

These goals are designed to be very broad and unspecific in order to serve as long-term guides for the county's hazard mitigation efforts.

Mitigation Actions:

Mitigation actions are specific projects and activities that help achieve goals. Mitigation actions are completed through the following mitigation types:

Prevention: Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and stormwater management regulations.

Property Protection: Actions that involve modification of existing buildings or structures to protect them from a hazard, or removal from hazard areas. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.

Public education and awareness: Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include

outreach projects, real estate disclosure, hazard information, and school age and adult education programs.

Natural Resource Protection: Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.

Emergency Services: Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical infrastructure and facilities.

Structure Projects: Actions that involve construction of structures to reduce the hazard impact. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

Local Plan and Regulations: Actions that include government authorities, policies, or codes that influence the way land and buildings are developed and built.

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Chapter 6: Previous Mitigation Goals

In the previous Hazard Mitigation Plan that was adopted in 2016, several goals and objectives were spelled out as a means of mitigating the county's hazards. Below is a list of those goals and what actions were taken to obtain those goals set forth in the plan:

Goal: Increase community preparedness for a variety of hazard situations:

- SMART911/RAVE have been implemented and used with some success, citizens are still apprehensive about signing up for the program.
- Several public safety, municipal and utilities promote preparedness information on social media accounts.
- Local fire officials have met with DTE officials to improve the response to downed power lines within the county.
- Tuscola County Sheriff's Office and Huron County Sheriff's Office have jointly purchased an airboat used for ice rescue situations but also can be used in flood events such as the large flood that occurred in Midland County in May of 2020.
- Because of recent water related tragedies along the Saginaw Bay, ACW-Unionville Fire now have water and ice rescue capabilities. Caro Fire and Mayville have ice and water rescue capabilities as well.
- All Tuscola County Fire Departments have become members of the Michigan Mutual Aid Box Alarm System (MiMABAS). MiMABAS is a user-driven system designed to streamline the requesting and providing of emergency and fire services resources across Michigan for day to day mutual aid and for large scale events such as major fires, train derailments, tornadoes, wildfires, domestic or foreign terrorism and other events that may overwhelm local resources.
- Tuscola County has updated its alert system to notify first responders for calls (Switched from alphanumeric pagers to MPSCS paging system).
- Caro Fire has partnered with POET and the Regional Response Team (RRT) to purchase needed equipment and to train for grain bin rescue capabilities.
- The Tuscola County Sheriff's Office has obtained and put into place a canine member, Blek. Blek is cross trained in both bomb detection and tracking capabilities and has been utilized on several occasions in missing person complaints, bomb detection and tracking.
- DTE and Thumb Electric have tree trimming programs in place to remove trees and vegetation around power lines.

Goal: Provide adequate warning time to residents in the event of a disaster:

- SMART911/RAVE has been utilized for county residents.
- New outdoor warning sirens have been installed in the Village of Gagetown, Village of Fairgrove, the City of Vassar (two additional sirens were installed for a total of three), Fremont Township and the Village of Mayville.

Goal: Maintain a safe, reliable, and efficient transportation infrastructure:

- Continued road and bridge maintenance programs.
- Drainage ditch relocation along M-138 (Fairgrove Rd) from Reese Rd to Bradleyville Rd.
- Fixed Object Removal Safety Grant Projects along various roadways within the county using compiled traffic crash data.

Goal: Encourage and aid private hazard mitigation activities including those that protect private property

- Since the last update in Hazard Mitigation Plan update completed in 2016 there have been no private hazard mitigation projects completed. Projects were encouraged during the record Great Lakes lake levels in 2020

Goal: Protect the drinking water supply:

- Municipal water was brought to several townships along the western edge of the county. This was done because of poor drinking water quality from privately owned wells in those areas.
- Aqueous Film Forming Foam (AFFF) containing PFAS collected from county fire departments and POET through a state sponsored program.

Goal: Reduce losses and damages from repetitive flooding:

- The Drain Commissioner's Office continues with drainage ditch maintenance and cleaning programs.
- The Drain Commissioner's Office is working on replacing the Murphy Lake Dam which is beyond its service life.
- Because of a major flooding event that occurred in May of 2019, several road culverts were replaced and two new bridges were constructed replacing old structures that were near the end of their service life.
- The Office of Emergency Management and the Drain Commissioner's Office have both encouraged the City of Vassar about updating the "City of Vassar Flood Mitigation Plan". This plan was originally written in 1998 and has never been updated to include the flood mitigation work that has been completed there and the needed upkeep of that project.

See Appendix 13 for a list of hazard mitigation alternative ideas that were considered or submitted by local units of government.

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Chapter 7: Action Plan

After determining Tuscola County's goals and objectives, hazard mitigation actions were identified. These actions were evaluated to determine the effect they will have on specified mitigation objectives and prioritized to determine when these actions should be implemented. (Alternative mitigation activities are listed in each hazard description within Chapter 4.)

In addition to local operating budgets and private-public partnerships, FEMA Hazard Mitigation Assistance, specifically HMGP, FMA, and BRIC. These programs were described at length at the end of Chapter 2.

The prioritization of the following actions occurred by considering the cost-effectiveness, previous implementation status, survey results, community needs, and general/technical feasibility. The levels include:

- ❖ *Low*: a poor cost/benefit ratio for implementation within a 5 year timeframe.
- ❖ *Medium*: A moderate cost/benefit ratio for implementation within a 5 year timeframe.
- ❖ *High*: A favorable cost/benefit ratio for implementation within a 5 year timeframe.

ACTION ITEM #1: Test, expand and update the current countywide warning system

PRIORITY LEVEL: High (previously list as High in 2016 plan)

RESPONSIBLE AGENCY: Central Dispatch, Emergency Management and Local Units of Government

FINANCIAL & TECHNICAL RESOURCES: HMGP funding and Local Units of Government

PROGRESS / STATUS: On-going. Tuscola County has been expanding and upgrading the outdoor warning system as grants and funding become available. Continue to grow and utilize the Smart 911 program.

PREVIOUS PLANS: This subject has been listed in the last several plans. The priority will not change and this will be one area that will be continuously implemented and improved upon.

ACTION ITEM #2: Hardening and reinforcing of critical infrastructure such as water & sewer facilities and local unit of government facilities (back-up generators and security measures)

PRIORITY LEVEL: High (previously listed as High)

RESPONSIBLE AGENCY: Local Units of Government and Emergency Management

FINANCIAL & TECHNICAL RESOURCES: Hazard Mitigation Assistance

PROGRESS / STATUS: On-going, several agencies have been budgeting their own generators as money becomes available.

PREVIOUS PLANS: This subject has been discussed and carried forward for the last several Hazard Mitigation Plans. Because of the associated costs, progress has been slow.

ACTION ITEM #3: Encourage the establishment of heating and cooling shelters for vulnerable populations

PRIORITY LEVEL: Medium

RESPONSIBLE AGENCY: Civic Groups, Churches, Local Units of Government and Emergency Management

FINANCIAL & TECHNICAL RESOURCES: HMGP, Civic Groups, Local Units of Government, Emergency Management

PROGRESS / STATUS: On-going, several partner agencies and organizations have developed facilities and plans to assist with sheltering when needed. Since the 2016 plan the City of Vassar, the Village of Cass City, Hills and Dales General Hospital and Vassar Area Ambulance have all made facilities available in times of need.

PREVIOUS PLANS: This item has been retained from the 2016 plan

ACTION ITEM #4: Update and continue integration of Critical Infrastructure data into the County GIS System

PRIORITY LEVEL: Medium

RESPONSIBLE AGENCY: Emergency Management, local units of government, and County GIS Department

FINANCIAL & TECHNICAL RESOURCES: County and State Government utilizing Federal grants.

PROGRESS / STATUS: On-going. Recent data collection for the State of Michigan has placed most critical infrastructure into the GIS System.

PREVIOUS PLANS: This is a "New" action item.

ACTION ITEM #5: Participate and encourage joining in the National Flood Insurance Program

PRIORITY LEVEL: High (previously listed as "Moderate")

RESPONSIBLE AGENCY: All Local Units of Government and Emergency Management

FINANCIAL & TECHNICAL RESOURCES: Federal Government and EGLE

PROGRESS / STATUS: On-going, with Tuscola County's water resources such as the Bay and the Cass River, we will always continue to be vulnerable to flooding. (FMA funds could result from this activity)

PREVIOUS PLANS: This item has been listed in the last several Hazard Mitigation plans, as Tuscola County has a deep history involving floods.

ACTION ITEM #6: Increase/continue with community preparedness and other hazard mitigation projects

PRIORITY LEVEL: High (previously listed as "High")

RESPONSIBLE AGENCY: First Responder Agencies & partners and Emergency Management

FINANCIAL & TECHNICAL RESOURCES: All forms of Government, HMA Grants, local first responders, partner agencies and Emergency Management

PROGRESS / STATUS: On-going / Long Term throughout the county, updates as needed.
PREVIOUS PLANS: This item has been retained from the last several plans and will continue to be reviewed and updated as needed.

ACTION ITEM #7: Integration hazard mitigation concepts into local master plan updates or other pertinent plans

PRIORITY LEVEL: Moderate

RESPONSIBLE AGENCY: Local units of government

FINANCIAL & TECHNICAL RESOURCES: Local units of government

PROGRESS / STATUS: On-going

PREVIOUS PLANS: This is a “new” Action Item

ACTION ITEM #8: Identify special needs populations

PRIORITY LEVEL: Moderate (previously listed as “High”)

RESPONSIBLE AGENCY: Citizens, health department, local hospitals, health care agencies

FINANCIAL & TECHNICAL RESOURCES: All units of government, local first responders and emergency management

PROGRESS / STATUS: On-going

PREVIOUS PLANS: This action item was included in the 2016 plan and continues to be a work in-progress. With the county adopting RAVE/Smart 911 as a notification system, it allows residents to create profiles that will include any medical issues and/or special needs residents by address.

ACTION ITEM #9: Repetitive Flood Damage Mitigation

PRIORITY LEVEL: High (previously listed as “High”)

RESPONSIBLE AGENCY: All units of government, drain commissioner's office, involved property owners, and emergency management

FINANCIAL & TECHNICAL RESOURCES: Federal Government and EGLE

PROGRESS / STATUS: On-going

PREVIOUS PLANS: This action item was previously listed in the 2016 Hazard Mitigation Plan as an action item and was listed in this rendition because of Tuscola County’s history of flooding.

ACTION ITEM #10: Flood Drainage Expansion

PRIORITY LEVEL: High (previously listed as “High”)

RESPONSIBLE AGENCY: All units of government, drain commissioner’s office, and emergency management

FINANCIAL & TECHNICAL RESOURCES: Federal Government and EGLE

PROGRESS / STATUS: On-going

PREVIOUS PLANS: This action item was previously listed in the 2016 Hazard Mitigation Plan, because of the county's history of flooding it was carried over to this plan.

Local units of government are now required to “participate” in the Hazard Mitigation Plan, as part of that participation, they must select one of the action items that they will focus on accomplishing in the next five years.

The initial email(s) to local governmental officials (Appendix 12) and the results of that survey are listed below. Those local units that did not respond to the initial three separate emails were also faxed a request to participate in the plan as well.

Table 38: Local Unit of Government Action Item Selection and Action to be taken

Local Unit of Government	Planned Action Item Participation
<u>Akron Twp</u> Response from Mary Warren-Twp Clerk	#2 Hardening of Critical Infrastructure- #10 Flood Drainage Expansion-
<u>Almer Twp</u> Response from Jim Mantey-Twp Supervisor	#6 Increase/Continue Community Preparedness-Willing to host training at our Twp Hall for first aid, CPR and fire prevention.
<u>Arbela Twp</u> Mary Warren-Twp Clerk	#2 Hardening of Critical Infrastructure
<u>Columbia Twp</u> Response from Kathy Trischler-Twp Supervisor	#2 Hardening of Critical Infrastructure-Building new Fire Hall
<u>Dayton Twp</u>	#1 Test Expand and update countywide warning system-Promote Smart911
<u>Denmark Twp</u> Response from Charles Heinlein-Twp Supervisor	#1 Test Expand and update countywide warning system-Promote Smart911 #2 Hardening of Critical Infrastructure-sanitary sewer upgrades #7 Integration of Haz Mit concepts into local plans-in the process of rewriting Master Plan
<u>Elkland Twp</u> Response from Terry Munz-Twp Supervisor	#1 Test Expand and update countywide warning system-Promote Smart911
<u>Ellington Twp</u>	#1 Test Expand and update countywide warning system-Promote Smart911
<u>Elmwood Twp</u> Response from Pam Brinkman-Twp Clerk	#2 Hardening of Critical Infrastructure
<u>Fairgrove Twp</u> Response from Keith Aeder-Twp Supervisor	#6 Increase/Continue Community Preparedness-Continue to provide & assemble first aid kits distributed at Twp Hall in cooperations with VAAS. Coordinate and sponsor CPR classes at the Twp Hall and other suitable venues as necessary.
<u>Fremont Twp</u>	#1 Test Expand and update countywide warning system-Promote Smart911

Gilford Twp	#5 Participate and encourage joining in the National Flood Insurance Program
Indianfields Twp	#1 Test Expand and update countywide warning system-Promote Smart911
Juniata Twp Response from Lisa Geiger-Twp Supervisor	#6 Increase/Continue Community Preparedness-Juniata Township is currently represented on the board of directors of the Vassar Area Ambulance Service (VAAS) as a trustee. As part of this organization, we have distributed Stop The Bleed first aid kits to our residents and plan to continue providing this free resource. We will also plan to increase community preparedness by offering CPR/First Aid classes within our community, as well as a Stop The Bleed Program to educate our residents. Lastly, we will also continue to work with our local fire departments to provide fire prevention education to our community residents. #7 Integration of Haz Mit concepts into local plans-The Juniata Township Master Plan is currently being updated and will include integration of hazard mitigation concepts. For example, information may be included on what areas of Juniata are flood prone and work toward educating those in that area. We may include where residents can locate the flood maps and/or make our zoning such that we discourage large development in those flood prone areas.
Kingston Twp Response from Carrie Gilley - Twp Clerk	#1 Test Expand and update countywide warning system-Promote Smart911
Koylton Twp Response from Doug Kramer-Twp Supervisor	#1 Test Expand and update countywide warning system-Promote Smart911
Millington Twp	#1 Test Expand and update countywide warning system-Promote Smart911
Novesta Twp Response from Pennie Rienas-Twp Clerk	#2 Hardening of Critical Infrastructure-Considering installation of security camera #4 Critical Infrastructure into GIS-Believe that tax assessor is doing this #6 Increase/Continue Community Preparedness-Future Narcan Training
Tuscola Twp Response from entire Twp Board during monthly meeting on 5/17/22	#1 Test Expand and update countywide warning system-Promote Smart911 #10 Flood Drainage Expansion-look at updating of possible storm drain solutions for the unincorporated area of Tuscola.
Vassar Twp Response from John Stack-Twp Supervisor & Deb Pounds Twp Clerk	#1 Test Expand and update countywide warning system-Addition of warning system in the township park. #3 Heating and Cooling Centers-Open township hall at times of need #10 Flood Drainage Expansion-Continual inspection & maintenance of flood control devices and improvements as needed or as funding becomes available.
Watertown Twp Response from Malisa Pyles - Township Clerk	#1 Test Expand and update countywide warning system-Promote Smart911 #4 Critical Infrastructure into GIS- #6 Increase/Continue Community Preparedness- #7 Integration of Haz Mit concepts into local plans-
Wells Twp	#1 Test Expand and update countywide warning system-Promote Smart911 #3 Heating and Cooling Centers-Open Township hall
Wisner Twp Response from Pam Shook-Township Clerk	#1 Test Expand and update countywide warning system-Promote Smart911
City of Caro Chief Brien Newcomb-Police Chief	#1 Test Expand and update countywide warning system-Promote Smart911
City of Vassar Response from Andrew	#1 Test Expand and update countywide warning system-Promote Smart911 #2 Hardening of Critical Infrastructure-generators for water tower, lift stations, & wells #3 Heating and Cooling Centers-City Hall and VAAS Base are both being used as such #4 Critical Infrastructure into GIS-Continue entering data in own GIS system

<p><i>Niedzinski-City Manager</i></p>	<p>#5 Participate & encourage joining NFIP-Already members but continue to encourage participation #6 Increase/Continue Community Preparedness-Heart Smart Community, continue education of the public #7 Integration of Haz Mit concepts into local plans-Update local Emergency Response Plans #8 Identify Special Needs populations-Smart911 promotion #9 Repetitive Flood Damage Mitigation-Encouraging EDC not to restore Caro Dam #10 Flood Drainage Expansion-Continual inspection & maintenance of flood control devices and improvements as needed or as funding becomes available.</p>
<p><u>Village of Akron</u> <i>Response from Marv Hasso-Fire Chief/DPW</i></p>	<p>#2 Hardening of Critical Infrastructure-Upcoming water project</p>
<p><u>Village of Cass City</u> <i>Response from Debbie Powell-City Manager</i></p>	<p>#1 Test, expand, and update countywide warning system- Promote Smart911 #3 Heating and Cooling Centers-Generator at Municipal Building to become shelter #5 Participate & encourage joining NFIP-WWTP renovation requirement</p>
<p><u>Village of Fairgrove</u></p>	<p>#3 Heating and Cooling Centers-Seek replacement of an antiquated generator and develop a plan for opening and running a shelter.</p>
<p><u>Village of Gagetown</u> <i>Response from Jan Koch-Village Treasurer/Clerk</i></p>	<p>#2 Hardening of Critical Infrastructure-Using CLFRF funding to replace water lines. #3 Heating and Cooling Centers-If needed, the village would partner with area churches. #9 Repetitive Flood Damage Mitigation-Have future meeting with Road Commission and Spicer's to discuss options for area that floods #10 Flood Drainage Expansion-Major street project occurring in the future that will change out existing drainage tubes as needed.</p>
<p><u>Village of Kingston</u> <i>Response from Cory Skinner-Village President</i></p>	<p>#1 Test Expand and update countywide warning system-Promotion of Smart911</p>
<p><u>Village of Mayville</u></p>	<p>#10 Flood Drainage Expansion</p>
<p><u>Village of Millington</u> <i>Response from Kaylene Long-Village Clerk</i></p>	<p>#3 Heating and Cooling Centers-Looking for a location to open this type of Center #4 Critical Infrastructure into GIS-mapping water and sewer lines with recent SAW grant #5 Participate & encourage joining NFIP-Potential of joining this program with additional information #6 Increase/Continue Community Preparedness-Outreach in collaboration with local emergency services #7 Integration of Haz Mit concepts into local plans-Willing to work into Master Plan and local economic plan #10 Flood Drainage Expansion-With mapping occurring, future drain work might become apparent</p>
<p><u>Village of Reese</u> <i>Response from Thomas Raymond-Village Manager</i></p>	<p>#1 Test Expand and update countywide warning system-Promotion of Smart911 #2 Hardening of Critical Infrastructure-generator replacement at the Fire Hall #3 Heating and Cooling Centers-Continue in purchasing items to strengthen Heating & Cooling Centers capability (cots, blankets, water, etc.)</p>
<p><u>Village of Unionville</u> <i>Response from Jessica VanHove-Village Clerk</i></p>	<p>#2 Hardening of Critical Infrastructure- #5 Participate & encourage joining NFIP-Potential of joining this program with additional information #9 Repetitive Flood Damage Mitigation-Working on updating storm sewers #10 Flood Drainage Expansion-Working on updating storm sewers</p>

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Chapter 8: Previous Hazard Mitigation “Action Plans”

The following Actions were listed in the Tuscola County Hazard Analysis and Mitigation Plan that was adopted on August 11, 2016. This chapter will list the Action Plan and provide an update to its progress to each specific “Action Plan”.

Action Item #1: Mass Notification System

In the 2016 plan the Mass Notification System action advised the following: “The mass notification system is a system that alerts county residents by several means, such as “hard lined” telephone, cell phone, text messages, and email. The system meets Tuscola County warning needs by both actively contacting residents and providing them with adequate information. It is also significantly less expensive than creating a countywide siren system.”

Today, Tuscola County now has the RAVE/SMART 911 notification system in place to notify residents about emergent events. This system can send out phone calls, text messages, and emails to those who participate. Notifications are sent out for events such as shoreline flooding, inclement weather warnings, and road closures. Tuscola County has been slowly building this system and has recently started to integrate local units of government in using the system.

Because of aging equipment, rapidly evolving/updating technology, and areas lacking adequate outdoor warning sirens, this action item was carried over in this plan.

Action Item #2: Identify Special Needs Population

In the 2016 plan: Identify special needs populations' ' was described by: “The County must develop a voluntary registry of people with special needs in order to be able to inform and assist them during hazards. The utmost care must be given to protect the privacy of special needs individuals and to comply with all relevant personal privacy laws. The registry can be used to great advantage in evacuation and shelter situations, and it can also be used in coordination with the Community Alert Network to provide customized messages to people with special needs.

Since the 2016 plan's adoption, Tuscola County was provided a list from the Human Development Commission and was provided special needs population information from the Region Three Healthcare Coalition, until Covid struck. Citizens of the county can also put in medical information, including special needs issues into RAVE/SMART 911 when they are creating their profile.

Because of the on-going and constant changes in this population, it was retained in this update.

Action Item #3: Education of Elected Officials

The 2016 plan describes this action as “This problem could be solved if all elected officials were made aware of or reminded of the county’s hazard mitigation strategy on a regular basis. After each election in the county, within a month of assumption of office, all elected officials (new & incumbent) should be invited to a program that will inform them about hazard mitigation strategies and the special role they play in educating citizens, ensuring public ordinances and plans support hazard mitigation activities and how to lead people in the event of an emergency. This will not only prepare elected officials to serve as leaders during a hazard event, but also give them the necessary information to provide to their constituents who are concerned about hazards in the county.”

Since the 2016 plan’s adoption, Tuscola County elected officials have been offered two Public Officials Conferences. The first was an all day event that occurred at the Bay City DoubleTree Hotel on March 31, 2017 and the second was hosted at the Hills and Dales Business Annex in Cass City on March 22, 2019. The first conference was a general conference covering many areas dealing with emergency management while the second was more focused on flooding, specifically shoreline flooding that was a major concern at the time.

This action item was removed from the current plan as these previous conferences were not well attended and other media sources could be utilized to pass information on to elected officials when it was more convenient for them to attend.

Action Item #4: Repetitive Flood Damage Mitigation

According to the 2016 plan, this action item had the following description: “For those locations identified by planners as vulnerable to flood damages, it may become possible to protect at-risk structures (including those suffering repetitive losses) by elevating, retrofitting, or relocating them out of harm’s way. Alternatives may include the acquisition and removal of structures that are too frequently and heavily damaged to merit further repair or rebuilding.”

Since 2016, very little has been done to mitigate repetitive flood damages. Several large projects have been completed in the City of Vassar area several years ago that have alleviated much of the flood losses in that area.

The Drain Commissioner’s Office continues with drain maintenance projects and other drain improvements which have helped with flooding to some degree.

Action Item #5: Flood Drainage Expansion

According to the 2016 plan, this item had the following action listed: “In those areas identified by planners as vulnerable to flood damages and where study by engineers deems it to be feasible, the county and the appropriate jurisdiction will work to improve drainage and sewer systems by expanding their capability to handle area waters. It should be noted that the funding sources listed above will cover only the expansion of drainage systems, and that their maintenance and cleaning remains the responsibility of the appropriate jurisdiction.”

The Drain Commissioner’s Office has continuously worked to clean and maintain all drains that the office is responsible for. During a flood event in 2019, the Road Commission out of necessity, replaced several culverts that were damaged as a result of a flooding event.

Sewer improvements are done at the local level as areas of concern are located and funding is secured.

Action Item #6: Emergency Power Supplies

In the 2016 plan, the following action was written for emergency power supplies: “ For those locations identified as both essential to community hazard response and recovery and that currently lack adequate backup power supplies, such generators and other backup systems as are deemed necessary and adequate will be purchased and/or maintained. The Emergency Management Director will work with local officials to determine which infrastructure is considered most essential and will then contact those in charge of each specific piece of infrastructure to determine backup power needs and capabilities. Once funding has been obtained, the Emergency Management Director will work with on-site staff at identified infrastructure to ensure that backup power systems are purchased and installed as quickly as possible.

Since the 2016 plan was adopted, several generators have been installed through the county for powering critical infrastructure. Some of these generators have been purchased with Homeland Security funding, equipment grants such as the military 1033 program, or funded at the local level. Generators have been installed at locations such as the Mayville Fire Department, the Vassar Fire Department, Vassar Area Ambulance Service base in Vassar and Reese sanitary sewer lift stations.

Action Item #7: Cooperation with Utilities

The 2016 plan describes the action as: “Emergency numbers have already been provided by all utilities to at least Central Dispatch. Unfortunately, one of Tuscola County’s main power suppliers, Detroit Edison, has a poor system in place to prioritize calls entered into their system. 911 operators experience long wait times when calling in down power lines to DTE and emergency first responders experience even longer wait times in the field waiting for power

crews to arrive at the location to remedy the situation. This has been an ongoing problem for the last several years with no signs of change being taken by DTE to correct the issue.”

Since this was written in 2016, DTE has instituted a multitude of changes. On June 21, 2018, several fire chiefs met with DTE representatives at the Lapeer Service Center to discuss the issues raised above. After some discussion about the problems, DTE changed and has greatly improved their response to line down calls. DTE has also begun meeting with Emergency Managers virtually on a regular basis in attempts to improve service and to plan ahead for weather related events. A DTE representative has also attended a fire chiefs meeting on September 14, 2021 to make sure there were no issues with the service they are providing and the response in emergent situations.

This action item was removed from the current plan as much progress has been made in this category in recent years.

Action Item #8: Caro Water Detention

The 2016 Hazard Mitigation Plan states the following for this action: “In order to prevent future damage from this recurring hazard, it must be attacked at the source. To prevent water from flowing down from the high area to the northwest of the City of Caro, a series of retention ponds and flow constrictors should be built. These modifications to the land will help store the excess flows of water that cause flooding in Caro until the water has had time to dissipate.

Since the 2016 plan, Caro Community Schools have added three new retention ponds while doing major renovation and building improvements to the school buildings and property along Hooper St. These new ponds have significantly reduced the threat of flooding in this section of the City of Caro.

Because of the work completed above, this action item was removed from the current plan.

Action Item #9: National Flood Insurance Program

In the previous 2016 plan, the Action for this item states: Joining FEMA’s National Flood Insurance Program can solve both of these problems. Besides acting as a financial insurance program in the event of a real flooding disaster in insured communities, the NFIP provides the additional benefit of automatic federal flood mapping for all areas that participate in the program. Up-to-date maps of floodplains and other affected areas are invaluable in planning for floods. In particular, they allow a community to identify which structures are at risk.

Since the last Hazard Mitigation Plan update, it appears that Gilford Township is now in the process of joining the National Flood Insurance Program. With Gilford Township potentially

joining, Tuscola County now has 14 townships participating in the NFPI. Those who are non-participants, have either very little or no areas prone to flooding.

This action item was retained in the current plan.

Action Item #10: Hazard Preparedness Newsletter

In the 2016 Hazard Mitigation Plan, the Action item for this topic stated the following: “No matter how many hazard preparedness services a community offers to its residents, the preparation is mostly useless if residents remain unaware of available services. Even today, lack of awareness is a problem in Tuscola County as current hazard mitigation services are underutilized. If the county is going to invest substantial resources in some of the projects described in this plan, residents must be aware of their availability.

Since the 2016 plan was written, much consideration was given to this topic by the All Hazards Group. With so many social media platforms present, the group felt that using social media was a better mechanism in reaching the citizens of this county. Preparedness information is pushed out by the Sheriff’s Office, the Health Department and several of the partner agencies as a way to increase awareness to the citizens.

Because of the reasons listed above, this action item was removed from the current plan.

Action Item #11: Hazard Pamphlets

In the 2016 Hazard Mitigation Plan, the action for this topic stated the following: “The best way to passively provide this information to a large number of residents at various county functions is to prepare a pamphlet about personal and family hazard preparedness. The pamphlet will be distributed to doctor’s offices, churches, civic organizations, and other important bodies within the county who can in turn offer the pamphlet to their members at their already planned functions.

Since the 2016 edition of this plan, feelings similar to the Hazard Preparedness Newsletter were felt in dealing with hazard pamphlets. Groups and organizations felt that the use of social media was a better platform and was capable of reaching more people than using printed pamphlets.

Because of the increased use of social media, this action item was removed from the current plan.

In addition, the 2016 plan had identified a goal of integrating hazard mitigation concepts into local master plans. The following progress was noted within Tuscola County:

- Denmark Township's 2017-2021 master plan update included a consideration of flood hazards.
- Fremont Township's 2020-2040 master plan update included consideration for flooding and referenced the Hazard Mitigation Plan
- Indianfield Township's 2020-2025 master plan update included consideration for flooding, airport & traffic accidents, and training
- Millington Township's 2019 master plan update included considerations for flooding and fires.
- Village of Millington's 2021-2041 Master Plan update included consideration for flooding and erosion control.

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Chapter 9: Implementation, Maintenance & Integration

Implementation:

Many of the recommended mitigation strategies are outside of the County's specific jurisdiction, and are strategies for each local unit of government to facilitate or implement. However, the County should, through its Planning Commission and Local Emergency Planning Committee, promote responsible decisions and assist with coordination of projects by the local units of government. Under amendments to the Michigan Planning Enabling Act, the County Planning Commission must review local plans. The review should consider:

- Consistency with County Plans.
- Validity of comments received at local public hearings on the plan and the unit of government's response to those comments.
- Degree of consistency with the plans of adjoining units of government. If inconsistencies exist, are they due to outdated plans of the adjoining unit? Is there some way to resolve the conflict? Which has the highest consistency with the County Plan?
- Consistency with other governmental agency plans.

The County's Emergency Manager and the All Hazards Team should work with local agencies and units of government to encourage them to undertake mitigation projects as well as those that prepare for response and recovery. On an ongoing basis, the Emergency Manager should monitor available grants and inform appropriate agencies of potential matches with mitigation strategies and projects identified in the plan.

Maintenance:

In an effort to ensure that the Tuscola County Hazard Mitigation Plan remains useful and current, the Office of Emergency Management, with the assistance of the local all hazards team, will update the Plan contents as needed. At least once each year, the Plan will be reviewed by the All Hazards Team to determine if additional changes need to be made.

The All Hazards Team will also be called upon to conduct a formal review and update of the Plan at least every five years. The team will monitor and evaluate any changes to all aspects of this Plan, particularly in the areas where there were hazard events in the next five years. Mitigation options and opportunities will also be reviewed and updated as the natural and man-made hazards and social climate evolves..

The Plan is intended to be a fluid document, meaning one that is used regularly and is able to be changed to reflect current needs. Many items listed in the Plan are intended to be carried out through existing programs where funding and staffing permit. Priorities may change over time as will the proposed implementation strategies.

Continued public involvement will be encouraged by making the Plan available on the County's website and by other means such as social media, emails, and making copies of the Plan available at local libraries.

Integration:

Tuscola County, and all of the local units of government should consider integrating information contained in this plan into their comprehensive and operations plans. When jurisdictions update their master plans and zoning ordinances, they shall consider incorporating appropriate hazard mitigation information. All communities will be encouraged to adopt zoning regulations to minimize hazard effects.

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Appendix 1

Meeting and Contact Log for Hazard Mitigation Update

Date	Time	Location	Meeting	Topic	Present
09/15/2020	1900 hrs	Caro Fire	Tuscola County Fire Chiefs Association	Hazard Mitigation plan update- assistance needed	See list in Appendix #2
09/25/2020	1100 hrs	Darbee Park	All Hazards	Hazard Mitigation Plan kick off meeting	See list in Appendix #2
11/10/2020	1603 hrs	Email correspondence		Email to City of Vassar Officials about updating the City of Vassar Flood Mitigation Plan	See list in Appendix #2
02/19/2021	0936 hrs	Email correspondence		Email to City of Vassar Officials about updating the City of Vassar Flood Mitigation Plan	See list in Appendix #2
03/10/2021	0830	Tuscola County Fairgrounds-Midway Building	All Hazards	Hazard Mitigation Plan update and survey request	See list in Appendix #2
03/10/2021	1430 hrs	Denmark Twp Hall	Meeting with supervisor	Review Hazard Mitigation Plan and potential projects for Twp	Supervisor Chuck Heinlein
03/17/2021	1100 hrs	Cass City Municipal Building	Meeting with administrators	Review Hazard Mitigation Plan & possible updates	Police Chief Craig Haynes & City Manager Debbie Powell
05/03/2021	1230 hrs	Phone call	Plan update about county dams	Plan update from Drain Commissioner's Office about dams in the county	Bob Mantey Drain Commissioner
05/03/2021	0915 hrs	Email correspondence		Email asking for Planning Commissions assistance with reviewing documents. Copy of plan attached	Lonnie Kester Tuscola County Planning Commission Chairperson
05/12/2021	0830 hrs	Tuscola County Fairgrounds-Midway Building	All Hazards	Hazard Mitigation Plan update and survey request	See list in Appendix #2
05/27/2021		Email correspondence & Document sharing		Proofread & review of draft plan	911 Director Sandra Nielsen
5/27/2021		Copy of draft plan for review		Proofread & review of draft	Kathy Pokorski

				plan	
7/12/2021		Copy of draft plan for review		Initial Review	Mike Sobocinski MSP-EMHSD
10/7/2021	1330 hrs	Phone Call		Discuss plan	Mike Sobocinski
10/28/21	1156 hrs	Copy of draft revisions plan for review		Revision Review	Mike Sobocinski
3/15/22	1300 hrs	Google Hangouts meeting		Plan review	Mike Sobocinski
3/29/22	1225 hrs	Email Correspondence		Local Units to pick "Action Item" from Chapter 7	See Appendix 12 & Table 38
4/7/22	1000 hrs	Facebook Post (Sheriff's Office Page)		Public Input and survey	See Appendix 11
4/7/22	1358 hrs	Facebook Post (Tuscola County, Michigan 911 Central Dispatch)		Public Input and survey	See Appendix 11
4/7/22	1400 hrs	Email correspondence		Partner agencies & surrounding counties	See Appendix 13
4/18/22	1324 hrs	Email Correspondence		Reminder for Local Units to pick "Action Item" from Chapter 7	See Appendix 12 & Table 38
4/25/22	0800	BOC Meeting Room	Committee of the Whole Meeting	Initial Hazard Mitigation Plan Presentation to BOC	BOC and guests
5/17/22	1300	Tuscola Twp Hall	Twp Board Meeting	Discuss plan and "Action Item"	Twp board and guests
6/10/22	0900	Google Hangouts meeting		Plan review	Mike Sobocinski

Appendix 2

Sign in Sheets and Meeting Minutes/Agendas for Hazard Mitigation Plan Update

Tuscola County All Hazard Meeting

9/25/2020

Almer Twp. Darbee Park

Name	Title	Agency
Mary Scigel	Nurse	McLaren Caro Region
Mark Jensen	Commiss	Tuscola Co
Roger Edwards	TC ARES/ARCS/ED/EO	ARES / ARCS
Robert Hite	Fire Chief	Marquette
Brady Heckroth	Caro FD	Chief
Douglas Young	Fairbourns FD	Chief
Brian McComb	MSP F/LT.	MSP
Anna Moran	LTC S&H aka	TCEM
Steve Anderson	EM	TCEM
Jay Tuckey		TCRC
Carol Langmaid	Chief Deputy Clerk	T.C. Clerk's Office
Mark Newine	EP Coordinator	Hills + Darbes
Mindy Zimark	HR/Admin Assistant	TBHS
Eric Sniderbach	Admin Director	STRMA
Ann Westover	admin transport	Caro schools
Rick Cox	maintenance	Caro schools
Melissa Holton	Safety Coordinator	Lighthouse Fire
Meridith Letine	Facility Administrator	DuVita
Sander Bills	Cert coordinator	CERT
Alan LAD	Sherriff	TCSO
Katie Alexander	EPC	TCHD



TUSCOLA COUNTY FIRE CHIEFS ASSOCIATION
MEETING MINUTES
SEPTEMBER 15, 2020

I. **CALL TO ORDER**-THE REGULAR MEETING WAS CALLED TO ORDER AT 7:02PM BY PRESIDENT DOUG YOUNG.

II. **ROLL CALL/MEETING ATTENDANCE:**

ACRON FIRE	X	REESE FIRE	X
CARO FIRE	X	RICHVILLE FIRE	X
CASS CITY FIRE	X	UNIONVILLE FIRE	X
FAIRGROVE FIRE	X	VASSAR FIRE	X
GAGETOWN FIRE	X	FOSTORIA FIRE	
KINGSTON FIRE	X	DISPATCH	X
MAYVILLE FIRE	X	TCSD/TCEM	X
MILLINGTON FIRE		MMR	X
MSP		DNR	

MINUTES OF PREVIOUS MEETING – SECRETARY/TREASURER NICK SAKON READ ALOUD THE MEETING MINUTES FROM THE REGULAR MEETING ON 3/11/2020. MOTION BY VASSAR, SECOND BY MAYVILLE TO ACCEPT THE MEETING MINUTES AS READ.

III. **TREASURER'S REPORT**-NO TREASURER'S REPORT WAS GIVEN; INFORMATION STILL NEEDS TO BE GATHERED FROM PREVIOUS SECRETARY/TREASURER.

IV. **PRESENTATIONS:**

A. ROBERT FROM MFISM PRESENTED ON ASSISTING THEIR AGENCY/COMPANY WITH LIFT ASSISTS OF BODIES IF THEY NEED TO TRANSPORT THEM. WOULD PREFER TO GET AN AGREEABLE AMOUNT FOR ALL AGENCIES WITHIN THE COUNTY. THE GROUP DISCUSSED AND DECIDED TO DO A TRIAL RUN OF A \$100 DONATION FROM MFISM PER ASSIST. WE WOULD ONLY NEED TO PROVIDE 2-3 GUYS TO ASSIST AND WOULD NOT NEED TO SEND AN ENGINE.

B. ROBIN FROM LIFE NET AIR AMBULANCE GAVE A PRESENTATION ON THEIR SERVICE AND ABILITIES. PLEASE CONTACT HER FOR A LANDING ZONE. IF THE CALL SOUNDS SERIOUS IN NATURE, PLEASE CONSIDER HAVING THEM SCRAMBLED RIGHT AWAY AND CANCEL IF NOT NEEDED. THEY HAVE A 10-MINUTE LIFT OFF WINDOW PLUS FLIGHT TIME TO OUR LOCATION.

V. OLD BUSINESS

- A. **MABAS-** STEVE/NICK GAVE AN UPDATE ON THE DEPLOYMENT TO MIDLAND COUNTY'S MABAS REQUEST. DISCUSSED THE AFTER-ACTION REPORT AND LOOKED AT THINGS THAT COULD BE IMPROVED. IT WAS DISCUSSED TO COME UP WITH APPROPRIATE DRESS ATTIRE FOR RESPONDING TO MABAS CALLS, ALONG WITH PROPER STAFFING AND EQUIPMENT BEING SENT. DISCUSSED THE CALIFORNIA NEMAC REQUEST THAT WAS DONE STATEWIDE. IN OCTOBER THERE WILL BE A TANKER TASK FORCE DRILL.
- B. **PAGERS ISSUES-** ANY ISSUES WITH PAGERS WERE DISCUSSED. IT WAS ALSO NOTED THAT IF DEPARTMENTS ARE EXPERIENCING PAGER ISSUES TO FIRST CONTACT YOUR IN-DEPARTMENT PAGER PERSON TO DIAGNOSE AND OR TAKE CARE OF. IF THAT DOES NOT WORK TO CONTACT SANDY/DIGICOM TO GET THINGS FIXED. IF NO ONE REPORTS ISSUES THEY CAN'T BE ADDRESSED. ALSO DISCUSSED THAT SOME ISSUES ARE JUST DUE TO THE NATURE OF THE EQUIPMENT AND SOME BUILDING CONSTRUCTION.
- C. **SETTING OF PAGERS FOR ACTIVE/FORMER FIREFIGHTER'S THAT HAVE PASSED AWAY.-** DISCUSSION WAS HAD ON THIS SUBJECT, SANDY PROVIDED SOME FEEDBACK ON CONCERNS OF PAGING THEM OVER THE VOICE PAGERS. VASSAR MADE A MOTION THAT WAS SECONDED BY CARO THAT IF A DEPARTMENT HAS A MEMBER OR FORMER MEMBER PASS AWAY THEIR CHIEF IS RESPONSIBLE TO GET AHOLD OF THE TCFA EXECUTIVE BOARD (DOUG, RANDY, NICK) TO SEND OUT AN EMAIL COMMUNICATION TO OUR EMAIL GROUP FOR THE FIRE CHIEFS, MOTION PASSED.
- D. **FIRE CHIEFS ASSOCIATION DUES-** DISCUSSION WAS HAD ON WHETHER PREVIOUS BILLINGS WERE SENT OUT FOR DUES. NO ONE PRESENT RECALLED GETTING AN INVOICE NOR THE SET AMOUNT THAT WAS DECIDED PREVIOUSLY. WILL NEED TO REVIEW PAST MEETING MINUTES TO FIND THAT OUT.

VI. NEW BUSINESS

- A. **FIRE CHIEFS BY -LAWS-**RANDY PROVIDED A DRAFT COPY OF OUR TCFA BYLAWS. IT WAS REVIEWED AS A GROUP WITH EDITS AND SUGGESTIONS NOTED BY RANDY TO PROVIDE BACK TO THE GROUP VIA EMAIL PRIOR TO THE NEXT MEETING. IT WAS DECIDED THAT IN ADDITION TO THE PRESIDENT, VICE PRESIDENT, AND SECRETARY/TREASURER POSITIONS THERE WILL BE 3 TRUSTEE POSITIONS.
- B. **FUTURE SOG-** ADDITIONS/EDITS WERE DISCUSSED. THOSE IDEAS WERE TO SET A COUNTY STANDARD ON IC VESTS SO THAT WHEN MULTIPLE CHIEFS ARE ON A SCENE THAT THE IC HAS A CLEARLY MARKED VEST TO INDICATE THAT THEY ARE THE IC OF THE SCENE. IT WAS ALSO DISCUSSED TO COME UP WITH A STANDARD FOR MARKING DOWN POWER LINES ON A FIRE SCENE. A SUGGESTION WAS MADE TO USE LIME/NEON YELLOW CONES TO MARK THE POWERLINE, SO IT STICKS OUT.

VII. REPORTS

- A. **TUSCOLA Co. SHERIFFS**
1. CURRENTLY SHORT 5 DEPUTIES
- B. **TUSCOLA Co. EMERGENCY SERVICES**
1. ERG BOOKS ARE IN, GET WITH STEVE TO GET YOURS

2. SHORE LINE FLOODING ISSUE HAS SLOWED DOWN
3. STEVE IS UPDATING THE EMERGENCY MANAGEMENT WEB PAGE.
4. MEGA MOVERS ARE IN, IF YOUR DEPARTMENT HAS NOT GOTTEN YOUR SEE STEVE.
5. BAY CO. ACTIVE SHOOTER TRAINING IS GOING TO BE HELD. IT WILL BE \$100 FOR ANY FIRE DEPARTMENT WISHING TO HAVE PERSONNEL ATTEND. STEVE WILL PROVIDE A DATE.
6. NEED TO SEND DEPARTMENT TRAINING SCHEDULES TO STEVE.
7. NIGHT OUT WAS CANCELLED
8. SCHOOL DRILL SCHEDULES HAVE BEEN POSTED TO SHARE FILES. CONTACT YOUR SCHOOLS ABOUT ABILITY TO ATTEND.
9. HAZARD MITIGATION PLAN DUE AUGUST 2021.
10. ONLINE ICS-300 CLASSES ARE ON THE MITRAIN WEBSITE.

C. TUSCOLA Co. CENTRAL DISPATCH

1. 2 EMPLOYEES IN TRAINING, NEED TO HIRE 2 MORE.
2. CAD SYSTEM HAS BEEN SELECTED, KICK OFF MEETING FOR SANDY WILL BE NEXT TUESDAY. NO SET TIMELINE BUT HOPES TO HAVE IT IN PLACE 1- QUARTER OF 2021.

D. TUSCOLA Co. FIRE INSTRUCTORS

1. FIRE ACADEMY TO START 10/21/2020

E. TUSCOLA Co. FIRE FIGHTERS ASSOCIATION

1. NO MEETING SINCE MARCH, AND OCTOBER MEETING WAS CANCELLED AS WELL.

F. DISPATCH AUTHORITY BOARD

1. MEETING TODAY, APPROVED FY21 BUDGET, AND DISCUSSED CAD IN FURTHER DETAIL.

G. MMR

1. MFR CLASS SCHEDULED TO START 1/4/21 AND END 3/24/21 AT VASSAR AMBULANCE BASE. WILL BE MONDAY/WEDNESDAY NIGHT'S 6-10PM.

H. MICHIGAN STATE POLICE-NOT PRESENT

I. DNR-NOT PRESENT

VIII. ADJOURNMENT- REESE MOVED TO ADJOURN THE MEETING, VASSAR. 2- THE MOTION, MOTION PASSED, MEETING ADJOURNED AT 8:55PM.

Next Meeting - Nov. 10, 2020



Tuscola County

Steve Anderson <sanderson@tuscolacounty.org>

City of Vassar Flood Mitigation Plan

0 messages

Steve Anderson <toemanderson@tuscolacounty.org> Tue, Nov 10, 2020 at 4:03 PM
To: Andrew Niedzinski <citymanager@cityofvassar.org>, Ben Guile <bguile@cityofvassar.org>, Gary Millerov <garyshmill@sboglobal.net>

Gentleman,

What are the chances of going through and updating the Vass Flood Mitigation Plan? The original plan was completed in 1998 and I don't believe that it has been updated since. I have typed the document as a Google Docs as the original was only a paper copy that I know of. Areas that I am unsure of are marked in yellow or green.

If you read the original city resolution it is supposed to be updated yearly and I believe it was a requirement for the FEMA flood mitigation work as well...

In the most recent hazard mitigation plan updating this plan was one of the goals...

Steve



—
Deputy Steven Anderson
Emergency Services Coordinator
420 Court St. Suite #1
Caro, MI 48723
Office # 989-673-5181
Cell # 989-450-0147
Fax # 989-673-8164

CONFIDENTIALITY WARNING: This email may contain confidential or proprietary business information and is for the sole use of the intended recipient(s). Any unauthorized use or disclosure of this communication, including attachments, is strictly prohibited. If you believe that you have received this email in error, please notify the sender immediately and delete it from your system.

Steve Anderson <toemanderson@tuscolacounty.org>

Fri, Feb 19, 2021 at 9:36 AM

To: Andrew Niedzinski <citymanager@cityofvassar.org>, Ben Guile <bguile@cityofvassar.org>, Gary Millerov <garyshmill@sbcglobal.net>, Ted Gamet <tedfire01@hotmail.com>, cmiller@cityofvassar.org

Cc: Robert Mantey <rmantey@tuscolacounty.org>

Gentlemen,

I am asking for your assistance on this plan. I just need you (the City) to review the data and answer the areas that I don't have an answer for that are highlighted in yellow. Once that is done, it should be taken before your city council for approval as an update to the original plan that was adopted by your city council on September 21, 1998 to coincide with the large hazard mitigation project that was completed in the city to alleviate flooding along the Cass River.

Again, I would like to include this plan in the Tuscola County Hazard Mitigation Plan that I am currently re-writing and hope to have done this fall...

If you have any questions please let me know.

Here is the link to the draft plan:

City of Vassar Flood Mitigation Plan.

Steve
[Quoted text hidden]

Mail Delivery Subsystem <mailer-daemon@googlemail.com>

Fri, Feb 19, 2021 at 11:59 AM

To: sanderson@tuscolacounty.org



Address not found

Your message wasn't delivered to cmiller@cityofvassar.org because the address couldn't be found, or is unable to receive mail.

Robert Mantey <mantey@tuscolacounty.org>

Fri, Feb 19, 2021 at 3:49 PM

To: Steve Anderson <tcemanderson@tuscolacounty.org>

Cc: Andrew Niedzinski <citymanager@cityofvassar.org>, Ben Guile <bguile@cityofvassar.org>, Gary Millerov <garyshmill@sbcglobal.net>, Ted Gamet <tedfire01@hotmail.com>, cmiller@cityofvassar.org

Steve

With the flood control project that I think was done in 2006 we came up with a plan for maintenance to the existing structures, berms, detention areas etc. to keep them operational. I also think there are some protocols to go along with them. I have been meaning to approach the city council to discuss any questions or concerns they may have. We have been very fortunate to not have much significant flooding since 2009 when a flood stage of number 10 on record was reached.

I have more data to show when the record stages occurred at the m15 bridge. I see Mr Miller is cc'd and he has

significant knowledge on everything.

I will also send this off to the engineer that was involved with the 2006 project for his input.

What time frame are we working with?

Bob

Sent from my iPhone

[Quoted text hidden]

Steve Anderson <tcemanderson@tuscolacounty.org>

Fri, Feb 19, 2021 at 3:56 PM

To: Robert Mantey <mantey@tuscolacounty.org>

The email to Miller bounced back. I originally sent this in November but never got any response. So I sent again and CC'd you.

Part of that original FEMA hazard mitigation grant for the whole flood mitigation project was to maintain a current plan.

We have until fall. My plan would be to attach this

As an attachment to the county hazard mitigation plan...

[Quoted text hidden]

[Quoted text hidden]

Robert Mantey <mantey@tuscolacounty.org>
To: Steve Anderson <tcemanderson@tuscolacounty.org>

Wed, Mar 3, 2021 at 10:00 PM

Cc: Andrew Niedzinski <citymanager@cityofvassar.org>, Ben Guile <bguile@cityofvassar.org>, Gary Millerov <garyshmill@sbcglobal.net>, Ted Gamet <tedfire01@hotmail.com>, Dara Hood <dhood@tuscolacounty.org>, Alecia Little <alittle@tuscolacounty.org>, Mike Quaine <mquaine@bmjinc.com>

Steve and Andrew,

I have enclosed some corrections of a portion of the City of Vassar Mitigation plan that will correct information pertaining to the Drain office. Reasons are explained by each of these. This was supplied by the project engineer, Mike Quaine, on the 2004/05 flood control project done then. I have also cc'd Mike Quaine of BMJ engineers if anyone has any further questions. There are many items that need to be updated by the City of Vassar and I think this information will assist in them updating this plan. There are several attachments with this email that may also help.

Bob Mantey
Tuscola County Drain Commissioner

From Mike Quaine:
In reviewing the City of Vassar Flood Mitigation Plan I find some items that should be clarified.

- 1.The current Flood insurance Study (FIS) and Flood Insurance Rate Map (FIRM) appear to be 2012 now.
- 2.Section 1.2.3 Enforce existing Drain easement regulations, up and downstream states that "The Michigan Drain Code requires a "set-back" from the actual Moore Drain channel." There is no such provision of the code. Setbacks from the drain are voluntary only.
 - a.That same section goes on to state under Potential Sources of Financial Assistance: "None necessary. Use Drain Commission operating expenses and/or assess violators forcosts of corrective action."
- No operating expenses are provided for the drain unless the Drainage District is assessed for costs.
- 3.Maintenance of the flood protection works built in 2004-05 are subject to an agreement between the Drainage District and the City of Vassar that is attached.

Note that the 1948 and 1988 flooding events would have overtopped the present berm elevation which is, at its lowest 631.1

Also, the Cass River Dam, downstream of M-15, was removed recently, which improves the river flooding recession rate. I am not aware of any analysis of that modification, but removal of the dam downstream of the berms should be an improvement. In all, the flood protection works intent was a cost effective approach that did not seek to prevent all

possible flood events, but lessen the impact and duration of any flooding experienced in Vassar. Flood proofing and elimination of flood prone structures therefore remain a necessary component of your mitigation plan.

The attached resources may serve to clarify further issues and assist in the process of updating your plan.

Michael W. Quaine, P.E.
Senior Project Engineer
mquaine@bmjinc.com
BMJ Engineers and Surveyors, Inc.
519 Huron Avenue
Port Huron, MI 48060
Ph: (810) 984-5596
Fax: (810) 984-8760

[Quoted text hidden]

—
Robert J. Mantey
Tuscola County Drain Commissioner
125 W. Lincoln Street Suite 100
Caro, MI 48723
Office: 989-872-3820
Cell: 989-553-3824
Fax: 989-873-3497

6 attachments

All Hazards Planning Committee Meeting
 March 10th, 2021
 Tuscola County Fairgrounds

NAME	Agency
Douglas Young	Fairgrove F.D.
Robert Hüter 96.8	Maquillo Fire Dept
PHIL PETZOLD	MMR
Josh Dord	Richville Fire
Roger Edwards	TP HRES RACES
Jenny McDonald	Tuscola County Medical cor
Randy Heckroth	Caro Fire
Jodi Fitting	County Clerk
Douglas DuRussel	County Commissioner
Bobacker	Madelinee Cross City
Roger East	Tuscola Rd comm
Eric Snider	TCSD
ERIC SNIDERSIAT	STMCA
Sandra Bills	CERT
Hattie Tennant	TCAD

March 10, 2021 All Hazards Agenda Topic:

- Tuscola County Hazard Mitigation Plan Update
 - Current plan expires August 11, 2021 (need to be updated every 5 years)
 - Have sent out several surveys gathering information for the update. Thanks to those who have been completing them.
 - Have the "draft" plan about halfway completed.
 - Trying to make the information in the plan more useful and easier to understand.

March 10, 2021 All Hazards Minutes specific to Hazard Mitigation Plan:

Tuscola County Hazard Mitigation Plan Update -

- Current plan expires August 11, 2021 (need to be updated every 5 years)
 - Have sent out several surveys gathering information for the update. Thanks to those who have been completing them.

All Hazards

4

3/10/2021

Tuscola County All Hazard Meeting
 May 12, 2021
 Tuscola County Fairgrounds Midway Building

Name	Title	Agency
Andrew	Eng	TC
Kristen Munt	ERC	TCHD
Robert Hites	Chief	Mayville Fire
Randy Heckroth	Chief	Geno Fire
Randy Heckroth	TE ARES/Resp ECRP	
Phil Petzold	ops MGR	MMR
Bob Backe	Man. Director	med. logging (Pass City)
Jimmy McDaniel	Life Safety Officer	TCMCF
JAY TUCKEY		TCRC
RANDY TFAU	MFSM Director	MFSM
Glen Skrot	Sherriff	TCSD
Jodi Fetting	County Clerk	Tuscola
BRIAN McComb	FILT	MSP
ERIC SMYBERSCH	mgr	STMCA
Robert Lorenzini	mgr	STMCA

First name	Last name	Email	Duration	Time joined	Time exited
Steve	Anderson	sanderson@tuscolacounty.org	35 min	8:22 AM	8:57 AM
Doug	DuRussel	ddur*****@** *.com	31 min	8:26 AM	8:57 AM
Melissa	Hobson	mike*****@** *.com	35 min	8:22 AM	8:57 AM
Dana	Newwine	12ne*****@** .com	2 min	8:36 AM	8:36 AM
Sandra	Nielsen	snielsen@tuscolacounty.org	29 min	8:29 AM	8:57 AM
Mary	Solgel	mary*****@** .com	22 min	8:34 AM	8:56 AM
Mark Newwine			17 min	8:40 AM	8:57 AM
Mindy Zmierski			31 min	8:27 AM	8:57 AM



MINUTES

Committee of the Whole Meeting

8:00 AM - Monday, April 25, 2022
H.H. Purdy Building Board Room, 125 W. Lincoln St., Caro, MI 48723

Commissioner Bardwell called the regular meeting of the Committee of the Whole of the County of Tuscola, Michigan, held at the H.H. Purdy Building Board Room, 125 W. Lincoln St., Caro, MI 48723, on Monday, April 25, 2022, to order at 8:00 AM local time.

Roll Call - Clerk Fetting

Commissioners Present In-Person: Thomas Young, Thomas Bardwell, Kim Vaughan, Doug DuRussel, Dan Grimshaw

Commissioners Absent: None

Others Present In-Person: Clerk Jodi Fetting, Tracy Violet, Clayette Zechmeister, Mike Miller, Steve Anderson, Mike Tuckey, Nancy Barrios, Deb Cook, Amanda Ertman, Brent Dankert, Will Green, Keith Kosik

Also Present Virtual: Jon Ramirez, Cody Horton, Eean Lee, Jeremy Bouvrette, Renee Francisco, Don Derryberry, Steve Root, Mark Haney, Heather Thomas-Verhaeghe, Debbie Babich, Mary Drier, Treasurer Ashley Bennett, Matt Brown, Barry Lapp, Cindy Hughes, Alicia Miller, Kim Brinkman, Mark Ransford, Robert McKay, Pam Shook, Pat Mecham, Mary Hamlin, Jill Schmidt, Janie Hemerline, Brian Harris, Angie Daniels, Elizabeth Shook, Kristi Phipps, Bob Baxter, Heather Walther, Karen Haire, Brenda Peters

At 8:02 a.m., there were a total of 20 participants attending the meeting virtually.

County Updates

None

New Business

1. Health Department 2021 Audit Presentation - Heather Thomas-Verhaeghe with Gardner, Provenzano, Thomas & Luplow P.C. reviewed the 2021 Audit for the Tuscola County Health Department. Matter to be placed on the Consent Agenda.
2. Road Commission Millage and Projected Projects - Mike Tuckey, Will Green and Brent Dankert presented to the Board regarding the Primary Roads and Street Improvement Proposal, the Bridge and Street Improvement

Renewal Proposal and the road at Vanderbilt Park. Proposals to be placed on Thursday's agenda. Vanderbilt Park to be reported back to the Board by Brent Dankert for further clarification at a future meeting.

Brent Dankert updated the Board regarding the fiber optic project by Thumb Electric and that the project is moving forward.

3. Proposed Resolution Proclaiming the Month of May Motorcycle Awareness Month - Jeremy Bouvrette, ABATE of Michigan Regional Legislative Officer, explained the request for the adoption of the Resolution. Matter to be placed on Thursday's Agenda.
4. Hazard Mitigation Plan - Steve Anderson, Emergency Services Director, reviewed the Proposed Plan which will need adopted after approval by FEMA.
5. Jail Stove Bids - Mike Miller, Building and Grounds Director, opened the bids received for the project.

Elliott Food Equipment, Lansing, Michigan - \$17,707.00
Douglas Equipment, Bloomfield, West Virginia - \$15,240.00
Stafford Smith, Bay City, Michigan - \$22,620.00

Board to award project to Douglas Equipment as the low bidder. Matter to be placed on the Consent Agenda.

Old Business

1. Potential Annex Addition Review - Keith Kosik, TSSF Architects, reviewed the site and floor plan for a possible addition on the Annex Building for County Space needs. An estimate cost projected for moving in this direction is \$2.5 million.

Recessed at 10:25 a.m.

Reconvened at 10:36 a.m.

At 10:36 a.m., there were a total of 27 participants attending the meeting virtually.

2. American Rescue Plan Act (ARPA) List of Projects, Provision of Government Services Details Potential Action - Clayette Zechmeister reviewed potential projects that were submitted by the local jurisdictions and county departments. Board discussed.
3. Board Rules of Order Discussion on Potential Amendments - Board discussed adding an item in Section 6. Conduct of Meetings to limit presentations to the Board to 15 minutes unless the Board grants additional time. Clayette Zechmeister will prepare proposed language and present back to the Board for review and approval.

**UNAPPROVED MINUTES OF THE TUSCOLA TOWNSHIP BOARD OF
TRUSTEES REGULAR BOARD MEETING HELD ON MAY 17TH, 2022 AT
1:00 P.M.**

Trustees present: Hicks, Fackler, Verbeek, Rodammer

Guests: 10

Rodammer made a motion to approve the agenda. Verbeek seconded. Carried.

Verbeek made a motion to approve the minutes from the April 19th meeting.

Rodammer seconded. Carried.

Barber arrived at 1:20

Residents from Main St. were present to discuss their concerns with how long it is taking for the drainage project on Main St. to be completed.

Ken Lind was present from EMC to discuss the insurance renewal.

Steve Anderson was present to discuss the Hazard Mitigation Plan for the County.

Appendix 3

Participant list for Priority Assessment for Risks in Tuscola County Survey, Survey #1

Natural Risks

Participant list for Priority Assessment for Risks in Tuscola County Survey, Survey #1, dealing with Natural Risks.

Name	Title	Agency/Company
Adam Prill		McLaren Caro Region
Brian Mattheis	Supervisor	Mobile Medical Response
Brian McComb	Lieutenant	Michigan State Police
Dan Lisowski	Sergeant	Tuscola County Sheriff's Office
Eric Snidersich	Assistant Director	Saginaw-Tuscola Medical Control Authority
Glen Skrent	Sheriff	Tuscola County Sheriff's Office
Jay Tuckey	Superintendent/Manager	Tuscola County Road Commission
Jodi Fetting	County Clerk	Tuscola County Clerk's Office
Josh Doud	Captain	Richville Fire Department
Kathy Pokorski	retired	Tuscola County Health Department
Mary Scigel		McLaren Caro Region
Melissa Hobson	Safety Coordinator	Lighthouse Rehabilitation
Mike Evans	President	Tuscola County Fire Fighters Association (Reese Fire/Rescue)
Mike Kemp	Deputy	Tuscola County Sheriff's Office
Mike Kennedy	Deputy	Tuscola County Sheriff's Office (Elkland Twp Fire Dept)
Mindy Zmierski	HR/Administrative Assistant	Tuscola Behavioral Health Systems
Myles Breinager	Deputy	Tuscola County Sheriff's Office (Millington/Arbela Township Fire Dept)
Nathan Licht	Sergeant	Tuscola County Sheriff's Office (Winsor Twp Fire Dept-Huron County)
Phil Petzold	Operations Manager	Mobile Medical Response
Randy Heckroth	Chief	Caro Fire Department
Robert Baxter	Undersheriff	Tuscola County Sheriff's Office
Rodney Friday	Deputy	Tuscola County Sheriff's Office (Marlette Fire Dept-Sanilac County)
Sandra Nielsen	Director	Tuscola County Central Dispatch
Steve Anderson	Emergency Manager	Tuscola County Sheriff's Office

Survey was sent to all members of the All Hazards Team, plus a few additional community members seeking their input on natural hazards in Tuscola County.. In all, the survey was completed by 25 members, with 53 failing to complete the survey.

Appendix 4

Responses for Priority Assessment for Risks in Tuscola County Survey, Survey #1

Natural Risks

In an effort to continue toward the goal of completing the updated Hazard Mitigation Plan during Covid, I am asking for the county's All Hazards group to complete the following survey. I am looking to get everyone's opinion on what you believe is the biggest risk/threat to the county.

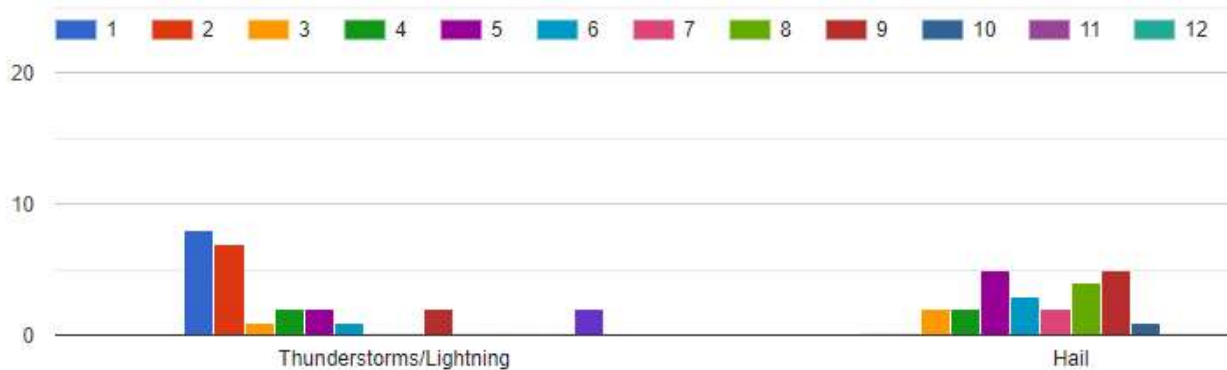
I have broken down the potential hazards down into three main categories: Natural Hazards, Technical Hazards and Adversarial/Human Related Hazards.

This assessment is for the Natural Hazards only, additional surveys will come out later for Technical Hazards and the Adversarial/Human Related Hazards.

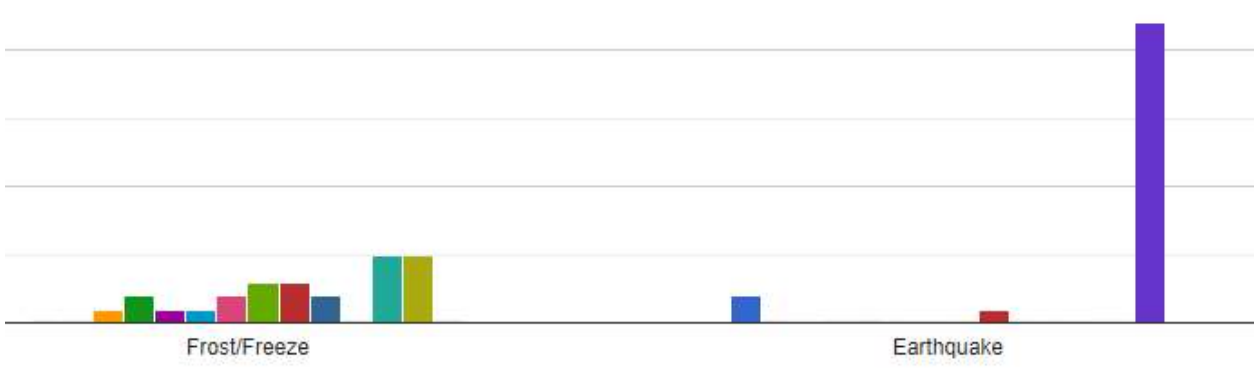
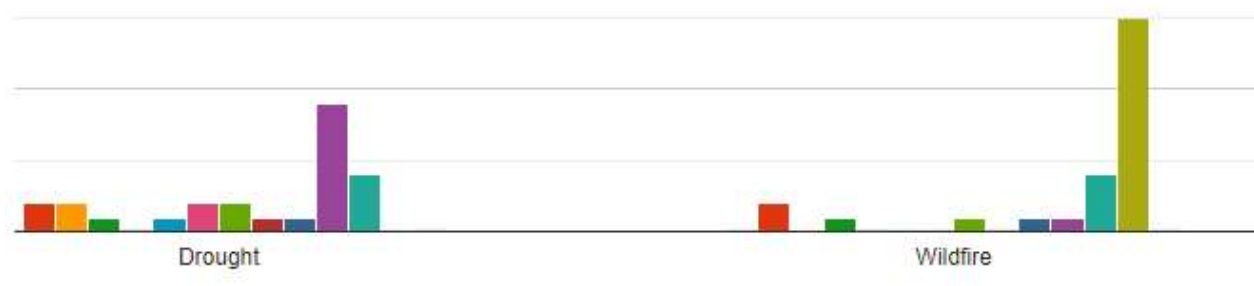
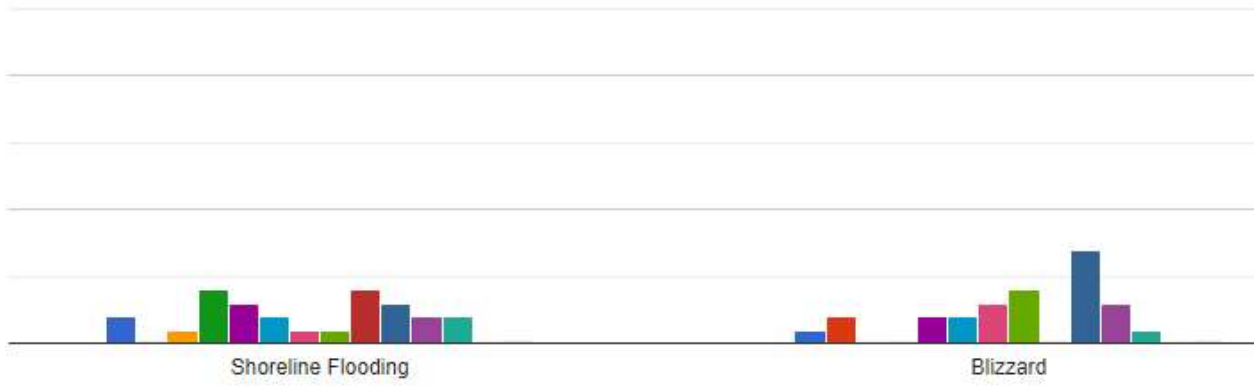
While completing this survey, do not consider the Natural Hazard risk in just the last year but think back over the last 10 to 20 years as you answer the questions.

Question 1:

Natural Hazards: the following Natural Hazards are the most frequently occurring hazards in the county. Please rank the following 14 hazards 1 through 14, with 1 being the greatest threat/most frequent occurring to the county and 14 as the smallest threat/least occurring hazard. (Please use numbers only once)

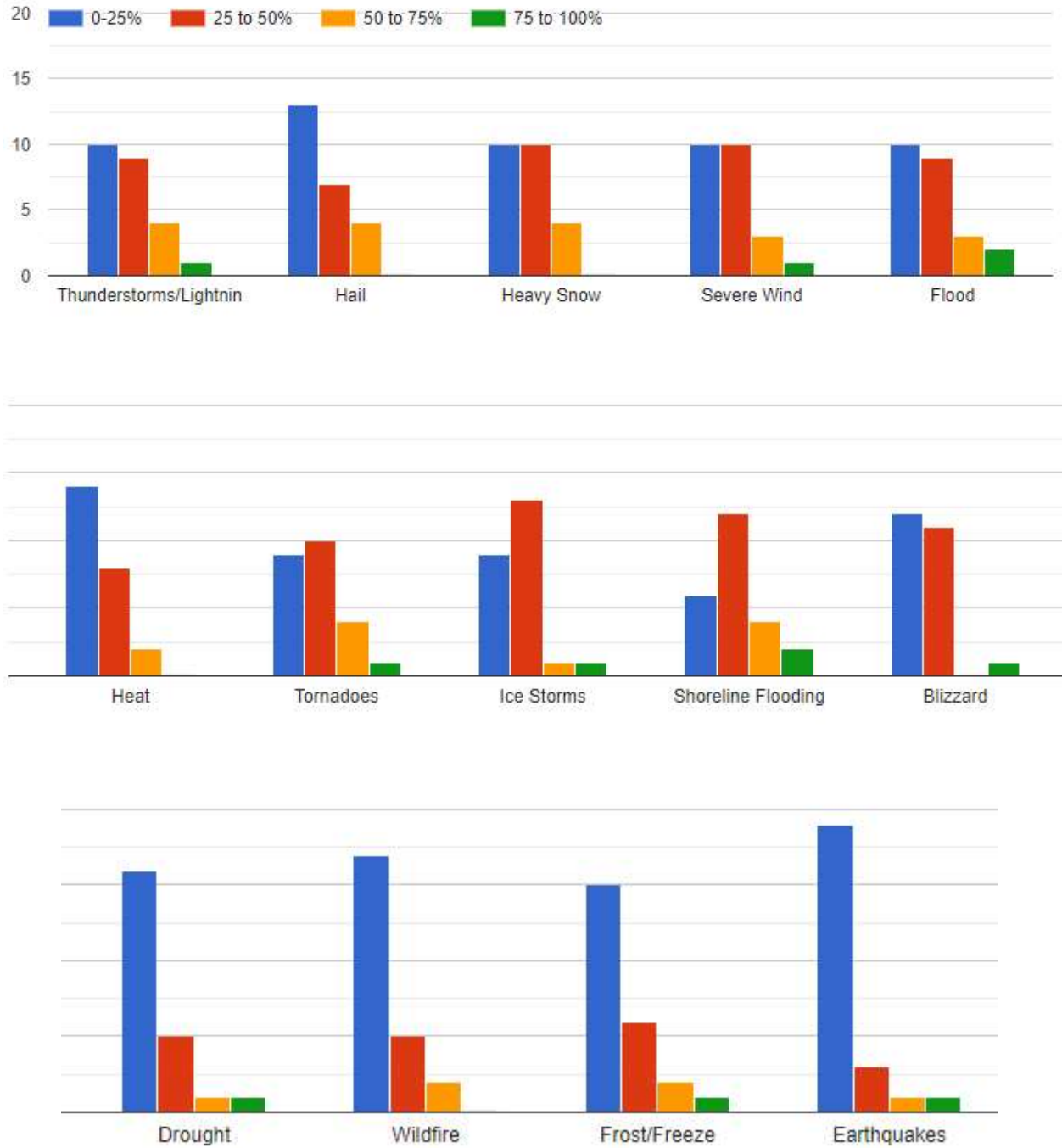






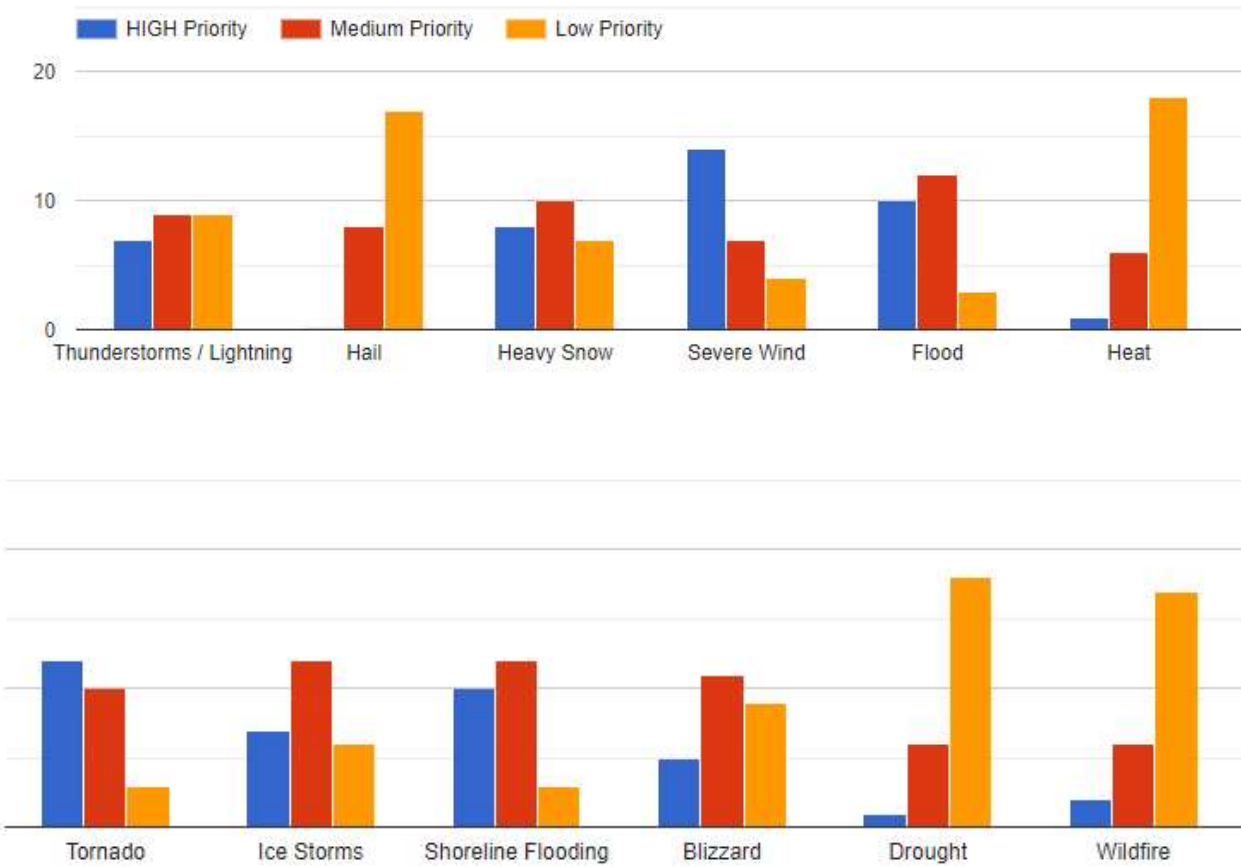
Question 2:

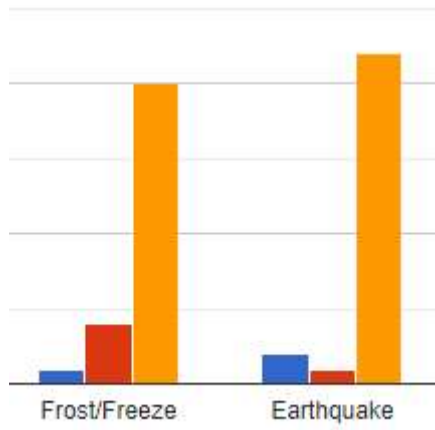
In your opinion, please rank each Natural Hazard on how vulnerable Tuscola County is to each using the chart above.



Question 3:

Looking at the same 14 Natural Hazards, please rank them as to what priority we as a county should attempt to mitigate their effects. Consider "HIGH" as being a top priority and "LOW" as least priority.





Appendix 5

Participant list for Priority Assessment for Risks in Tuscola County Survey, Survey #2

Technical Hazards/Adversarial-Human Related Hazards

Participant list for Priority Assessment for Risks in Tuscola County Survey, Survey #2, dealing with Technical Hazards and Adversarial/Human Related Hazards.

Name	Title	Agency/Company
Adam Prill		McLaren Caro Region
Brian Mattheis	Supervisor	Mobile Medical Response
Cayrl Langmaid	Deputy Clerk	Tuscola Clerk's Office
Dan Lisowski	Sergeant	Tuscola County Sheriff's Office
Ann Hepfer	Health Officer	Tuscola/Huron County Health Departments
Glen Skrent	Sheriff	Tuscola County Sheriff's Office
Charles Barker	Lieutenant	Michigan State Police-Emergency Management and Homeland Security Division
Jodi Fetting	County Clerk	Tuscola County Clerk's Office
Doug DuRussel	County Commissioner	Tuscola County Board of Commissioners
Kathy Pokorski	retired	Tuscola County Health Department
Jimmy McDaniel	Life Safety Officer	Tuscola County Medical Care Community
Dale Churchill		Red Cross Disaster Services
Roger Edwards		RACES/ARES
Phil Petzold	Operations Manager	Mobile Medical Response
Randy Heckroth	Chief	Caro Fire Department
Robert Baxter	Undersheriff	Tuscola County Sheriff's Office
Rodney Friday	Deputy	Tuscola County Sheriff's Office (Marlette Fire Dept-Sanilac County)
Sandra Nielsen	Director	Tuscola County Central Dispatch
Steve Anderson	Emergency Manager	Tuscola County Sheriff's Office

Survey was sent to all members of the All Hazards Team, plus a few additional community members seeking their input on natural hazards in Tuscola County.. In all, the survey was completed by 35 members (health department members who completed the survey all had the same return address), with 56 failing to complete the survey.

Appendix 6

Responses for Priority Assessment for Risks in Tuscola County Survey, Survey #2

Technical Hazards/Adversarial-Human Related Hazards

In an effort to continue toward the goal of completing the updated Hazard Mitigation Plan during Covid, I am asking for the county's All Hazards group to complete the following survey. I am looking to get everyone's opinion on what you believe is the biggest risk/threat to the county.

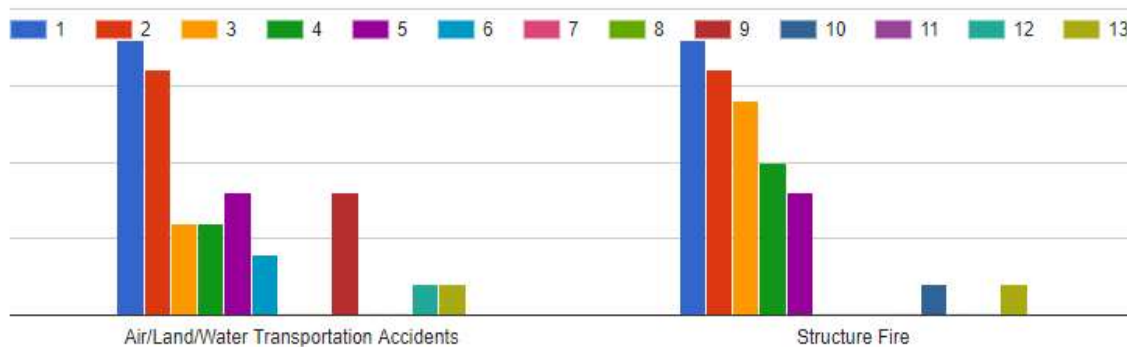
I have broken down the potential hazards down into three main categories: Natural Hazards, Technical Hazards and Adversarial/Human Related Hazards.

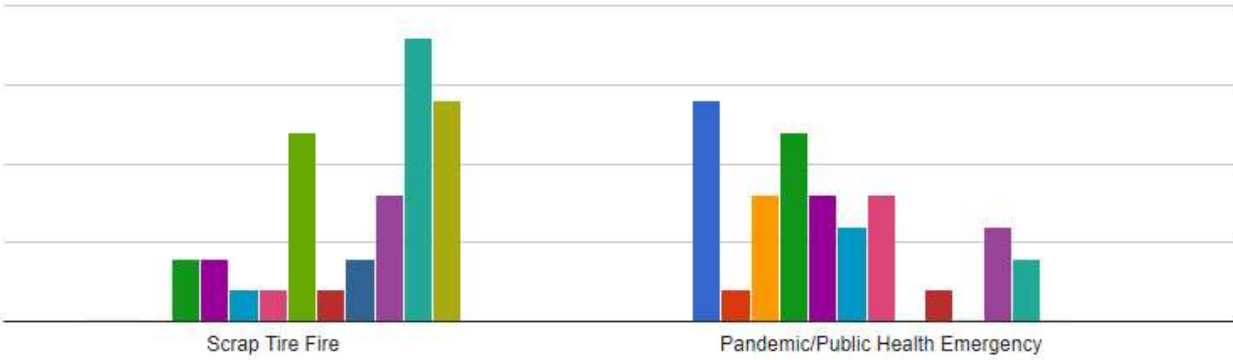
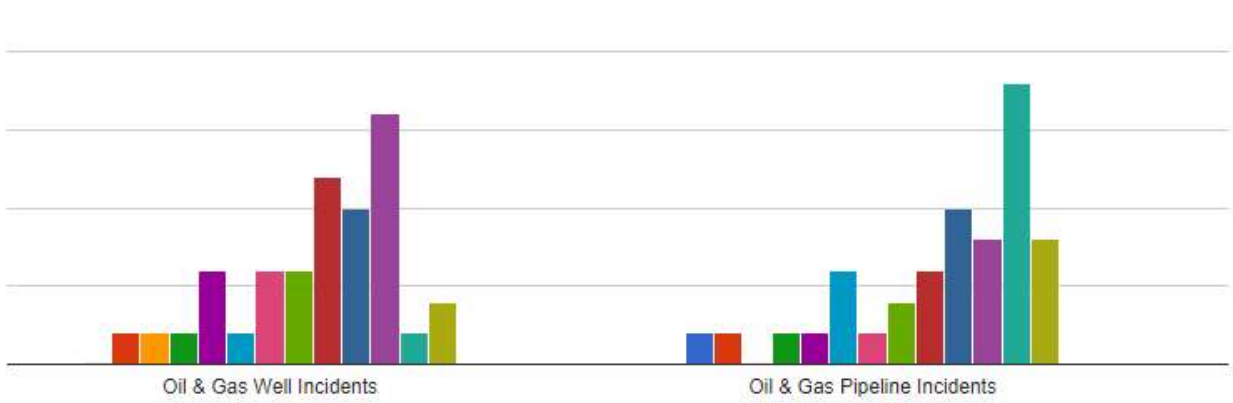
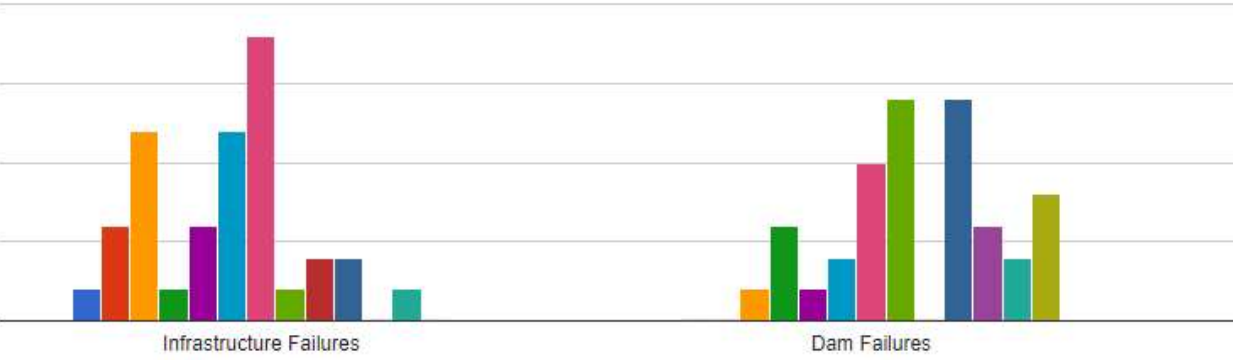
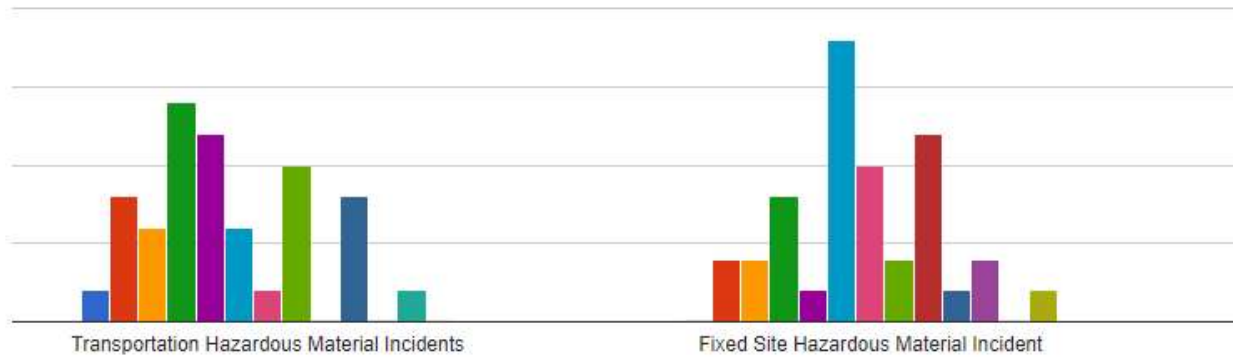
This assessment is for the Technical & Adversarial/Human Related Hazards only.

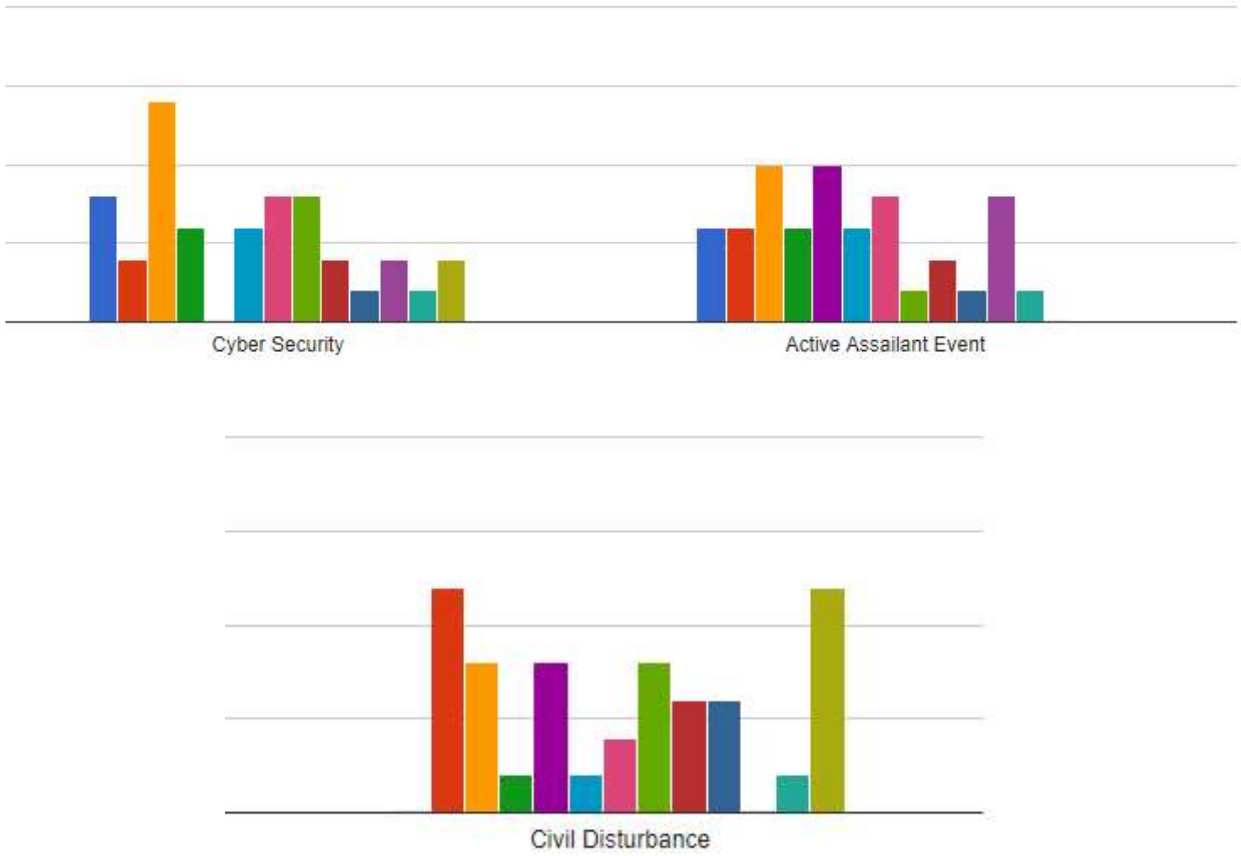
While completing this survey, do not consider the Natural Hazard risk in just the last year but think back over the last 10 to 20 years as you answer the questions.

Question 1:

Natural Hazards: the following Technical & Adversarial/Human Related Hazards that are the most frequently occurring or potential hazards to occur in the county. Please rank the following 13 hazards 1 through 13, with 1 being the greatest threat/most frequent occurring to the county and 13 as the smallest threat/least occurring hazard. (Please use numbers only once)

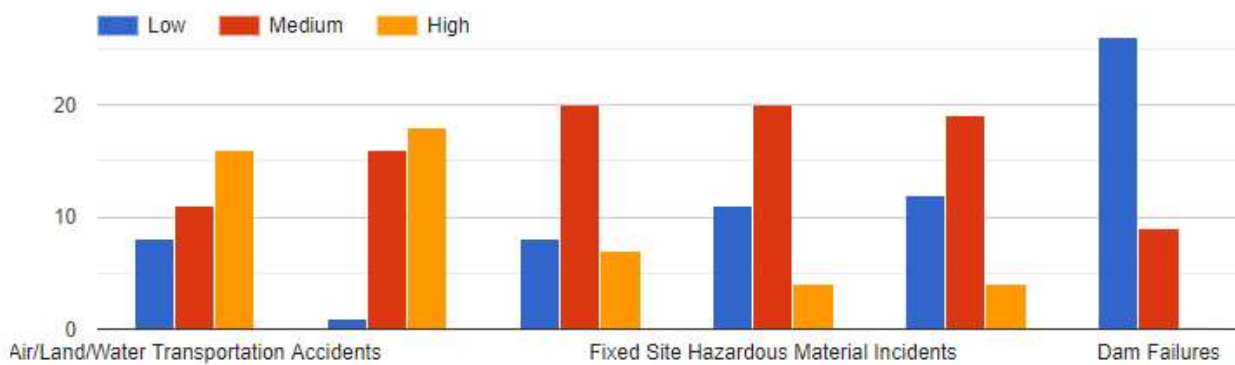


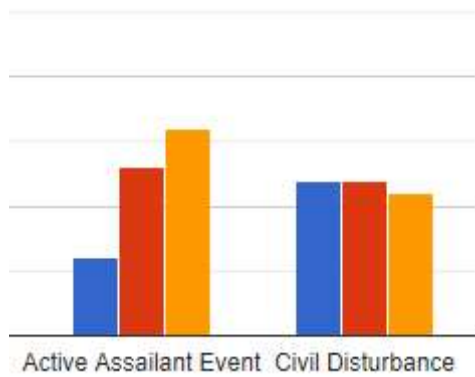
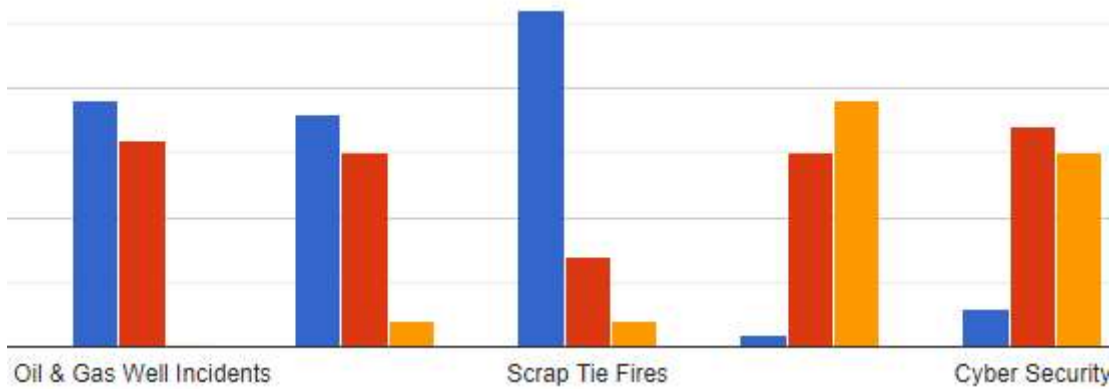




Question 2:

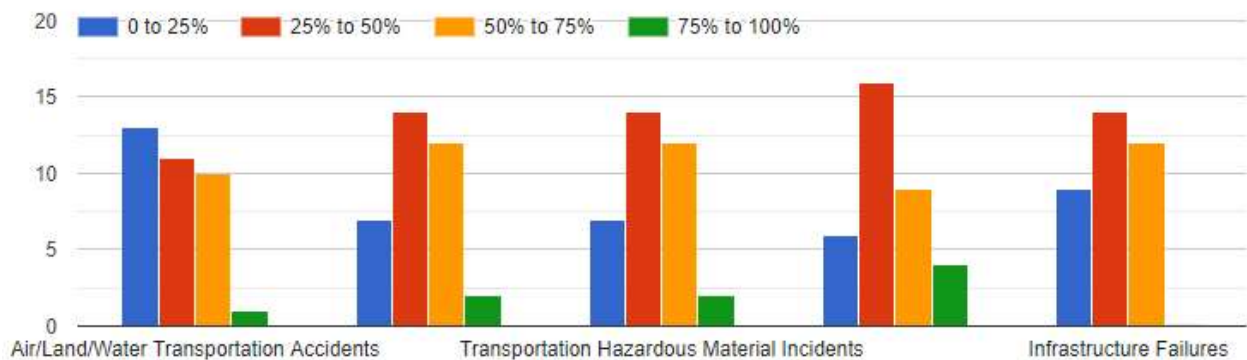
Using the 13 Technical & Adversarial/Human Related Hazards listed previously, please rank each Technical & Adversarial/Human Related Hazards as being "HIGH", "MODERATE" or "LOW". See the image below for definition of rankings.

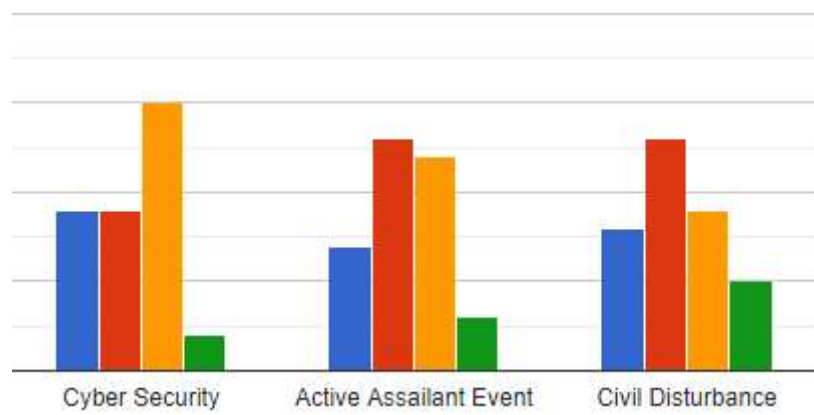
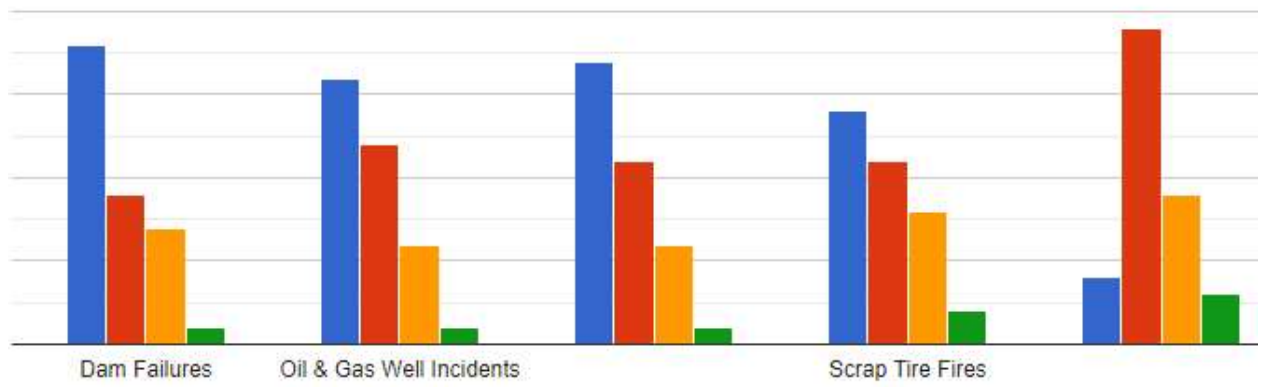




Question 3:

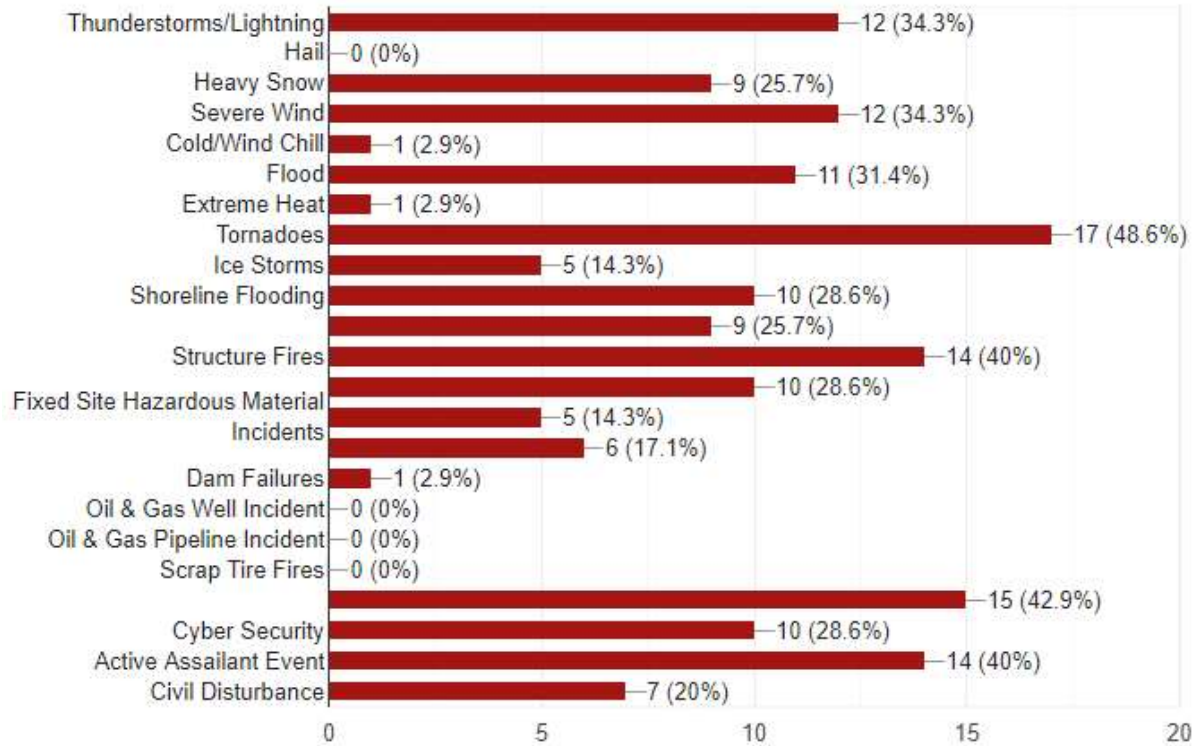
For this section, please mark your opinion, in percentages, on our ability to mitigate or lessen the threat of the hazards to the county. For instance, think of some of the training, projects or partnerships (MABAS/Regional Response Team) that we have done in the past few years. Because of these actions we could mitigate at least 25% or the threat/risk to the county.





Question 4:

Of all of the hazards that exist or have the potential to occur in Tuscola County, which five (5) should be of highest priority to focus on? Please pick your five below



Do you have any comments to add about anything related to the Hazard Mitigation Plan?

8 responses

None

Practice, Practice, Practice

Nothing

N/A

no

NO

Yes, Over next several years, any severe weather event would be good to focus on not only Tornadoes. Because we have active health problem, my thinking is to avoid this until we get through the Covid19 issue.

Appendix 7

Invite List and Participant list for “Tuscola County 2021 Hazard Mitigation Plan Update - Stakeholder Survey”

The following email invite was sent to the listed emails below.

Date: Fri, 19 Feb 2021 11:09:00 -0500

Subject: Hazard Mitigation Plan Update Survey

From: Steve Anderson <tcemanderson@tuscolacounty.org>

To: Adam Prill <adam.prill@mclaren.org>, Amy Wagner <AmyW@mclaren.org>, Amy Yearta <amy@reliacareagency.com>, Angela Titus <angela.titus@mclaren.org>, Angie Daniels <angie.daniels@tuscolacounty.org>, Ann Hepfer <ahepfer@tchd.us>, Ann Westover <awestover@carok12.org>, Annette Swain <ann.swain@redcross.org>, "Barker, Charles (MSP)" <BarkerC@michigan.gov>, Brian Mattheis <bmattheis@mobilemedical.org>, Brian McComb <mccombb1@michigan.gov>, Brian Newcomb <bnewcomb@carocity.net>, Caryl Langmaid <clangmaid@tuscolacounty.org>, Clayette Zechmeister <zcclay@tuscolacounty.org>, Dale Churchill <dalechurchill@hotmail.com>, Dale Fritz <dfritz@hillsanddales.com>, Deb Lawson <dlawson@tcmcf.org>, Don Pisha <pishad@michigan.gov>, Doug DuRussel <ddurussel@tuscolacounty.org>, Doug Young <firechiefdoug@yahoo.com>, "Dr. Russell Bush" <bushru@msu.edu>, Ed Tucker <etucker4738@gmail.com>, Elaine Fiorillo <rossfiorillo@speednetllc.com>, Eric Snidersich <eric.snidersich@cmich.edu>, Gary Millerov <garyshmill@sbcglobal.net>, Gayle Holbrook <gholbrook@medilodgeofcasscity.com>, Glen Skrent <ggs@tuscolacounty.org>, Jason Root <jroot@tuscolaroad.org>, Jay Tuckey <jtuckey@tuscolaroad.org>, Jeff Welch <welchj5@michigan.gov>, Jennifer Stefaniak <jennifer.stefaniak@cmich.edu>, Jim Parker <jparker@fisherch.com>, Jimmy McDaniel <jmcdaniel@tcmcf.org>, Jodi Fetting <jfetting@tuscolacounty.org>, Josh Doud <firefighterdoud@gmail.com>, Kathy Pokorski <nurserl@speedconnect.com>, Kathy Taylor <taylork@michigan.gov>, Katie Alexander <kalexander@hchd.us>, Katie Creason <katie.creason@heritagehillassistedliving.com>, Kristi Villalobos <kvillalobos@tchd.us>, Loren Curtis <curtisl@michigan.gov>, Mark Newvine <mnewvine@hillsanddales.com>, Mary Scigel <mary.scigel@mclaren.org>, Melissa Hobson <mhobson@lighthouse rehab.com>, Meridith Latimer <meridith.latimer@davita.com>, Mike Meyer <mayvillemike@yahoo.com>, Mindy Zmierski <mzmierski@tbhs.net>, Phil Petzold <ppezold@mobilemedical.org>, Rachael Koepf <greatstarttuscola@gmail.com>, Randy Heckroth <rheckroth@carocity.net>, Richard Ahrens <AhrensR1@michigan.gov>, Rick Cox <rcox@carok12.org>, Rob Kelly <rob.kelly@cmich.edu>, Robert Baxter <rbaxter@tuscolacounty.org>, Robert Hiiter <hiiterr@villageofmayville.org>, Roger Edwards <redwards68@centurylink.net>, Sandra Bills <scoutbills@gmail.com>, Sandra Nielsen <snielsen@tuscolacounty.org>, Scot Smeader <ssmeader@mobilemedical.org>, Sharon Beals <sebeals@tbhs.net>, Stacey Roth <stacey@cch-mi.org>, Stacy Byron <administrator@fisherch.com>, Steve Anderson <sanderson@tuscolacounty.org>, Yvonne Vandecar <yvonne.vandecar@mclaren.org>, Albert Pearsall <kingstonpolice48741@gmail.com>, Ben Guile <bguile@cityofvassar.org>, Bill Owens <uvillepd@airadvantage.net>, Brandon Gettel <police@sebewaingmi.gov>, Craig Haynes <ccpolicechief@casscity.org>, Jason Oliver <jolivermpd@millingtonvillage.org>, Louis Cook <lcook@villageofmayville.org>, Mark Reene <mreene2011@gmail.com>, Matt Simerson <simersonm@villageofakron.org>, Matt Simerson <simersonmatt@gmail.com>, Mike Hadd <chiefhadd@villageoffreese.us>, Ted Hull

<thull@tuscolacounty.org>, "Toni Narvaiscooklin (MDOC)" <NarvaiscooklinT@michigan.gov>, "WALKER, CHARLES" <WALKERC8@michigan.gov>, acwambulance@gmail.com, Alan Ellison <alan@reeseffire.org>, Alice Vermeersch <alirae1954@yahoo.com>, Andy Hecht <hecht_andy@hotmail.com>, Chad Tumblin <ctumblin@tuscolacounty.org>, Cory Skinner <cskinner@kingstonk12.org>, Dale Tabar <daletabar@gmail.com>, Dave Russell <ddrussell63@yahoo.com>, Dennis RIEVERT <driever13@att.net>, Gene Solgat <truckbuilder47@hotmail.com>, Glen Guilds <g.guilds5873@hotmail.com>, James Welke <jmwelke@yahoo.com>, Jeff Mallory <jmallory@kingstonk12.org>, Jeremy Ross <jeremy@signaturetruck.com>, Kevin Fent <rfdcaptain52@outlook.com>, Kirk Atkins <katkins2@speedconnect.com>, Larry Boitel <larryboitel@live.com>, Marvin Hasso <akronfirechief@live.com>, Mike Evans <tcfa.president@gmail.com>, Mike Rogers <mrogers8111@sbcglobal.net>, Nick Sakon <nsakon@unionvillefire.com>, Ray Herington <firedept@watertowntownship.org>, Rick Gilman <rgilman@mobilemedical.org>, Ted Gamet <tedfire01@hotmail.com>, Terry Blackmer <terryblackmer@yahoo.com>, Trace Lopez <gfdcaptain2@gmail.com>, Albert Pearsall <trustee@wellstwp.org>, Allen Green <millingtontownship@millingtontownship.com>, Amy Holbrook <clerk@fremonttownship.org>, Andrew Niedzinski <citymanager@cityofvassar.org>, Anthony Shaver <daytontownshipclerk@gmail.com>, Art Graff <graffandsons@gmail.com>, Barbara Valentine <bvalentine@villageofmayville.org>, Brenda Bigham <clerkbrenda@juniatatownship.org>, Bruce Foether <supervisor@vassartownship.org>, Carmen Stevens <clerk@wellstwp.org>, Carrie Gilley <kingstontwp@airadv.net>, Carrie Hines <hinescarrie@yahoo.com>, Carrie Petzold <cpetzold@millingtontownship.com>, Chad Daniels <cdaniels@casscityschools.org>, Charles Heinlein <supervisor@denmarktp.org>, Charles Sherwin <treasurer@fremonttownship.org>, Chris Graff <elmwoodtp@gmail.com>, Chris Ranney <clerk@villageoffreese.us>, Christine Kolar <ckolar@airadvantage.net>, Chuck Fabbro <cfabbro@cityofvassar.org>, Cristi Smith <indianfieldstowship@gmail.com>, deana Jacoby <deana.at@gmail.com>, Debbie Powell <ccmanager@casscity.org>, Debra Pounds <clerk@vassartownship.org>, Deidra Zdrojewski <dazdrojewski@gmail.com>, Dennis Weber Builder <treasurer@denmarktp.org>, Donald Schmuck <adamr@airadvantage.net>, Ed Hunt <echunt60@gmail.com>, Ed LaBelle <pade@airadv.net>, Hazel Schlosser <treasurer@watertowntownship.org>, Heather Severence <elklandclerk@gmail.com>, Jackie Sabgash <clerk@millingtontownship.com>, Jamie Schuette <akrontownship@yahoo.com>, Jamie Wark <jamielynwark@gmail.com>, Jeff Bassett <jbassett@vbcinc.com>, Jesse Robinson <jvrobinson13@gmail.com>, Jessica VanHove <uvilleclerk@airadvantage.net>, Joe Greene <jgreene@carocity.net>, John Stack <treasurer@vassartownship.org>, Judy Cockerill <treasjudy@juniatatownship.org>, Karen Varney <supervisor@wellstwp.org>, kathryn Sattelberg <ksattelberg@yahoo.com>, Kathy Trischler <acwclerk@att.net>, Katie Gebhardt <clerk@fairgrovetwp.org>, Kayla Reed <clerk@villageofmayville.org>, Kaylene Long <vom_clerk@millingtonvillage.org>, Keith Aeder <supervisor@fairgrovetwp.org>, Kristen Nelson-Young <villageoffairgrove@gmail.com>, Leila Rish <uvilletreas@airadvantage.net>, Lisa Geiger <juniatalisa@juniatatownship.org>, Lisa Valentine <lisa@lindyssales.com>, Malisa Pyles <clerk@watertowntownship.org>, Matt Blatt <supervisor@fremonttownship.org>, Matt Prime <unionville.prime@outlook.com>, Matthew Lane <Mlane@carocity.net>, Merri Lemcke <mlemcke@cityofvassar.org>, Mike Damm <mdamm@cityofvassar.org>, Nanette Walsh <cctreasurer@casscity.org>, Pam Shook <wisnertwp@gmail.com>, Pamela Brinkman <elmwoodclerk@gmail.com>, Pat Witkovsky

<almertreasurer@almertownshipmich.org>, Paul Keast <bangkeast@aol.com>, Pennie Rienas <novestatowshipclerk@gmail.com>, Renee Schiefer <clerk@denmarktwp.org>, Rex Vroman <koylontwp.clerk@gmail.com>, Rita Dickinson <dickinsonr@villageofakron.org>, Robert Loomis <supervisor@millingtontownship.com>, Robin Wallace <ccvillage@casscity.org>, Russell Rienas <flashtheoiler@hotmail.com>, Russell Speirs <ellingtonsupervisor@gmail.com>, Sara Savage <ssavage@carocity.net>, Sarah Donovan <treasurer@fairgrovetwp.org>, Shari Hadaway <villageofakron@airadv.net>, Shelly Hicks <clerk@tuscolatownship.org>, Stephanie Bruce <kingstonclerk@airadv.net>, Steve Linzner <slinzner@hotmail.com>, Steven Schwab <trustee@denmarktwp.org>, Sue Marlow <treasurer@villageofmayville.org>, Suzy Rockwell <ellingtonclerk@gmail.com>, Thomas Raymond <manager@villageofreese.us>, Valerie Peters <vpeters@thumbins.com>, Michael Sage <michael.sage@dteenergy.com>, Eean Lee <eean.lee@tuscolacounty.org>

Greetings,

Along with Covid, this year I am also working on the required update/rewrite of the Tuscola County Hazard Mitigation Plan. Because of Covid and our inability to hold public meetings, I am attempting to gather information and opinions via alternative modes.

NOTE: For those who are members of the All Hazards Group, please also complete this form as well, this survey is geared more towards your organization's perspective.

Below is a link to a Google Forms survey to gather information and data for this rewrite from you and your organization's perspective . Please complete the Google Forms Survey at your earliest convenience. (I will leave it open until March 5th).

https://docs.google.com/forms/d/e/1FAIpQLSdO6cccyawOp51z40GEY9BSW_CVijmp4wJ_vqOQXFt_xdnZgNw/viewform?usp=sf_link

If you have any questions, please let me know..

Thanks

Steve

--

Deputy Steven Anderson

Emergency Services Coordinator

420 Court St. Suite #1

Caro, MI 48723

Office # 989-673-5181

Cell # 989-450-0147

The following list are those who responded to the stakeholder survey:

Name	Title	Agency/Company
Angie Daniels	Equilization Director	Tuscola County Equilization
Ann Hepfer	Health Officer	Tuscola/Huron County Health Departments
Ann Westover	Director of Transportation and Building & Grounds	Caro Community Schools
Barb Valentine	President	Village of Mayville
Bobby Parker	Maintenance Director	Medlodge of Cass City
Brenda Bigham	Clerk	Juniata Township
Brian McComb	Lieutenant	Michigan State Police - Caro Post
Brian Newcomb	Chief	Caro Police Department
Charles Barker	Lieutenant	Michigan State Police - Emergency Management & Homeland Security Division
Craig Haynes	Chief	Cass City Police Department
Debbie Powell	City Manager	Village of Cass City
Doug Young	Chief	Fairgrove Fire Department
Eean Lee	Chief Information Officer	Tuscola County Information Systems
Eric Snidersich	Assistant Director	Saginaw-Tuscola Medical Control Authority
Gary Millerov	Chief	Vassar Fire Department and LEPC
Jason Oliver	Chief	Millington Police Department
Jay Tuckey	Superintendent/Manager	Tuscola County Road Commission
Jeff Mallory	Chief	Kingston Fire Department
Jim Parker	Maintenance Director	Fisher Senior Care & Rehabilitation
Jimmy McDaniel	Life Safety Officer	Tuscola County Medical Care Community
Jodi Fetting	Clerk	Tuscola County Clerk's Office
Josh Doud	Captain	Richville Fire Department and LEPC
Karen Varney	Supervisor	Wells Township
Keith Aeder	Supervisor	Fairgrove Township
Louis Cook	Chief	Mayville Police Department
Marv Hasso	Chief	Akron Fire Department
Matt Simerson	Chief	Akron Police Department
Mindy Zmierski	HR/Administrative Assistant	Thumb Behavioral Health Systems
Nick Sakon	Chief	A.C.W.-Unionville Fire Department
Randy Heckroth	Chief	Caro Fire Department
Rex Vroman	Clerk	Koylton Township
Robert Baxter	Undersheriff	Tuscola County Sheriff's Office
Robert Hiiter	Chief	Mayville Fire Department
Roger Edwards		RACES/ARES and LEPC
Sandara Nielsen	Director	Tuscola County Central Dispatch
Sharon Beals	Chief Executive Officer	Tuscola Behavioral Health Systems
staff		ACW Ambulance
staff		Akron DPW
Ted Hull	Lieutenant	Tuscola County Sheriff's Office
Thomas Raymond	Village Manager	Village of Reese
Trace Lopez	Chief	Elmwood Twp/Gagetown Fire Department

Appendix 8

Responses for “Tuscola County 2021 Hazard Mitigation Plan Update - Stakeholder Survey”

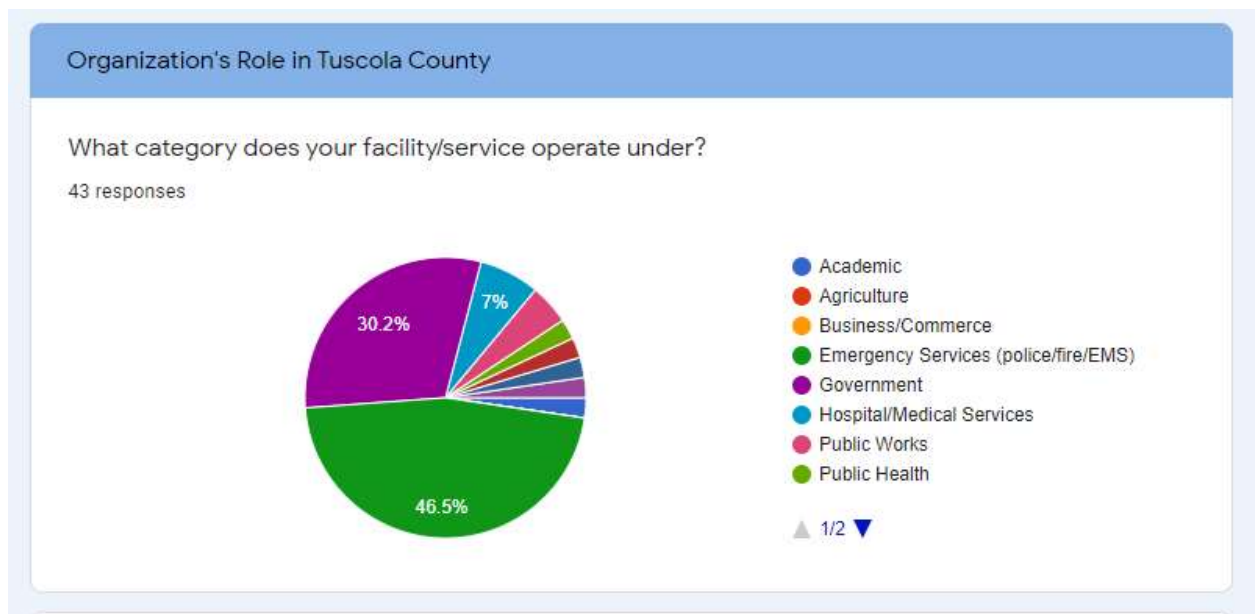
Tuscola County is currently working on updating the County's Hazard Mitigation Plan. This plan is required to be updated every five years under the Federal Disaster Mitigation Act of 2000. With an updated plan in place, Tuscola County will remain eligible for certain federal pre-disaster and post-disaster assistance.

The following survey is designed to help identify general needs for hazard mitigation and resiliency within Tuscola County from your prospective, as well as to identify specific projects that may be included in the mitigation plan update.

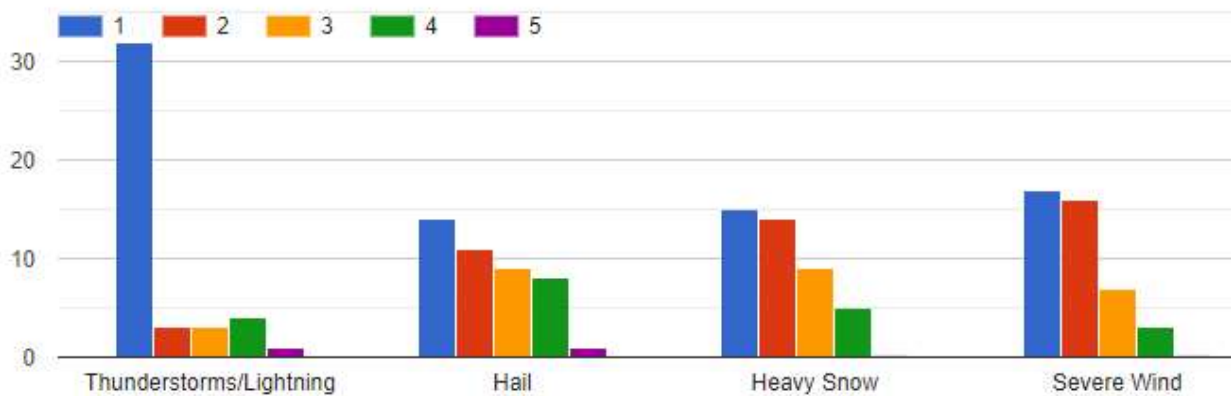
The current plan can be found in its entirety here:

<https://www.tuscolacounty.org/sheriff/doc/Tuscola%20County%20Hazard%20Mitigation%20Plan%202016.pdf>

Once a draft of the Hazard Mitigation Plan Update is completed, it will be sent out for comments and at some point (either in person or virtual) there will be a public meeting for comments on the Updated Plan.

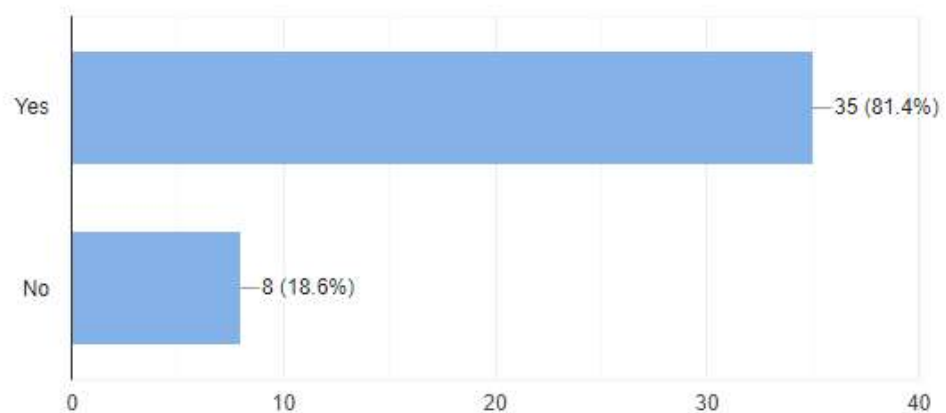


Please rate the following natural disaster on a scale of 1-5, with 1 being likely to happen and 5 not likely to happen.



Has your organization been impacted by a natural disaster such as those listed above in the last ten years?

43 responses



If you answered yes to the above questions, what was the natural disaster and how was your organization impacted? (i.e. flooding, damage from tornado, etc.) 33 responses

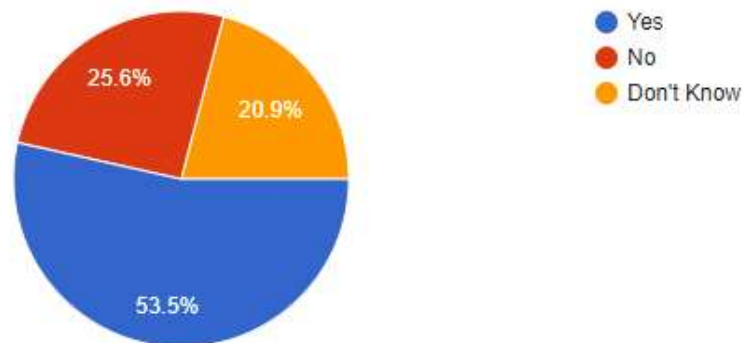
- A Lightning strike took out power lines to the building.
- Flooding
- Tornado damage
- Ice and Wind Storms, some shoreline flooding last spring.
- Tornado, flooded roadways from heavy rains
- A lot of inconvenience (power outages, bad roads, school closures). Limited property losses (road damage, crop losses)

- Flooding-washed out roads, Heavy snow- impassable roads,Severe wind- downed trees, Thunderstorms- washed out roads and culverts
- Flooding a couple years back. Flooded our courtyard (6" of water) which came in the bldg.
- Heavy snow, severe wind and loss of power causing county closures,
- Flood damage, high winds and storms
- heavy snow, shoreline flooding, wind chill, thunderstorms and lightning
- Flood in Spring in lower portion of county which shut down roads impacting transportation.
- Severe wind
- Flooding. Inaccessible roads affected responses
- Our amateur Radio Communications antennas have been damaged by Ice Storms and also at least one severe wind event in the past 10 years. A number of our members had their home station antennas damaged in such events as well. Because of this we probably could rate severe wind and Ice storms higher. We didn't think both could cause some loss of life, we haven't seen an event here in Tuscola Count with many lives lost. We try to mitigate such events by using better antennas that can take higher wind loads. While on this subject, we note that heavy snowfall could impact our ability to respond to any event needing emergency communications. It could be very difficult for most of our members to travel on unplowed roads.
-
- Shoreline flooding rescues, wind damage creating down power lines, heavy snow rescues.
- Heavy Snow
- Power failures impacting village water and sewer systems
- Coverage for wind storms/tornadoes. Always impacted by road conditions due to weather, etc.
- Severe Flooding, loss of Power
- Weather related issues
- Thunderstorms, high winds caused many down wires. Heavy snow, blocked and icy roads.
- Heavy rain caused flooding
- Flooding w/ road damage, Ice
- Flooding, high winds, ice storms, cold, snow, Hail
- Flooding. The majority of land to the north of the village drains into the village causing flooding.
- Wind Damage, downed power lines
- Thunderstorms/Lightning - Power outages
- storms with winds
- Severe Wind--Power outage
- Wind and ice storm damage, power failures.

- Closure due to heavy snow
- Flooding, Wind Storm, Ice Storm, Power Outages, etc.

Is the organization that you work for adequately prepared for withstanding a natural disasters?

43 responses



If you answered no, what do you feel your organization is lacking and why? 14 responses

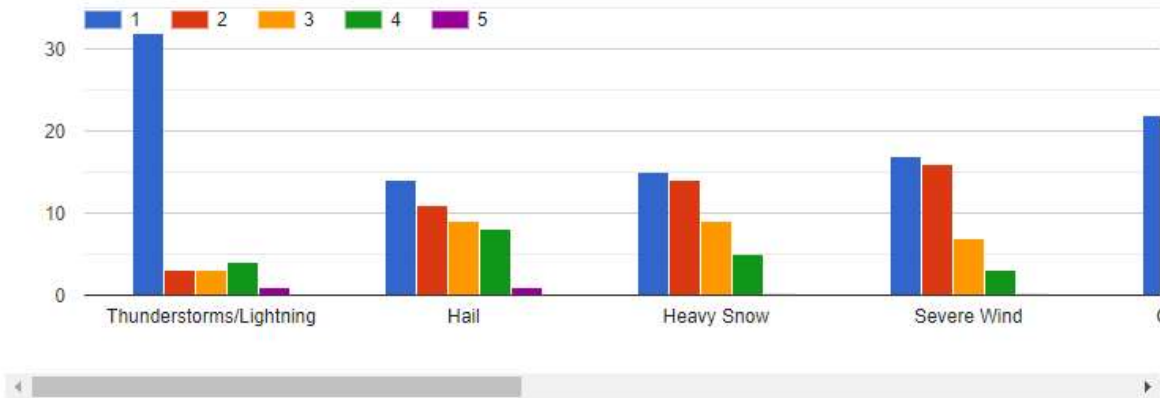
- Personnel
- The disasters we would need equipment for do not happen often enough to warrant my small department needing some things on hand.
- Yes but with the help from outside contractors
- unprotected records, lack of information existing electronically, ability to fully work remotely and still access all necessary programs.
- organization/leadership, plan/nonexistent, communication/nonexistent
- Back up generators questionable
- Members and Training: 1. Coronavirus hasn't helped, and seems more difficult to attract younger people into Amateur Radio today. It's an all volunteer group. We have not recruited well enough. Then getting members to keep up with training to improve their readiness. We are improving with training, but need more effort in this area.
- 1. Coronavirus hasn't helped, and seems more difficult to attract younger people into Amateur Radio today. It's an all volunteer group. We have not recruited well enough. Then

getting members to keep up with training to improve their readiness. We are improving with training, but need more effort in this area.

- 2. Most members have taken classes in the sky-warn program, and do keep track of possible Severe weather events. They plan for backup power sources, and portable antennas, along with Normal supplies for their families.
- 3. We still need to harden repeater sites more for wind and or Ice storms. We also need to plan for upgrading to some of the newer digital communications equipment. Some of our members are doing this on their own, but most of our repeaters that we use are still analog only.
- 4. Many things we can do on our own, but some things like upgrading equipment cost more
- then our group can raise through its members. So money is always an issue.
- Personnel, no interest in younger people.
- Man Power
- To a certain extent.
- Equipment & training
- Long term drainage issues need to be corrected through funneling excess water to the Center B drain. The Village adopts the Tuscola Co Emergency Mgmt Plan, but the follow up or communication is lacking on plan goals and objectives.
- We are a small community and we lack certain pieces of necessary equipment. Generators and Fire Equipment (Ladder Truck) are the most important.

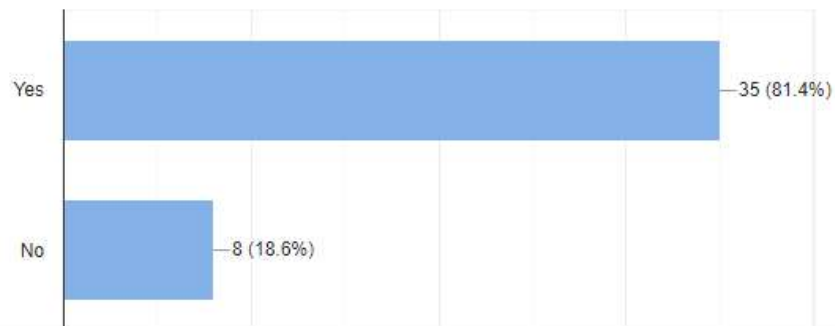
Natural Disasters

Please rate the following natural disaster on a scale of 1-5, with 1 being likely to happen and 5 not likely to happen.



Has your organization been impacted by a natural disaster such as those listed above in the last ten years?

43 responses



If you answered yes to the above questions, what was the natural disaster and how was your organization impacted? (i.e. flooding, damage from tornado, etc.) 33 responses

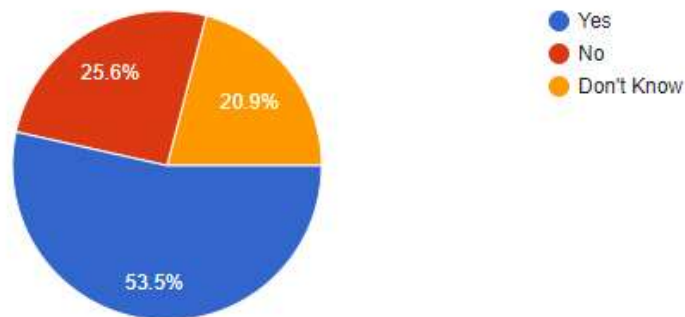
- A Lightning strike took out power lines to the building.
- Flooding
- Tornado damage
- Ice and Wind Storms, some shoreline flooding last spring.

- Tornado, flooded roadways from heavy rains
- A lot of inconvenience (power outages, bad roads, school closures). Limited property losses (road damage, crop losses)
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- Flooding, Wind Storm, Ice Storm, Power Outages, etc.

Is the organization that you work for adequately prepared for withstanding a natural disasters?

43 responses

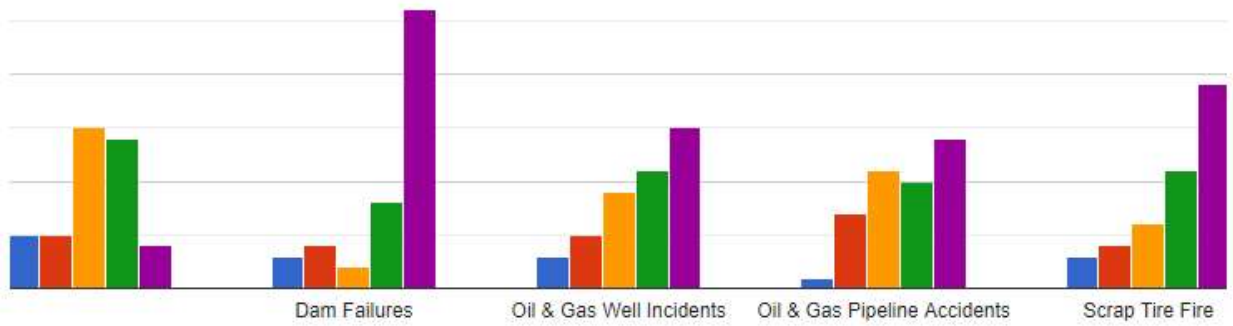
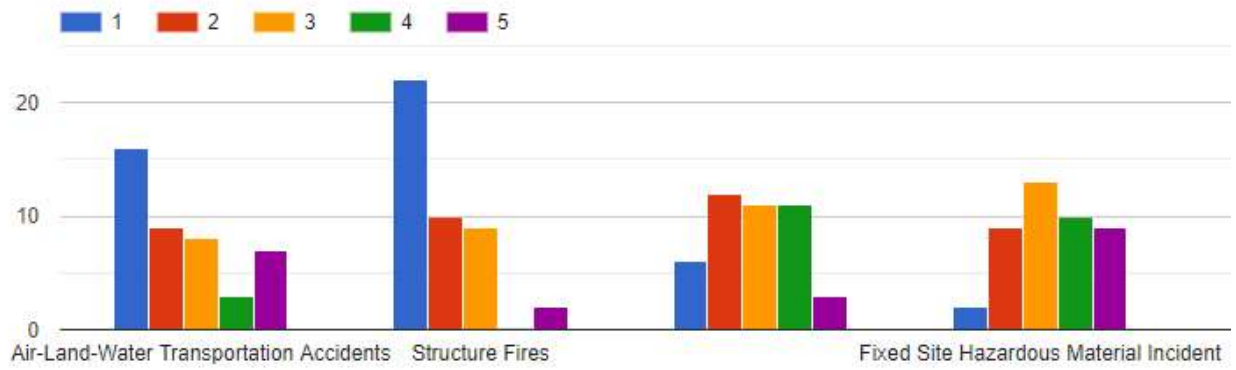


If you answered no, what do you feel your organization is lacking and why? 14 responses

- Personnel
- The disasters we would need equipment for do not happen often enough to warrant my small department needing some things on hand.
- Yes but with the help from outside contractors
- unprotected records, lack of information existing electronically, ability to fully work remotely and still access all necessary programs.
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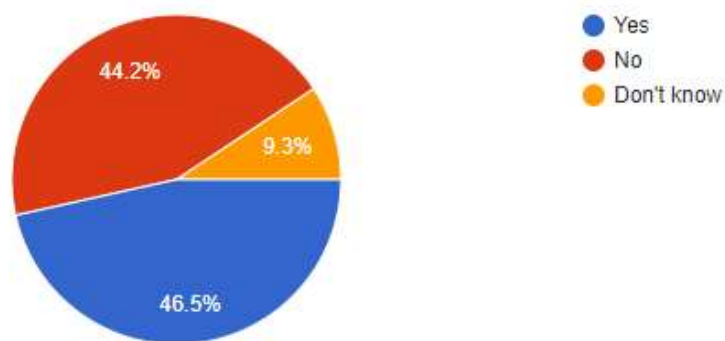
- 1. Coronavirus hasn't helped, and seems more difficult to attract younger people into Amateur Radio today. It's an all volunteer group. We have not recruited well enough. Then getting members to keep up with training to improve their readiness. We are improving with training, but need more effort in this area.
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 - We are a small community and we lack certain pieces of necessary equipment. Generators and Fire Equipment (Ladder Truck) are the most important.

Please rate the following technological hazards on a scale of 1-5, with 1 being likely to happen and 5 not likely to happen.



In the past 10 years, has your organization suffered from any technological issues listed above?

43 responses



If your organization suffered a Technological Hazard what was the hazard and how did it impact your organization?^{18 responses}

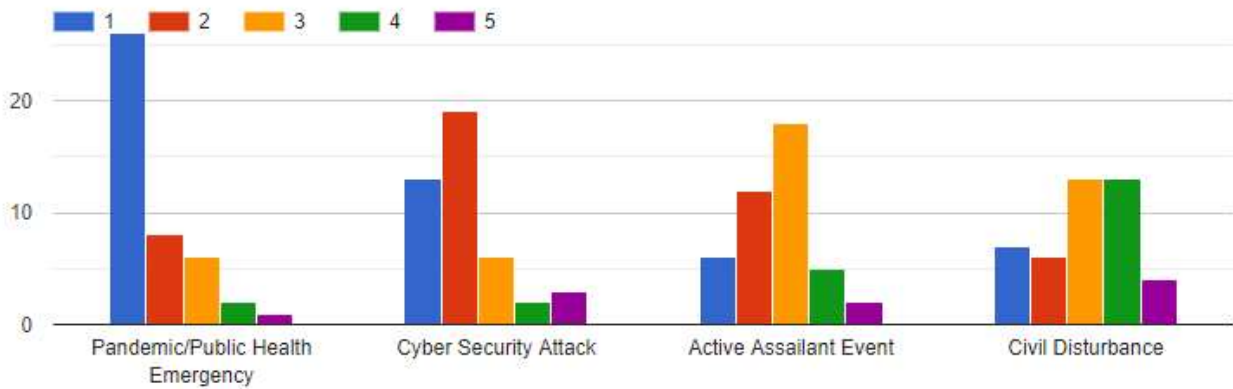
- Tree fell on trucks left us short of apparatus
- These incidents put a strain on staffing levels
- Auto accidents
- Transportation accidents-traffic control and road repairs
- Structure fires. General property damage.
- transportation incidents
- transportation / ethanol - no significant impact
- Oil well and tank fires, vehicle accidents, train derailments, structure fires.
- Power grid failures impacting water and sewer systems, underground boring thru water main causing a water system failure.
- Structure Fire and didn't have enough manpower to handle the event.
- Structure fires / tire fires
- Structure fires, Transportation accidents
- Propane leak at Fairgrove Oil and Propane. Because we did a walk through at that facility we were able to mitigate the situation with their employees' help.
- Traffic Crashes, Need for additional supplies
- loss of power
- Residential Fires - minimum impact to village operations
- Structure Fires and Land Accidents
- Sewer Lagoon Failure, Water Plant/Tower Communication System Failure, Fire Dept. Siren Failure, Gas Tank Leaks, Failing Natural Gas Lines, Failing Electrical Infrastructure...and the list goes on.

Do you think there is anything that the county government or local units of government can do to improve or decrease the chances of a technical hazard from occurring? If you believe "yes" what would the improvement be?^{15 responses}

- Maintain infrastructure
- Traffic accidents are what we are most involved with so proactive traffic enforcement is our approach.
- Not much that the Road Comm. can control
- not that I can think of

- no
- unsure
- more training and funds to do the training
- No.
- Tuscola County does a good job of getting info about classes out to the various agencies.
- Not at this time
- No
- Not really
- Yes, centrally located fire ladder truck for the county. Trained hazmat team
- no, doing a great job
- Tuscola County needs to get on the ball with DTE and Consumers and demand the needed upgrades required to maintain safe service for communities. This has been ignored far too long.

Please rate the following hazard on a scale of 1-5, with 1 being likely to happen and 5 not likely to happen.



In the past 10 years has your organization suffered any of the Adversarial/Human Related Hazards? If so which one(s) and how did it impact your organization? 43 responses

- No
- Pandemic
- no
- Pandemic, Civil Disobedience

- All of us have been affected by the COVID pandemic, we can't assume none of the other issues won't happen here.
- The governor has mishandled Covid forcing our township to suspend personal contact.
- Pandemic COVID19
- Pandemic - personnel off when infected
- Health emergency- changes in how our work force operates
- Covid 19 pandemic. Impacted all normal routines,visitors, quarantine in rooms etc.
- Pandemic - loss of productivity; civil disturbance in buildings
- Covid-19, - Overtime hours within the Village government. Loss of local business.
- pandemic
- yes
- unsure
- Pandemic, closed office
- N/a
- not that I am aware of
- Yes: Pandemic/Public Health Emergency Covid-19
- The Corona-virus, Covid-19, has impacted our group the most any event has that I know of.
- This last year has impacted our ARES/RACES program ability to have members meet. Some
- Members have had the covid-19, and we did have at least one death of a member from
- Complications of this virus. It has really impacted our ability to provide in person classes
- on getting an amateur radio license. We needed to postpone a class last April, but hope to
- Finish that class this year in (2021). We needed to cancel a few of our training exercises. We can still do some things by using our radios from home, and also doing virtual meetings. This is good, but not all of our members are able or willing to do virtual meetings.
- No
- Protests
- Pandemic/Public Health-difficulty conducting business, increase finances
- Civil Disturbance. There were more people and not enough local enforcement to handle.C
- Pandemic
- The current Covid 19 pandemic.
- Cyber attack on Village server
- Pandemic, Civil Disturbance
- BLM protest, pandemic, cyber attack vs. CARO MCCLAREN,
- COVID19

- Pandemic, impact daily operations. Cyber security, we are proactive in protecting our network and the cost is high, impacting our annual budget. Civil disturbance, our PD has participated in mutual aid to assist other areas when posed with potential civil disturbance.
- Pandemic-Covid 19
- none
- yes, covid

Is there anything that county government/local units of government can do to improve or lessen the severity of an Adversarial Human Related Hazard? (seminars, pass on informational emails or post to website, etc.)¹⁹ responses

- No
- Education on how to handle these specific events.
- Do not enforce the governors Covid mandates that are destroying our local economy.
- County Commissioners need to believe in the science and show public support for any of the lead agencies involved in the leadership role in a pandemic. This support would lead to less infectious disease and negative impacts, i.e. following CDC guidelines for mask and mitigation practices. This is science based on years of research.
- Improve building security
- pass on informational emails
- Improve remote access; continued training for active assailant or civil disturbance situations
- continue to provide essential PPE and support
- unsure
- N/A
- Our county has been really good at providing us information dealing with the covid-19 virus.
-
- communication between all units of Government as soon as possible.
- Again our County Health Dept. And Emergency Services Director have been and are very good about notifying the various agencies.
- Not at this time
- Finances and training
- Be prepared, to be proactive, to take potential threats seriously. Access to seminars or webinars would be appreciated.
- no, doing a great job

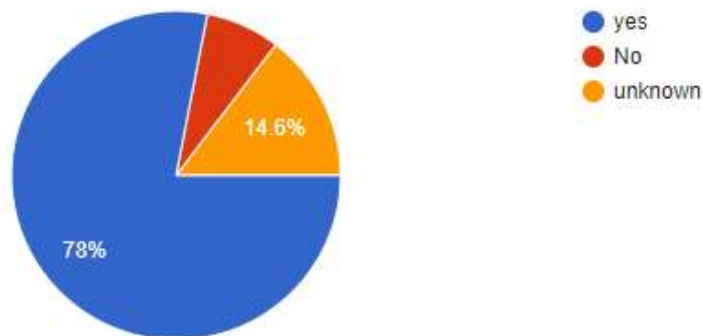
- Tuscola County Sheriff Department and Prosecutor's Office need to work with smaller communities like ours, and that isn't happening. Crimes need to be prosecuted, and we should receive police support when we need it.

Does your organization have any of the following plans in place? (please mark all the apply) 43 responses

- Continuity of Operations Plan (COOP): 15
- Continuity of Government Plan (COG): 4
- Emergency Operations Plan (EOP): 27
- Evacuation Plan: 20
- Covid Response Plan: 29
- None: 1
- No formal plans: 1
- I am sure MSP has all this??: 1
- Covid Resolution: 1
- None of the above: 1
- Fire Dept has building floor plans and lists of toxic storage items: 1
- Accident Fund Insurance: 1

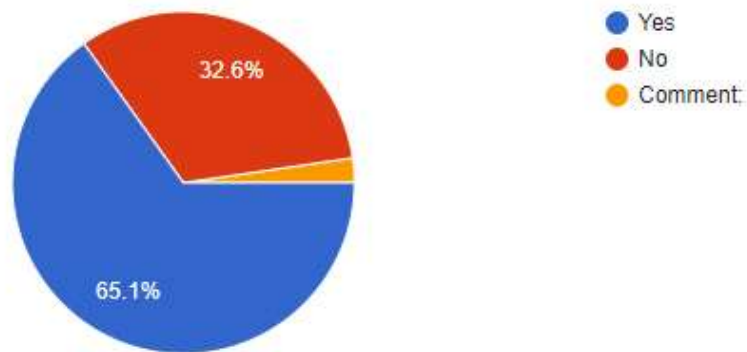
If your organization has any of the above plans in place are they updated on a regular basis?

41 responses



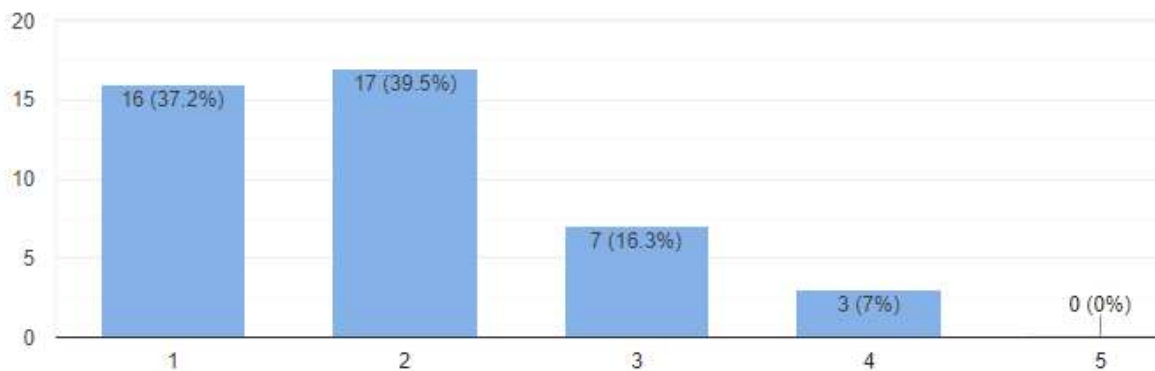
Does your organization exercise or review any of their plans on a regular basis with its employees?

43 responses



How confident are you in the resiliency of your organization to bounce back from any of the hazards spoken about in this survey?

43 responses



If you answered "Not Confident", please explain why you feel that way and what can be done to improve your organization's ability to return to normal. 5 responses

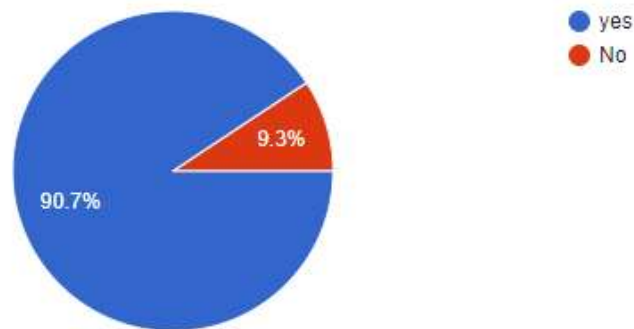
- We don't tabletop these plans and exercise them. Time/labor/availability all being contributing factors.
- NA
- Any significant financial impact will likely harm the township and what services are provided.

- If the fire department lost any of its apparatus it would take some time and money to replace that type of equipment.
- This needs work in our community.

Do you think that local public education and awareness programs and the means by which this information is pushed out to the citizens of Tuscola County are effective at informing the public on what they should do to prepare for and reduce personal risk to disasters?

(Examples of how information is disseminated via the following mechanisms: Sheriff's Office facebook page, Michigan State Police facebook page/MSP Phone App, county websites, local units of government facebook/websites, fire prevention programs, local media, etc)

43 responses



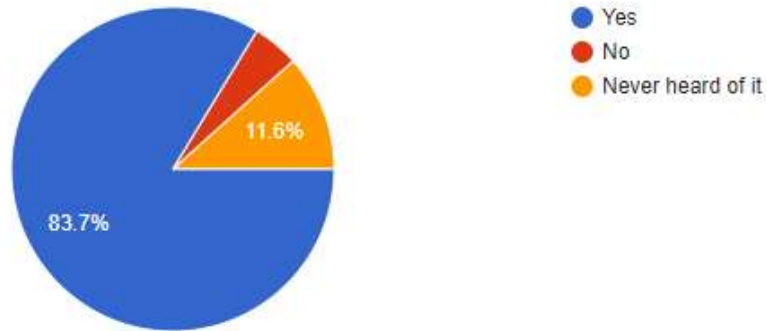
If you answered "no", what could be done to improve informing the public? 5 responses

- Not everyone pays attention to social media
- Too many facebook pages / agencies, etc. - where am I supposed to look? Information needs to be centralized and available to everyone regardless of internet abilities.
- The above listed methods does reach a lot of the population BUT not everybody uses the internet, not everybody on FB follows those pages plus not everybody is on FB or other apps and a lot of people don't get the paper.
- Not all residents have access to or use the internet. More direct door mailings need to occur.
- We need a Social Media presence in this county. It's cheap and easy to manage. TikTok, YouTube, even Instagram are used more often than Facebook and your websites suck. Don't take it personally, because ours sucks, too...maybe we should coordinate a Co-op Countywide Online presence? Something to think about...

Are you or members of your organization aware of, understand and take advantage of the emergency warning and notification system, Smart911 that is in place in Tuscola County?
Additional information about Smart911 can be found here:

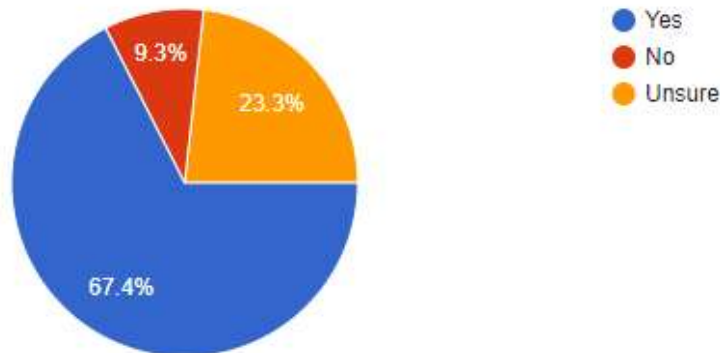
<https://www.ravemobilesafety.com/michigan-smart911-page> You can follow this link to sign up for this FREE service: <https://www.smart911.com/>

43 responses



Do you believe that local/county government understands, supports and possesses adequate resources for hazard risk reduction efforts in the community?

43 responses



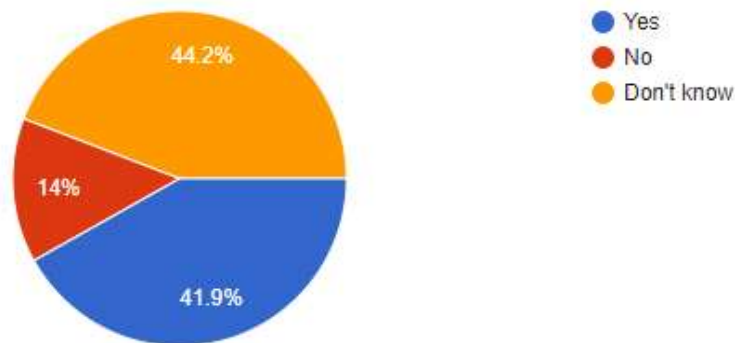
Do you have any comments or suggestions on the previous two questions? 13 responses

- Living involves risk. Not everything is predictable and we don't have the resources to try to prevent or prepare for every possible hazard ie volcano, massive earthquake, etc
- NA

- advertise smart 911 more and provide assistance maybe at libraries for elderly that don't have the technology. make it easier to navigate and update
- Not everyone has access to technology/internet services as a form of communication
- I think our county does a good job with the resources it has. We like most would need more than what we have for any major event. That takes funding, and so we like many smaller communities do what we can within budget limits.
- no
- I believe the county is more up to date than local government, townships
- No.
- The level of updating our 911 dispatch center and Sheriffs Department is slow or really slow.
- Not at this time
- The County must fund and seek grants to meet the communication requirements of the Emergency Management Plan. What is Smart911? and why don't I know about it...
- No
- We need to have more discussions about this - Countywide. Smaller Communities should be included in this more often.

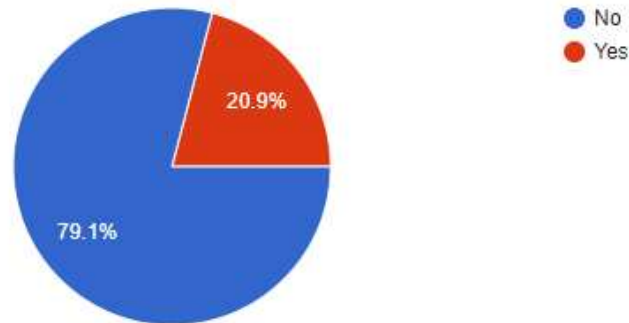
Do you know of any projects that have been completed within the county to mitigate hazards? (Photo: City of Vassar Flood 1986)

43 responses



Does your community/organization (if you qualify) have any plans to apply for a hazard mitigation project in the near future? (Keep in mind that your community/organization will have to contribute at a minimum of 25% of the cost of the overall project) Additional information about successful Hazard Mitigation Projects can be found here: https://www.michigan.gov/documents/msp/Michigan_Hazard_Mitigation_Success_Stories_May_2011_Final_Edition_web_355580_7.pdf

43 responses



If you answered yes to the previous question, what is the potential project that your community/organization is contemplating? 7 responses

- I'd defer this question to the County's Emergency Manager as he is the project planner.
- Generator
- Fixed object removal from road ROWs
- Nothing in the near future, this year, but I could see our program doing an upgrade to digital repeaters. I don't see this happening for a few years at least. Another project could be getting and installing amateur radio backup equipment in Fire Departments. I am not sure either of these projects would qualify.
- question doesn't apply to my role
- Discussion purchasing a generator that would automatically start to power the Fairgrove Village Municipal building to allow residents to have access to heat, cool air and fresh water in times of no power in winter and summer. This building also houses the Fire Department.
- We are discussing our options.

Do you have any other comments or concerns regarding the Hazard Mitigation Plan or its update? 12 responses

- No
- no
- None
- Na
- No.
- I looked at the former plan and not sure if there was progress on the goals and objectives.
- Not at this time.

Appendix 9

FEMA *National Risk Index* for Tuscola County

National Risk Index

October 22, 2021

Tuscola County, Michigan

Summary

Risk Index is **Relatively Low**



Expected Annual Loss is **Relatively Low**



Social Vulnerability is **Relatively Moderate**



Community Resilience is **Relatively High**

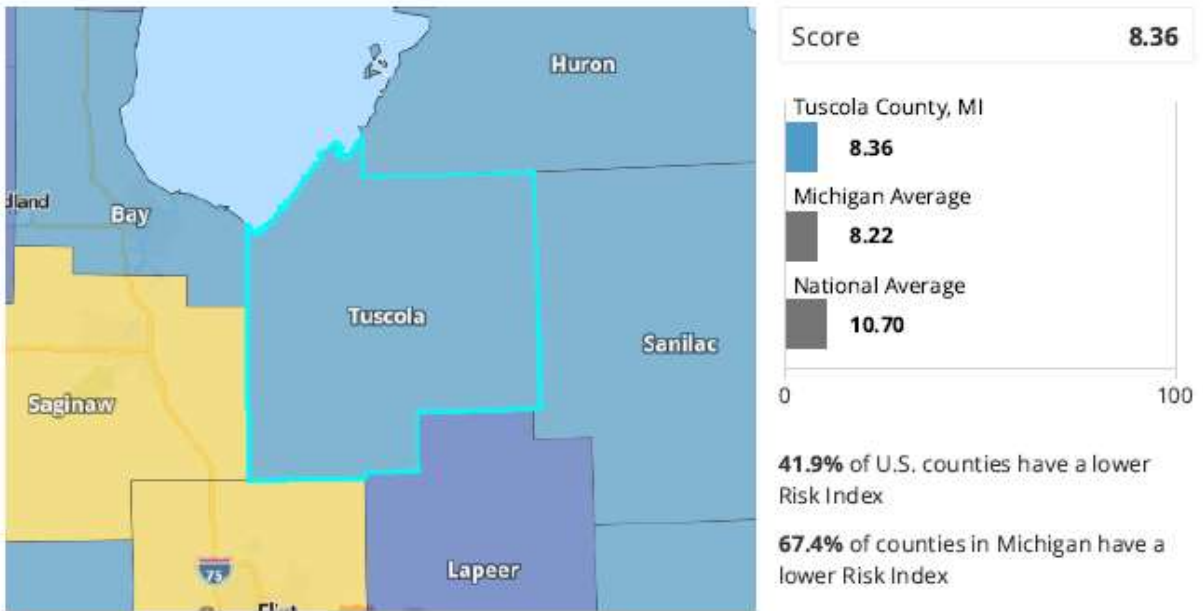


While reviewing this report, keep in mind that low risk is driven by lower loss due to natural hazards, lower social vulnerability, and higher community resilience.

For more information about the National Risk Index, its data, and how to interpret the information it provides, please review the **About the National Risk Index** and **How to Take Action** sections at the end of this report. Or, visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

Risk Index

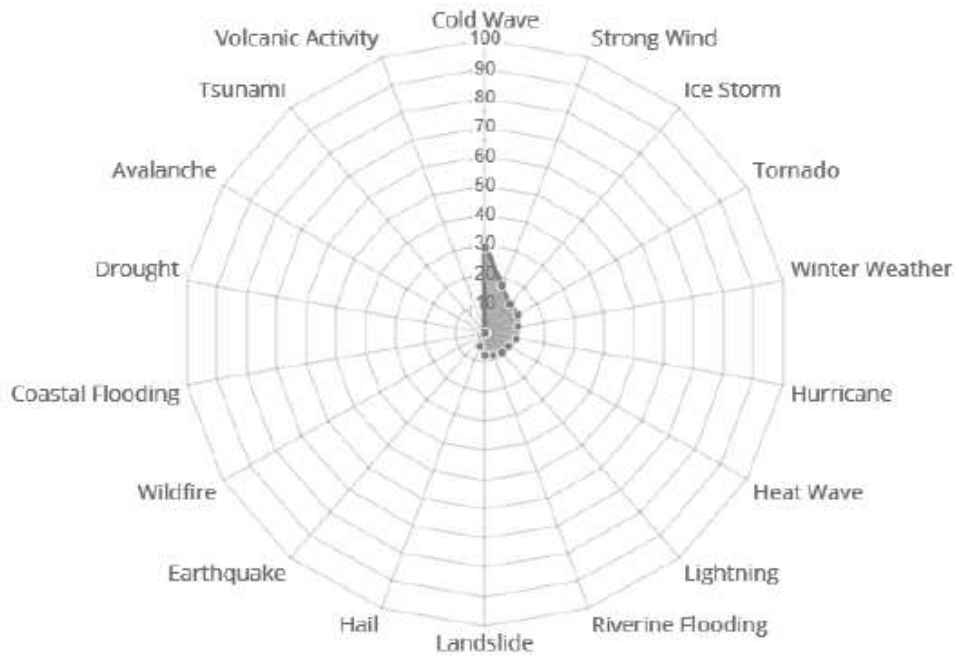
The Risk Index rating is **Relatively Low** for **Tuscola County, MI** when compared to the rest of the U.S.



Hazard Type Risk Index

Hazard type Risk Index scores are calculated using data for only a single hazard type, and reflect a community's relative risk for only that hazard type.

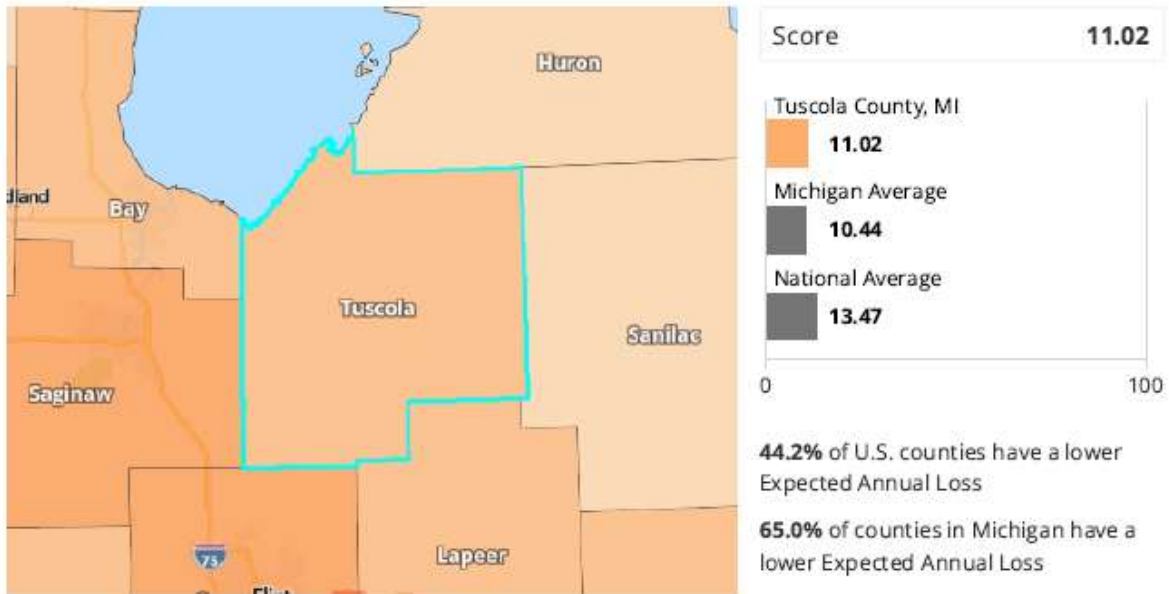
Hazard Type	Risk Index Rating	Risk Index Score		
Avalanche	Not Applicable	--		
Coastal Flooding	No Rating	0.00	0	100
Cold Wave	Relatively Moderate	29.05	0	100
Drought	No Rating	0.00	0	100
Earthquake	Very Low	1.46	0	100
Hail	Very Low	4.88	0	100
Heat Wave	Relatively Low	9.02	0	100
Hurricane	Relatively Low	10.49	0	100
Ice Storm	Relatively Low	13.12	0	100
Landslide	Very Low	7.63	0	100
Lightning	Very Low	8.77	0	100
Riverine Flooding	Relatively Low	8.09	0	100
Strong Wind	Relatively Moderate	17.16	0	100
Tornado	Relatively Low	12.65	0	100
Tsunami	Not Applicable	--		
Volcanic Activity	Not Applicable	--		
Wildfire	Very Low	0.97	0	100
Winter Weather	Relatively Low	11.17	0	100



The chart above demonstrates the relative distribution of hazard type Risk Index scores for **Tuscola County, MI**. Risk Index scores are plotted for each hazard type included in the National Risk Index. Higher relative risk corresponds to larger colored areas inside a given hazard type chart slice.

Expected Annual Loss

In **Tuscola County, MI**, expected loss each year due to natural hazards is **Relatively Low** when compared to the rest of the U.S.



Composite Expected Annual Loss		\$2,898,922.03	
Building Value	\$1,919,216.11	Population	0.10 fatalities
Population Equivalence	\$777,849.46	Agriculture Value	\$201,856.46

Expected Annual Loss for Hazard Types

Expected Annual Loss scores for hazard types are calculated using data for only a single hazard type, and reflect a community's relative expected annual loss for only that hazard type. **15 of 18** hazard types contribute to the expected annual loss for **Tuscola County, MI**.

Hazard Type	Expected Annual Loss Rating	Expected Annual Loss Score	
Avalanche	Not Applicable	--	
Coastal Flooding	No Expected Annual Losses	0.00	0 ----- 100
Cold Wave	Relatively Moderate	34.39	0 ----- 100
Drought	No Expected Annual Losses	0.00	0 ----- 100
Earthquake	Very Low	1.92	0 ----- 100
Hail	Very Low	6.03	0 ----- 100
Heat Wave	Relatively Low	11.34	0 ----- 100
Hurricane	Relatively Low	11.90	0 ----- 100
Ice Storm	Relatively Low	19.26	0 ----- 100
Landslide	Relatively Low	11.02	0 ----- 100
Lightning	Relatively Low	14.89	0 ----- 100
Riverine Flooding	Relatively Low	9.17	0 ----- 100
Strong Wind	Relatively Moderate	33.57	0 ----- 100
Tornado	Relatively Low	14.34	0 ----- 100
Tsunami	Not Applicable	--	
Volcanic Activity	Not Applicable	--	
Wildfire	Very Low	1.10	0 ----- 100
Winter Weather	Relatively Low	15.76	0 ----- 100

Expected Annual Loss Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	--	--	--	--	--
Coastal Flooding	\$0	\$0	\$0	0.00	n/a
Cold Wave	\$264,746	\$972	\$262,869	0.03	\$904
Drought	\$0	n/a	n/a	n/a	\$0
Earthquake	\$14,310	\$13,514	\$797	0.00	n/a
Hail	\$14,669	\$8,745	\$4,957	0.00	\$967
Heat Wave	\$102,398	\$295	\$96,851	0.01	\$5,253
Hurricane	\$866,633	\$694,986	\$26,205	0.00	\$145,442
Ice Storm	\$78,527	\$78,002	\$526	0.00	n/a
Landslide	\$11,617	\$5,494	\$6,122	0.00	n/a
Lightning	\$37,283	\$5,319	\$31,964	0.00	n/a
Riverine Flooding	\$386,530	\$260,816	\$82,749	0.01	\$42,965
Strong Wind	\$678,564	\$565,248	\$111,113	0.01	\$2,203
Tornado	\$418,209	\$262,312	\$152,875	0.02	\$3,022
Tsunami	--	--	--	--	--
Volcanic Activity	--	--	--	--	--
Wildfire	\$210	\$186	\$24	0.00	\$0
Winter Weather	\$25,225	\$23,326	\$798	0.00	\$1,101

Exposure Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	--	--	--	--	--
Coastal Flooding	\$0	\$0	\$0	0.00	n/a
Cold Wave	\$429,521,866,890	\$5,750,516,876	\$423,540,396,014	55,729.00	\$230,954,000
Drought	\$0	n/a	n/a	n/a	\$0
Earthquake	\$429,290,917,000	\$5,750,517,000	\$423,540,400,000	55,729.00	n/a
Hail	\$429,521,871,000	\$5,750,517,000	\$423,540,400,000	55,729.00	\$230,954,000
Heat Wave	\$429,521,866,890	\$5,750,516,876	\$423,540,396,014	55,729.00	\$230,954,000
Hurricane	\$428,693,727,131	\$5,733,031,813	\$422,732,450,169	55,622.69	\$228,245,149
Ice Storm	\$429,288,486,400	\$5,750,481,946	\$423,538,004,454	55,728.68	n/a
Landslide	\$34,587,686,152	\$451,582,836	\$34,136,103,316	4,491.59	n/a
Lightning	\$429,290,917,000	\$5,750,517,000	\$423,540,400,000	55,729.00	n/a
Riverine Flooding	\$11,639,660,796	\$198,381,528	\$11,435,877,641	1,504.72	\$5,401,627
Strong Wind	\$429,521,871,000	\$5,750,517,000	\$423,540,400,000	55,729.00	\$230,954,000
Tornado	\$429,521,871,000	\$5,750,517,000	\$423,540,400,000	55,729.00	\$230,954,000
Tsunami	--	--	--	--	--
Volcanic Activity	--	--	--	--	--
Wildfire	\$1,441,162,067	\$16,659,900	\$1,424,178,039	187.39	\$324,128
Winter Weather	\$429,521,866,890	\$5,750,516,876	\$423,540,396,014	55,729.00	\$230,954,000

Annualized Frequency Values

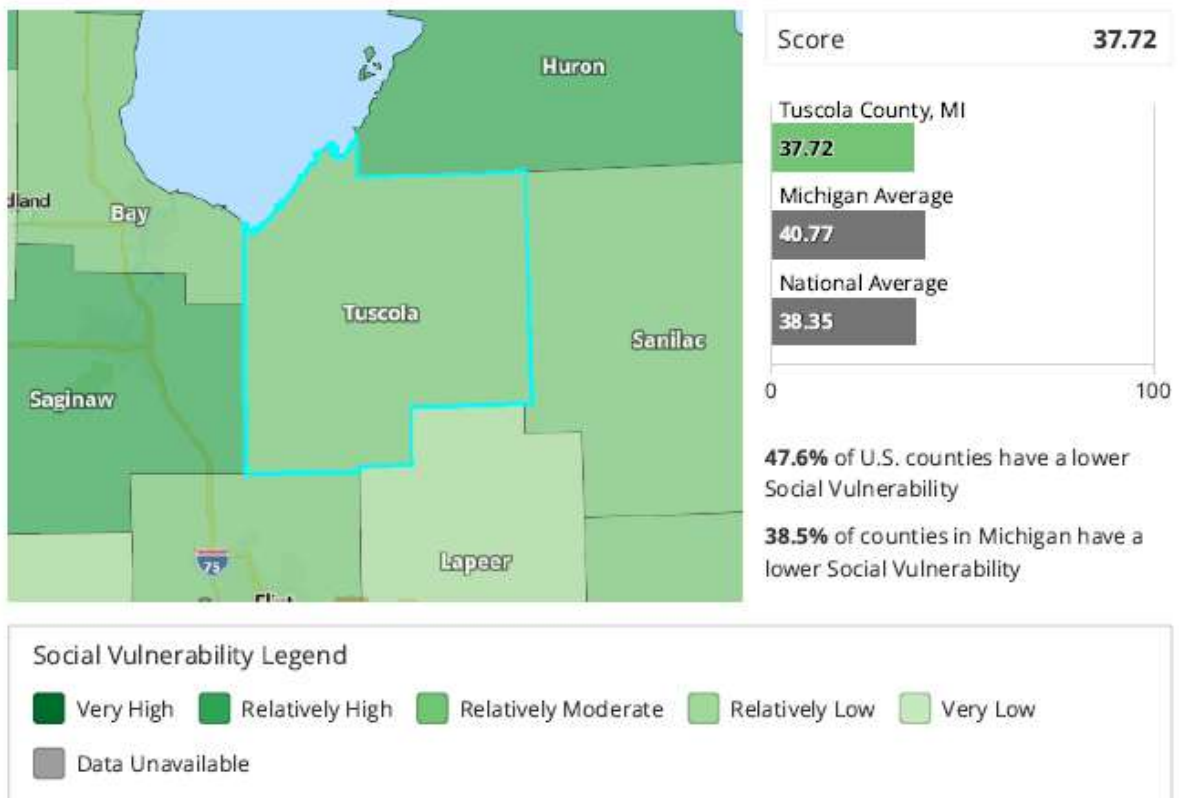
Hazard Type	Annualized Frequency	Events on Record	Period of Record
Avalanche	–	–	–
Coastal Flooding	0 events per year	n/a	Various (see documentation)
Cold Wave	0.7 events per year	8	2005-2017 (12 years)
Drought	0 events per year	0	2000-2017 (18 years)
Earthquake	0.017% chance per year	n/a	2017 dataset
Hail	2.3 events per year	73	1986-2017 (32 years)
Heat Wave	0.4 events per year	5	2005-2017 (12 years)
Hurricane	0 events per year	4	East 1851-2017 (167 years) / West 1949-2017 (69 years)
Ice Storm	0.7 events per year	47	1946-2014 (67 years)
Landslide	0 events per year	0	2010-2019 (10 years)
Lightning	32.2 events per year	709	1991-2012 (22 years)
Riverine Flooding	0.8 events per year	19	1996-2019 (24 years)
Strong Wind	3.7 events per year	120	1986-2017 (32 years)
Tornado	0.3 events per year	10	1986-2019 (34 years)
Tsunami	–	–	–
Volcanic Activity	–	–	–
Wildfire	Less than 0.001% chance per year	n/a	2016 dataset
Winter Weather	4.1 events per year	50	2005-2017 (12 years)

Historic Loss Ratios

Hazard Type	Overall Rating	Building Value	Population	Agriculture Value
Avalanche	–	–	–	–
Coastal Flooding	No Rating	\$4.51 per \$1K	1.18 per 100K	n/a
Cold Wave	Very Low	\$2.57 per \$10M	9.42 per 10M	\$5.94 per \$1M
Drought	No Rating	n/a	n/a	\$1.40 per \$1K
Earthquake	Very Low	\$1.68 per \$100	1.40 per 10K	n/a
Hail	Very Low	\$6.51 per \$10M	4.98 per 1B	\$1.83 per \$1M
Heat Wave	Very Low	\$1.24 per \$10M	5.55 per 10M	\$5.52 per \$100K
Hurricane	Relatively Low	\$6.75 per \$1K	3.45 per 1M	\$3.54 per \$100
Ice Storm	Very Low	\$1.87 per \$100K	1.69 per 1B	n/a
Landslide	Very Low	\$1.22 per \$1K	1.79 per 100K	n/a
Lightning	Very Low	\$2.78 per \$100M	2.25 per 1B	n/a
Riverine Flooding	Very Low	\$1.66 per \$1K	9.14 per 1M	\$1.00 per \$100
Strong Wind	Very Low	\$2.53 per \$100K	6.69 per 100M	\$2.53 per \$1M
Tornado	Very Low	\$1.51 per \$10K	1.20 per 1M	\$4.34 per \$100K
Tsunami	–	–	–	–
Volcanic Activity	–	–	–	–
Wildfire	Very Low	\$4.00 per \$10	6.04 per 10K	\$1.36 per \$100
Winter Weather	Very Low	\$9.85 per \$10M	4.57 per 10B	\$1.16 per \$1M

Social Vulnerability

Social groups in **Tuscola County, MI** have a **Relatively Moderate** susceptibility to the adverse impacts of natural hazards when compared to the rest of the U.S.



About the National Risk Index

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Explore the National Risk Index Map at hazards.fema.gov/nri/map.

Visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

Calculating the Risk Index

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience:

$$\text{Risk Index} = \text{Expected Annual Loss} \times \text{Social Vulnerability} + \text{Community Resilience}$$

Risk Index scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit hazards.fema.gov/nri/determining-risk.

Calculating Expected Annual Loss

Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios for 18 hazard types:

$$\text{Expected Annual Loss} = \text{Exposure} \times \text{Annualized Frequency} \times \text{Historic Loss Ratio}$$

Expected Annual Loss scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit hazards.fema.gov/nri/expected-annual-loss.

Calculating Social Vulnerability

Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).

For more information, visit hazards.fema.gov/nri/social-vulnerability.

Calculating Community Resilience

Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).

For more information, visit hazards.fema.gov/nri/community-resilience.

How to Take Action

There are many ways to reduce natural hazard risk through mitigation. Communities with high National Risk Index scores can take action to reduce risk by decreasing Expected Annual Loss due to natural hazards, decreasing Social Vulnerability, and increasing Community Resilience.

For information about how to take action and reduce your risk, visit hazards.fema.gov/nri/take-action.

Disclaimer

The National Risk Index (the Risk Index or the Index) and its associated data are meant for planning purposes only. This tool was created for broad nationwide comparisons and is not a substitute for localized risk assessment analysis. Nationwide datasets used as inputs for the National Risk Index are, in many cases, not as accurate as available local data. Users with access to local data for each National Risk Index risk factor should consider substituting the Risk Index data with local data to recalculate a more accurate risk index. If you decide to download the National Risk Index data and substitute it with local data, you assume responsibility for the accuracy of the data and any resulting data index. Please visit the [Contact Us](#) page if you would like to discuss this process further.

The methodology used by the National Risk Index has been reviewed by subject matter experts in the fields of natural hazard risk research, risk analysis, mitigation planning, and emergency management. The processing methods used to create the National Risk Index have produced results similar to those from other natural hazard risk analyses conducted on a smaller scale. The breadth and combination of geographic information systems (GIS) and data processing techniques leveraged by the National Risk Index enable it to incorporate multiple hazard types and risk factors, manage its nationwide scope, and capture what might have been missed using other methods.

The National Risk Index does not consider the intricate economic and physical interdependencies that exist across geographic regions. Keep in mind that hazard impacts in surrounding counties or Census tracts can cause indirect losses in your community regardless of your community's risk profile.

Nationwide data available for some risk factors are rudimentary at this time. The National Risk Index will be continuously updated as new data become available and improved methodologies are identified.

The National Risk Index Contact Us page is available at hazards.fema.gov/nri/contact-us.

Appendix 10

FEMA Flood Maps for Tuscola County

Location (Twp/Municipality)	Floodplain Map Panel Number	Page Number
Akron Twp	26157C0029E	252
Akron Twp	26157C0031E	253
Akron Twp	26157C0032E	254
Akron Twp	26157C0033E	255
Akron Twp	26157C0034E	256
Akron Twp	26157C0037E	257
Akron Twp	26157C0038E	258
Akron Twp	26157C0039E	259
Akron Twp	26157C0041E	260
Akron Twp	26157C0042E	261
Akron Twp	26157C0043E	262
Akron Twp	26157C0044E	263
Akron Twp	26157C0051E	264
Akron Twp	26157C0052E	265
Akron Twp	26157C0053E	266
Akron Twp	26157C0054E	267
Akron Twp	26157C0061E	268
Akron Twp	26157C0177E	269
Akron Twp	26157C0181E	270
Almer Twp	26157C0238E	271
Almer Twp	26157C0357E	272
Almer Twp	26157C0376E	273
Village of Cass City	26157C0258E	274

Location (Twp/Municipality)	Floodplain Map Panel Number	Page Number
City of Caro	26157C0238E	275
City of Caro	26157C0357E	276
City of Vassar	26157C0339E	277
City of Vassar	26157C0343E	278
City of Vassar	26157C0476E	279
City of Vassar	26157C0477E	280
City of Vassar	26157C0481E	281
Columbia Twp	26157C0061E	282
Denmark Twp	26157C0304E	283
Denmark Twp	26157C0308E	284
Denmark Twp	26157C0339E	285
Elkland Twp	26157C0253E	286
Elkland Twp	26157C0254E	287
Elkland Twp	26157C0257E	288
Elkland Twp	26157C0258E	289
Elkland Twp	26157C0259E	290
Elkland Twp	26157C0278E	291
Ellington Twp	26157C0234E	292
Ellington Twp	26157C0238E	293
Ellington Twp	26157C0239E	294
Ellington Twp	26157C0241E	295
Ellington Twp	26157C0242E	296
Ellington Twp	26157C0243E	297
Ellington Twp	26157C0253E	298

Location (Twp/Municipality)	Floodplain Map Panel Number	Page Number
Ellington Twp	26157C0261E	299
Ellington Twp	26157C0376E	300
Elmwood Twp	26157C0234E	301
Elmwood Twp	26157C0253E	302
Fremont Twp	26157C0362E	303
Fremont Twp	26157C0389E	304
Gilford Twp	26157C0154E	305
Gilford Twp	26157C0158E	306
Gilford Twp	26157C0159E	307
Gilford Twp	26157C0162E	308
Gilford Twp	26157C0164E	309
Gilford Twp	26157C0166E	310
Gilford Twp	26157C0167E	311
Gilford Twp	26157C0168E	312
Gilford Twp	26157C0178E	313
Indianfields Twp	26157C0354E	314
Indianfields Twp	26157C0357E	315
Indianfields Twp	26157C0358E	316
Indianfields Twp	26157C0359E	317
Indianfields Twp	26157C0362E	318
Indianfields Twp	26157C0376E	319
Juniata Twp	26157C0339E	320
Juniata Twp	26157C0343E	321
Juniata Twp	26157C0344E	322

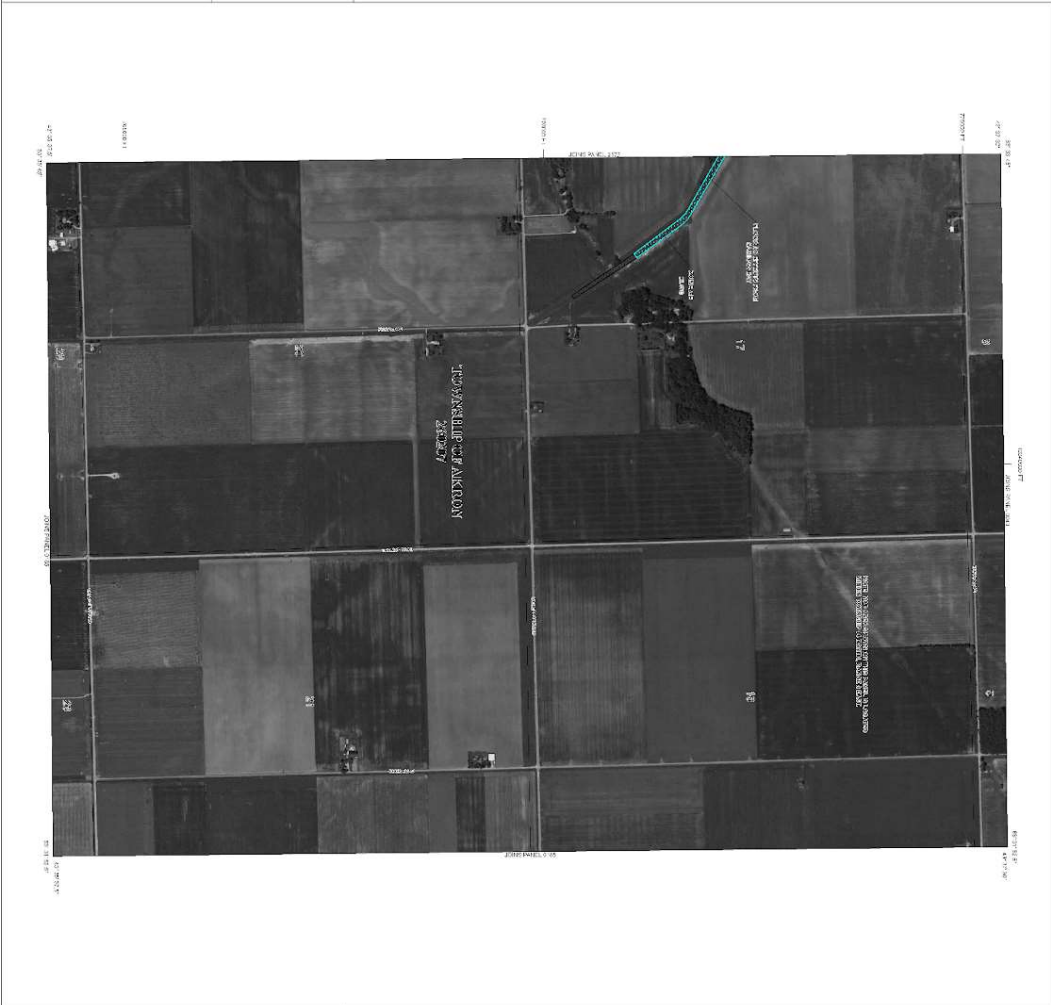
Location (Twp/Municipality)	Floodplain Map Panel Number	Page Number
Juniata Twp	26157C0354E	323
Juniata Twp	26157C0361E	324
Juniata Twp	26157C0362E	325
Juniata Twp	26157C0363E	326
Millington Twp	261570C0491E	327
Millington Twp	26157C0492E	328
Novesta Twp	26157C0253E	329
Novesta Twp	26157C0254E	330
Novesta Twp	26157C0258E	331
Novesta Twp	26157C0259E	332
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Novesta Twp	26157C0266E	334
Novesta Twp	26157C0267E	335
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Tuscola Twp	26157C0479E	344
Vassar Twp	26157C0339E	345
Vassar Twp	26157C0343E	346

Location (Twp/Municipality)	Floodplain Map Panel Number	Page Number
Vassar Twp	26157C0344E	347
Vassar Twp	26157C0363E	348
Vassar Twp	26157C0477E	349
Vassar Twp	26157C0479E	350
Vassar Twp	26157C0481E	351
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Vassar Twp	26157C0483E	353
Vassar Twp	26157C0484E	354
Vassar Twp	26157C0491E	355
Vassar Twp	26157C0492E	356
Village of Reese	26157C0304E	357
Village of Reese	26157C0308E	358
Village of Unionville	26157C0061E	359
Wells Twp	26157C0376E	360
Wisner Twp	26157C0019E	361
Wisner Twp	26157C0038E	362
Wisner Twp	26157C0039E	363
Wisner Twp	26157C0152E	364
Wisner Twp	26157C0154E	365
Wisner Twp	26157C0156E	366
Wisner Twp	26157C0157E	367
Wisner Twp	26157C0158E	368
Wisner Twp	26157C0159E	369
Wisner Twp	26157C0176E	370

Location (Twp/Municipality)	Floodplain Map Panel Number	Page Number
Wisner Twp	26157C0177E	371
Wisner Twp	26157C0178E	372

NOTES TO USERS

The information shown on this map is derived from the following sources: Aerial photography, ground surveys, and other data. The information is provided as a service to the public and is not intended to be used for any purpose other than that for which it was intended. The user assumes all responsibility for the use of the information. The information is not to be used for any purpose other than that for which it was intended. The user assumes all responsibility for the use of the information. The information is not to be used for any purpose other than that for which it was intended. The user assumes all responsibility for the use of the information.



LEGEND

- 1. FIRM (Flood Insurance Rate Map) - Flood Hazard Areas
- 2. Flood Hazard Areas - Flood Hazard Areas
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PANEL INDEX

FIRM FLOOD INSURANCE RATE MAP TUSCOLA COUNTY, MICHIGAN

MAP NUMBER: 26157C0181E

DATE: APRIL 2012

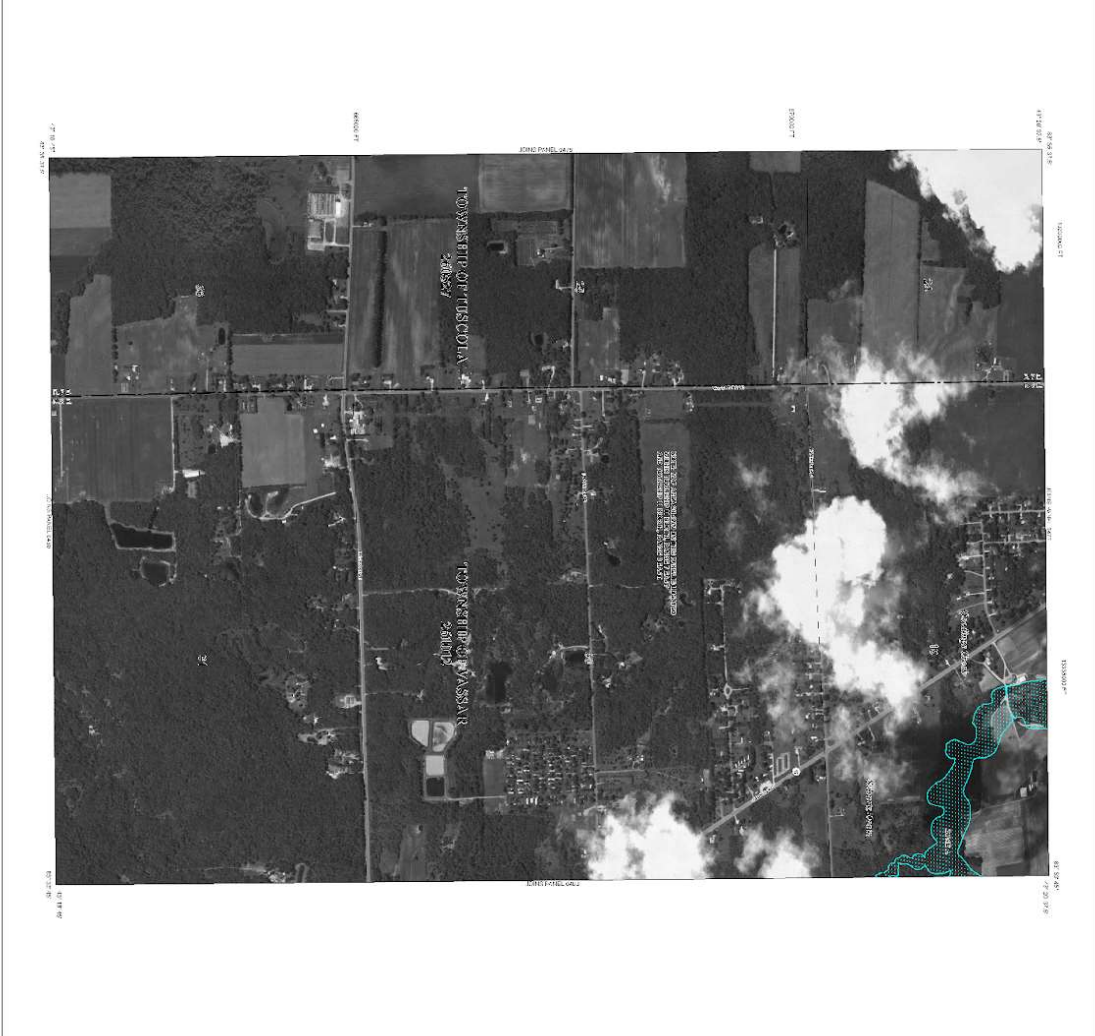
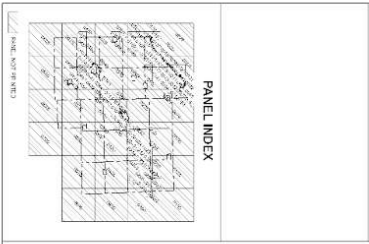
MAP NUMBER: 26157C0181E

DATE: APRIL 2012

Akron Twp - 26157C0181E

NOTES TO USERS

The data used in this map was obtained from the following sources: 1) Aerial photography from the Tuscola County GIS Department; 2) Data from the Michigan Department of Transportation (MDOT) for road centerlines and road names; 3) Data from the Michigan Department of Natural Resources (MDNR) for water bodies; 4) Data from the Michigan Department of Environment and Great Lakes Science (MDA) for flood hazard zones; 5) Data from the Michigan Department of Health and Human Services (MDHHS) for population density; 6) Data from the Michigan Department of Economic Development (MED) for land use; 7) Data from the Michigan Department of Transportation (MDOT) for road names; 8) Data from the Michigan Department of Natural Resources (MDNR) for water bodies; 9) Data from the Michigan Department of Environment and Great Lakes Science (MDA) for flood hazard zones; 10) Data from the Michigan Department of Health and Human Services (MDHHS) for population density; 11) Data from the Michigan Department of Economic Development (MED) for land use.



LEGEND

- FLOOD HAZARD ZONE (AS PER STATE OF MICHIGAN)
- ROAD CENTERLINE
- ROAD NAME
- WATER BODY
- POPULATION DENSITY
- LAND USE

FIRM

FLOOD INSURANCE RATE MAP

MUSKOGEE COUNTY,
(DALLAS COUNTY, TEXAS)

DATE: 07/18/2022

PROJECT: FIRM

SCALE: 1" = 100'

PROJECT LOCATION: TUSCOLA TWP, MICHIGAN

PROJECT NUMBER: 26157C0479E

PROJECT DATE: 07/18/2022

PROJECT STATUS: COMPLETE

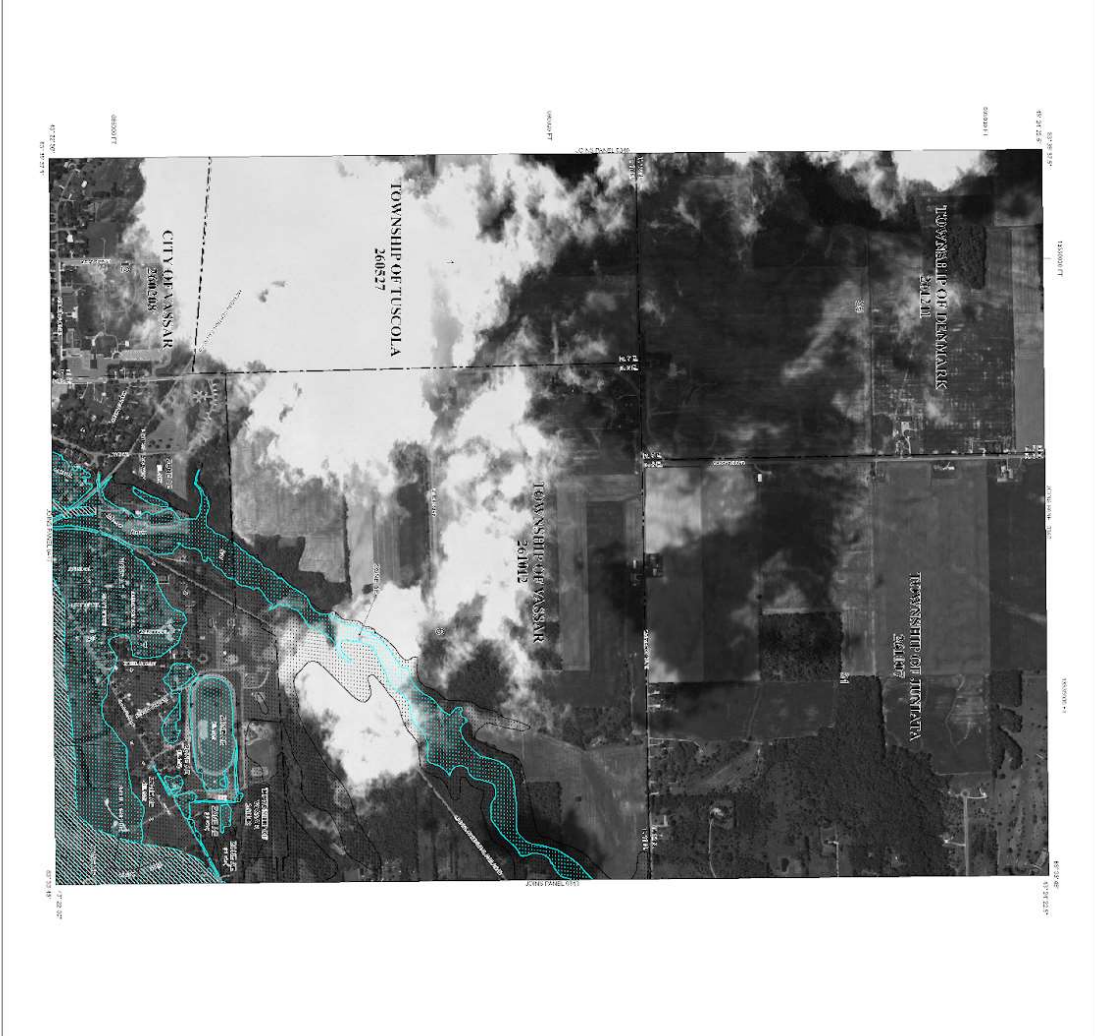
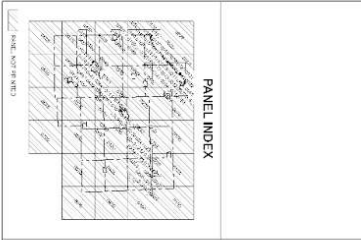
PROJECT CONTACT: KENNETH LEMMONS, Manager, Risk Management

Tuscola Twp - 26157C0479E

NOTES TO USERS

This map is a Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA) for Tuscola County, Michigan. It is based on data provided by the National Flood Insurance Program (NFIP) and is intended to be used for determining flood insurance rates. The map is not intended to be used for any other purpose, including but not limited to, engineering, construction, or other professional services. The map is not a warranty, guarantee, or endorsement of any product or service. The map is not a contract. The map is not a representation of the future. The map is not a prediction of the future. The map is not a forecast of the future. The map is not a guarantee of the future. The map is not a promise of the future. The map is not a statement of the future. The map is not a declaration of the future. The map is not a representation of the future. The map is not a prediction of the future. The map is not a forecast of the future. The map is not a guarantee of the future. The map is not a promise of the future. The map is not a statement of the future. The map is not a declaration of the future.

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LEGEND

Special Flood Hazard Areas (SFHA)

Zone A - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone B - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone C - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone D - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone E - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone F - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone G - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone H - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone I - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone J - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone K - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone L - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone M - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone N - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone O - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone P - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone Q - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone R - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone S - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone T - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone U - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone V - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone W - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone X - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone Y - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

Zone Z - Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood

FIRM

FLOOD INSURANCE RATE MAP

MUSKOGEE COUNTY,

ALABAMA

DATE: 01/18/2017

SCALE: 1" = 100'

PROJECT: 2017-01-18

MAP NUMBER: 2017-01-18

EFFENSIVE DATE: 01/18/2017

MAP NUMBER: 2017-01-18

EFFENSIVE DATE: 01/18/2017

MAP NUMBER: 2017-01-18

EFFENSIVE DATE: 01/18/2017

Vassar Twp - 26157C0339E

Appendix 11

Public Notifications about Hazard Mitigation Plan

News briefs

VFW spaghetti dinners set to resume

CASS CITY – Cass City VFW Post 3644 is restarting its monthly spaghetti dinners for the first time since the COVID-19 pandemic shut down the tradition more than two years ago.

Post member Phil Nicols invites the public to again participate in the dinners, which will be held on the third Wednesday of each month through October.

The dinners will be served from 4:30 to 6:30 p.m., with takeout orders available. More information is available by calling (989) 872-4933.

Fire department focus of meetings

ELMWOOD TOWNSHIP — During the last few meetings of the Elmwood Township Board, the agendas were dominated by issues related to the fire department.

Elmwood Township-Gagetown Fire Chief Trace Lopez informed the board he had applied for two grants for the department. One grant is through the state of Michigan for retention and training, and the other would fund roadside safety programs through AAA. He is waiting to hear back if his applications were successful.

He asked the board to approve an agreement with the fire academy at a cost of \$1,200. The request was approved.

Lopez explained the first department has five firemen who will be testing to receive Fire Instructor I certification. Once that is completed, the department will have almost half the certified Fire Instructor I personnel in the county, he said.

In addition, Lopez reported the fire department has completed the process of checking and certifying all air packs for another year.

Program set on Mighty Mac history

CASS CITY — “101 Things That Happened on the Mackinac Bridge” is the topic of a special program scheduled for Tuesday, May 3, starting at 7 p.m. at Rawson Memorial District Library.

The program, hosted by the Cass City Historical and Genealogy Society, will feature special speaker Mike Fornes.

A former reporter, Fornes has covered the Mackinac Bridge and the U.S. Coast Guard Cutter Mackinaw for 26 years via radio and television and for the Cheboygan Daily Tribune. He will discuss the bridge’s history, including strange crossings, tragedies and humorous events that have happened on the five-mile span.

Cooking for One series slated in May

CASS CITY — MSU Extension is planning to offer its Cooking for One series in Cass City.

The series is scheduled for Wednesdays — April 27, May 4, May 18, May 25, June 1 and June 8 — from 2 to 3:30 p.m. at the Hills and Dales General Hospital Regional Education Center (former Baker College campus building).

To register, call Nola at MSU Extension at (989) 672-3870 or email naemha5@msu.edu.

Whether you’re living on your own for the first time, a single college student, a hard-working adult or a senior on your own, this course is designed to teach ways to make cooking for yourself simple and enjoyable. Instructors will discuss helpful tips and tricks to making healthy choices, and guide students while participating in cooking real recipes.

The class is free, but everyone must pre-register.

Clean-up, tire collection set in town

CASS CITY — Cass City Village officials recently announced plans for this year’s “community clean-up” and a tire collection, both scheduled for Saturday, May 7, from 9 a.m. to 1 p.m. in the municipal building parking lot.

The community clean-up offers village and Eikland Township residents an opportunity to get rid of large items, including appliances.

Items that will be accepted include couches, mattresses, scrap metal,

Urges residents to get vaccinated

Health officials report state’s first pediatric flu death for ‘22

The Michigan Department of Health and Human Services (MDHHS) has confirmed the first influenza-associated pediatric death in Michigan for the 2021-2022 flu season.

The death, reported Friday, involved a child from Kalamazoo County who contracted Influenza A/H3. Nationally, there have been at least 16 influenza-associated pediatric deaths reported during the current flu season.

“Flu vaccine is a recommended childhood vaccine, and it is important to ensure that children are up-to-date with all of their vaccines,” said Dr. Natasha Bagdasarian, chief medical executive for MDHHS. “Once children reach six months of age, it is recommended they receive two doses of the flu vaccine for their first series.

In addition, pregnant women should get the flu vaccine during each pregnancy. Flu vaccine can be given at the same time as other vaccines, including the COVID-19 vaccine.”

Each year, influenza claims the lives of children across the United

States.

Increases in flu-like illness and hospitalizations are currently taking place in Michigan, which is not typical for this time of the year, according to MDHHS officials, who are continuing to strongly recommend that everyone six months of age and older get a seasonal flu vaccine.

“If you haven’t received your flu vaccine yet, there is still time to receive it. Flu can be serious and lead to severe illness and hospitalizations,” Bagdasarian said. “Flu vaccine is the best way to prevent getting the flu and can also reduce the severity of flu illness.”

There has been elevated flu activity across the country over the past few weeks, with Influenza A being the main flu type circulating.

The federal Centers for Disease Control and Prevention (CDC) estimates that since October, there have been at least 3.8 million flu illnesses, 1.8 million flu medical visits, 38,000 flu hospitalizations and 2,300 deaths from flu nationally.

Nearly all of the positive influenza specimens confirmed by

MDHHS Bureau of Laboratories this flu season have been Influenza A/H3 virus. This virus can cause severe flu infections in children, as well as in adults.

The influenza vaccine is especially important for persons at increased risk for complications from flu, including children, adults aged 65 years and older, persons of any age with underlying medical conditions and pregnant women.

Children less than six months of age are too young to be vaccinated and need to be protected by vaccination of their close contacts, including parents, siblings, grandparents, childcare workers and health care personnel.

Currently, for the 2021-2022 flu season, only 32 percent of Michigan residents have been vaccinated against flu. According to data from the Michigan Care Improvement Registry, flu vaccine coverage among children ages six months through 17 years is 5.4 percent lower for the 2021-2022 flu season (25.8 percent) compared to the 2020-2021 flu season (31.2 percent).

Emergency management officials update Tuscola’s hazard prep plan

by Mary Drier
For the Chronicle

Over the last several months, Tuscola County Emergency Services Director Deputy Steve Anderson has been steadily working on an update to the county’s hazard mitigation plan.

“Having an updated plan is required by FEMA (Federal Emergency Management Agency),” said Anderson who noted updates must be completed every five years.

Each county in the state has to adopt an updated plan.

Randy Miller, who is Huron County’s emergency manager and 911 director, developed a similar plan, which was approved by the Huron County Board of Commissioners earlier this spring.

Anderson, who has worked in co-

ordination with Miller, explained a hazard mitigation plan outlines the greatest potential threats and/or hazards in each county. The plan focuses on how to address the risks and impacts associated with those threats.

A key goal of the plan is to save lives and minimize property loss via a prompt and comprehensive response, as well as planning ahead before a situation becomes disastrous.

“By completing the hazard mitigation plan, Tuscola County and those local units of government within the county who adopt the plan, will maintain their eligibility for state and federal hazard mitigation funding,” Anderson pointed out.

A draft of the Tuscola County Hazard Mitigation Plan can be viewed online at:

<https://docs.google.com/document/d/1B80e1wipoNhJwzsg7QJZ5t1g1GCUtXmrKw-StkuF60/edit?usp=sharing>

Anyone who works or resides in Tuscola County is encouraged to review the draft hazard mitigation plan and provide feedback online to tuscolahazardmitigation@gmail.com.

Anderson pointed out the mitigation plan will be a key topic of discussion during a future Tuscola County Board of Commissioners meeting.

Once the plan is completed, it will be provided to FEMA.

Developing the plan took months of hard and coordinated work with various departments, so once the process is complete, local units of government are encouraged to adopt it as well.

TUSCOLA COUNTY

Residents asked to review county plan

By MARK HANEY | Reporter
haney@tcadvertiser.com

CARO — Steve Anderson wants to know what you think.

Tuscola County's director of emergency services, who also is a sheriff's deputy, wants to know what residents think of the county's proposed five-year hazard mitigation plan. That plan determines the greatest threats facing the county and what the county can do to mitigate those threats.

The Federal Emergency Management Agency requires those plans be updated every five years.

By completing the plan, the county and the local units of government which adopt the plan remain eligible for state and federal hazard mitigation funding.

Anyone who works, resides or visits Tuscola County is asked to take a look at the draft plan at <https://docs.google.com/document/d/1880e1wip0NhJwzXg7QQJZ5t1gtGCU/TXmrKwSTkuFd6o/edit?usp=sharing> and provide any feedback to tuscolahazardmitigation@gmail.com. There is also a short survey for the public to complete at <https://forms.gle/EvicaZPzXbnBfa3D8>.

The plan looks to weather as the biggest threat to the county, and finds the county at low risk to most weather-related threats except for wind and cold, which earn a relatively moderate threat level. Riverside flooding, tornadoes, ice storms and heat waves earn a

relatively low threat level.

Man-made threats, such as dam failures, get low threat levels in the updated plan.

The FEMA program is important because it includes grants to help with mitigation efforts. That program paid for a majority of the flood mitigation work in the city of Vassar several years ago. Anderson said the state still uses it as an example.

Real Estate One

Gary King
Owner/Broker
989-432-2485
garyking@realty.com
mike@realty.com

Kristine Chapelo
Associate Broker
989-432-2422
kristine@realty.com
mike@realty.com

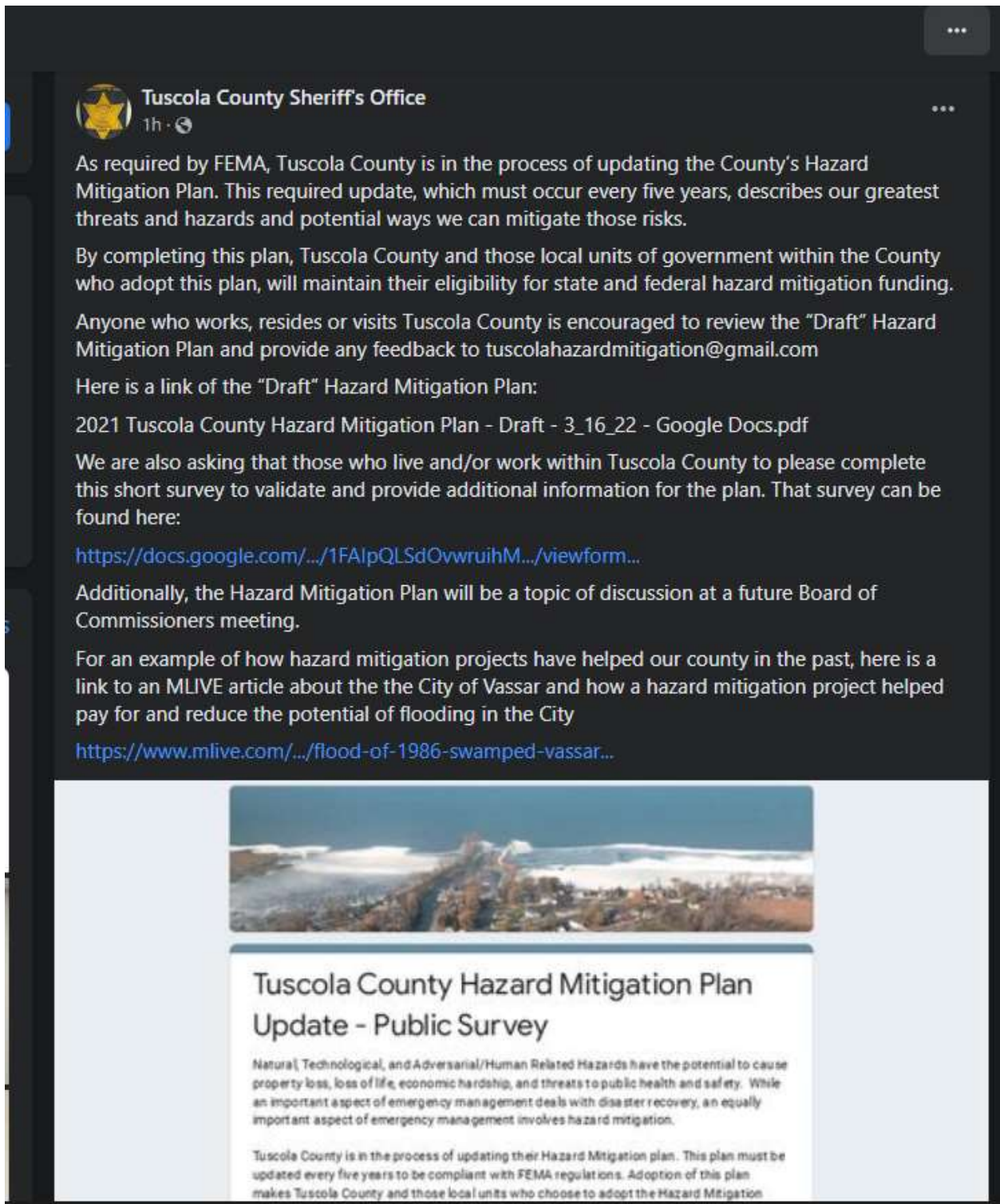
Rick Pullz
Associate Broker
989-432-2422
rick@realty.com
mike@realty.com

Brian Rickwalt
Associate Broker
989-432-2422
brian@realty.com

Tiffany Leyva
Sales Representative
989-432-2422
tiffany@realty.com

Walt Wandallak
Sales Representative
989-432-2422
walt@realty.com

361 N. State St. Caro, MI 48723
989-432-6000 - realty.com/ncaro



Tuscola County Sheriff's Office
1h · 🌐

As required by FEMA, Tuscola County is in the process of updating the County's Hazard Mitigation Plan. This required update, which must occur every five years, describes our greatest threats and hazards and potential ways we can mitigate those risks.

By completing this plan, Tuscola County and those local units of government within the County who adopt this plan, will maintain their eligibility for state and federal hazard mitigation funding.

Anyone who works, resides or visits Tuscola County is encouraged to review the "Draft" Hazard Mitigation Plan and provide any feedback to tuscolahazardmitigation@gmail.com

Here is a link of the "Draft" Hazard Mitigation Plan:

[2021 Tuscola County Hazard Mitigation Plan - Draft - 3_16_22 - Google Docs.pdf](#)


We are also asking that those who live and/or work within Tuscola County to please complete this short survey to validate and provide additional information for the plan. That survey can be found here:

<https://docs.google.com/.../1FAIpQLSdOvvruihM.../viewform...>

Additionally, the Hazard Mitigation Plan will be a topic of discussion at a future Board of Commissioners meeting.

For an example of how hazard mitigation projects have helped our county in the past, here is a link to an MLIVE article about the the City of Vassar and how a hazard mitigation project helped pay for and reduce the potential of flooding in the City

<https://www.mlive.com/.../flood-of-1986-swamped-vassar...>



Tuscola County Hazard Mitigation Plan Update - Public Survey

Natural, Technological, and Adversarial/Human Related Hazards have the potential to cause property loss, loss of life, economic hardship, and threats to public health and safety. While an important aspect of emergency management deals with disaster recovery, an equally important aspect of emergency management involves hazard mitigation.

Tuscola County is in the process of updating their Hazard Mitigation plan. This plan must be updated every five years to be compliant with FEMA regulations. Adoption of this plan makes Tuscola County and those local units who choose to adopt the Hazard Mitigation



As required by FEMA, Tuscola County is in the process of updating the County's Hazard Mitigation Plan. Thi...

Published by Steve Anderson · April 7 at 10:00 AM ·

Post Impressions

4,652

Post Reach

4,382

Post Engagement

107

Interactions



18



0



0



0



0



0



Reactions

18



Comments

0



Link Clicks

66



Shares

8



Other Clicks


15

Tuscola County Central Dispatch Facebook Post - April 7, 2022 at 1358 hrs.

Tuscola County, Michigan 911 Central Dispatch
April 7 at 1:58 PM · 🌐

Tuscola County Sheriff's Office
April 7 at 10:00 AM · 🌐

As required by FEMA, Tuscola County is in the process of updating the County's Hazard Mitigation Plan. This required update, which must occur every five years, ... [See more](#)



Tuscola County Hazard Mitigation Plan Update - Public Survey

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This anonymous survey was developed to assist in providing and verifying data within the plan.

DOCS.GOOGLE.COM

Tuscola County Hazard Mitigation Plan Update - Public Survey

Natural, Technological, and Adversarial/Human Related Hazards have the potential to cause pr...

👍 1

👍 Like 💬 Comment ➦ Share 🍔



Tuscola County Sheriff's Office

Published by Steve Anderson · April 26 at 8:55 AM · 🌐



As required by FEMA, Tuscola County is in the process of updating the County's Hazard Mitigation Plan. This required update, which must occur every five years, describes our greatest threats and hazards and potential ways we can mitigate those risks.

By completing this plan, Tuscola County and those local units of government within the County who adopt this plan, will maintain their eligibility for state and federal hazard mitigation funding.

Anyone who works, resides or ... [See more](#)



MLIVE.COM | BY ISIS SIMPSON

Flood of 1986 swamped Vassar. How this small town fixed its water problem

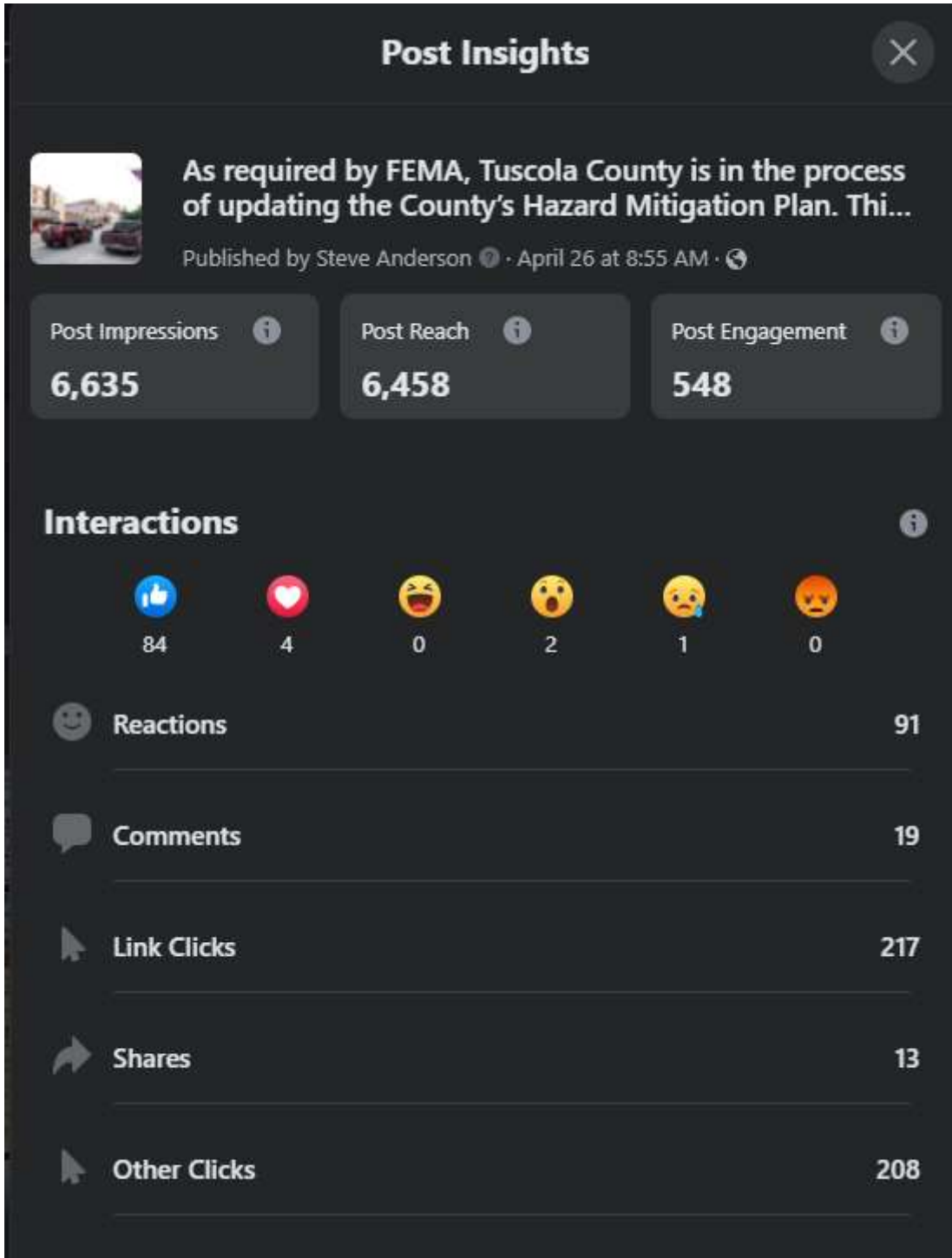
Before fixing a drain through town, the city regularly experienced flooding.

[See Insights](#)

[Boost post](#)

39

5 Comments 13 Shares



Appendix 12

Public Survey & Comments Results

Tuscola County Hazard Mitigation Plan Update - Public Survey

Natural, Technological, and Adversarial/Human Related Hazards have the potential to cause property loss, loss of life, economic hardship, and threats to public health and safety. While an important aspect of emergency management deals with disaster recovery, an equally important aspect of emergency management involves hazard mitigation.

Tuscola County is in the process of updating their Hazard Mitigation plan. This plan must be updated every five years to be compliant with FEMA regulations. Adoption of this plan makes Tuscola County and those local units who choose to adopt the Hazard Mitigation Plan eligible for mitigation grant funding.

This anonymous survey was developed to assist in providing and verifying data within the plan.

* Required

1. Do you live or work in Tuscola County?

Mark only one oval.

- Live in Tuscola County
 Work in Tuscola County

2. How long have you lived or worked in Tuscola County?

Mark only one oval.

- 0-5 years
 6-10 years
 11-15 years
 16-20 years
 21-25 years
 26 + years

Natural Hazards

City of Vassar 1986 Flood (tuscolatoday.com)



3. Several Natural Hazards have been identified that have occurred (or potentially could occur) in Tuscola County in the last twenty years . Please check all of these natural hazard events that you have experienced in those 20 years. *

Check all that apply.

- Thunderstorms/Lightning/Hail
- Heavy Snow/Blizzard
- Severe Wind
- Cold/Wind Chill
- Flood
- Extreme Heat
- Tornadoes
- Ice Storms
- Shoreline Flooding
- Drought
- Wildfire/Grass Fire
- Earthquakes

4. From the list of natural hazards, which three are of the biggest concern to you? *

Check all that apply.

- Thunderstorms/Lightning/Hail
- Heavy Snow/Blizzard
- Severe Wind
- Cold/Wind Chill
- Flood
- Extreme Heat
- Tornadoes
- Ice Storms
- Shoreline Flooding
- Drought
- Wildfire/Grass Fire
- Earthquakes

Technological Hazards

Video Venture Fire - Village of Reese May 2015



5. Several Technical Hazards have also been identified that have occurred, or potentially could occur in Tuscola County in the last twenty years . Please check all of these technical hazard events that you have experienced in those 20 years. *

Check all that apply.

- Air-Land-Water Transportation Accidents
- Structure Fire
- Transportation Hazardous Materials Incident
- Fixed Site Hazardous Materials Incident
- Infrastructure Failures
- Dam Failures
- Oil & Gas Well Incidents
- Oil & Gas Pipeline Accident
- Scrap Tire Fire
- Other: _____

6. From the list of technical hazards, which three are of the biggest concern to you? *

Check all that apply.

- Air-Land-Water Transportation Accidents
- Structure Fire
- Transportation Hazardous Materials Incident
- Fixed Site Hazardous Materials Incident
- Infrastructure Failures
- Dam Failures
- Oil & Gas Well Incidents
- Oil & Gas Pipeline Accident
- Scrap Tire Fire

Adversarial / Human Related Hazards



7. Several Adversarial/Human Related hazards have also been identified that have occurred, or potentially could occur in Tuscola County in the last twenty years . Please check all of these technical hazard events that you have experienced in those 20 years.

Check all that apply.

- Pandemic/Public Health Emergency
- Cyber Security
- Active Assailant Event
- Civil Disturbance
- Other: _____

8. From the list of Adversarial/Human Related hazards , which three are of the biggest concern to you? *

Check all that apply.

- Pandemic / Public Health Emergency
- Cyber Security
- Active Assailant Event
- Civil Disturbance

General Questions

9. Have you ever received information about how to make you, your home and/or business safer from any of the above hazards? *

Mark only one oval.

Yes

No

10. Who would you most trust to provide you with information about how to make you, your family, and/or home safer from these hazards? (Check all that apply) *

Check all that apply.

News Media

University or research institution

Government Agency

Insurance Company/Agent

American Red Cross

Other non-profit

Other: _____

Tuscola County Hazard Mitigation Plan Update - Public Survey

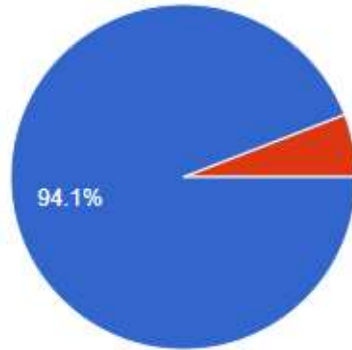
51 responses

[Publish analytics](#)

Do you live or work in Tuscola County?

 Copy

51 responses

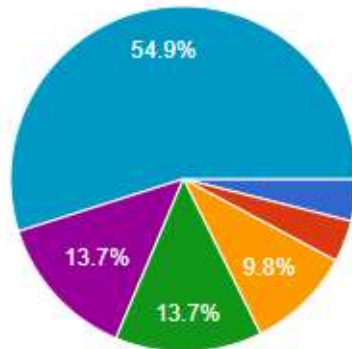


- Live in Tuscola County
- Work in Tuscola County

How long have you lived or worked in Tuscola County?

 Copy

51 responses



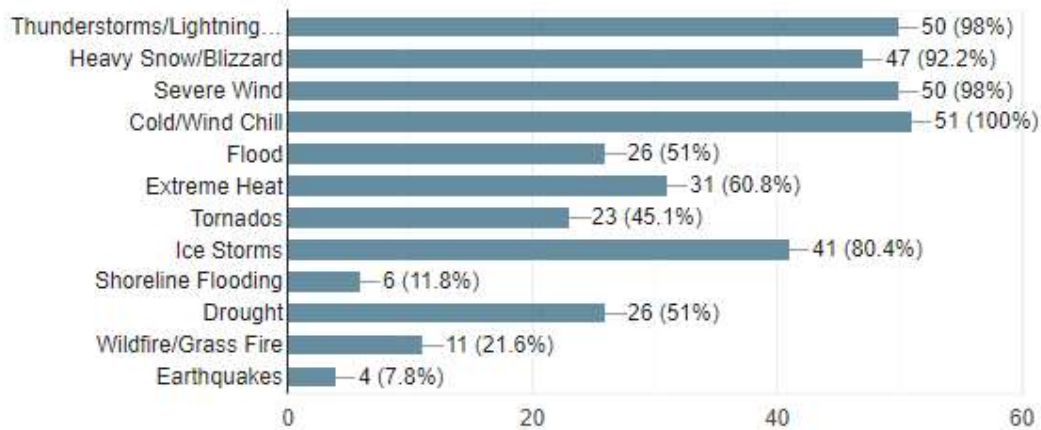
- 0-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- 21-25 years
- 26+ years

Natural Hazards

Several Natural Hazards have been identified that have occurred (or potentially could occur) in Tuscola County in the last twenty years . Please check all of these natural hazard events that you have experienced in those 20 years.



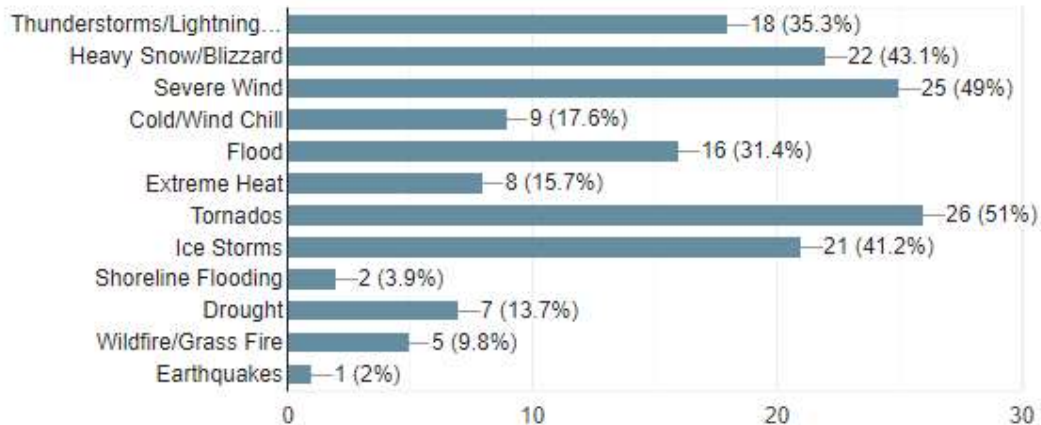
51 responses



From the list of natural hazards, which three are of the biggest concern to you?



51 responses

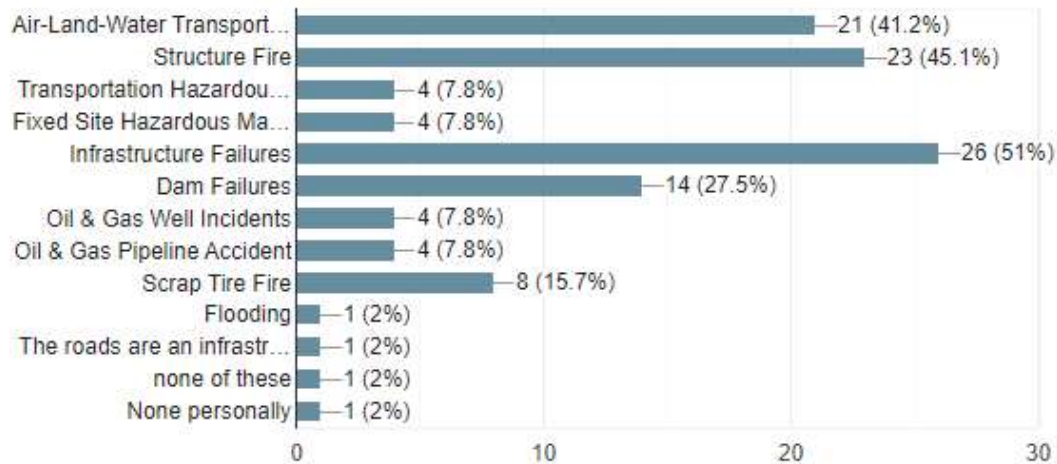


Technological Hazards

Several Technical Hazards have also been identified that have occurred, or potentially could occur in Tuscola County in the last twenty years . Please check all of these technical hazard events that you have experienced in those 20 years.



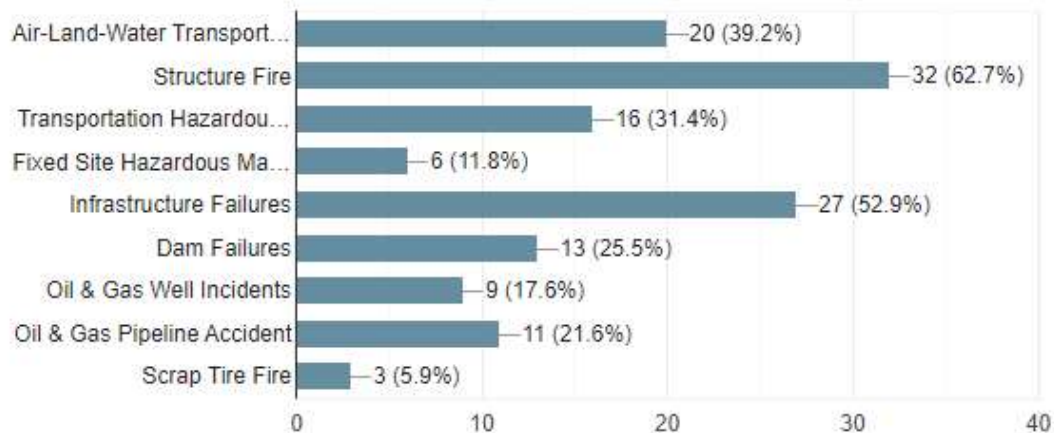
51 responses



From the list of technical hazards, which three are of the biggest concern to you?



51 responses

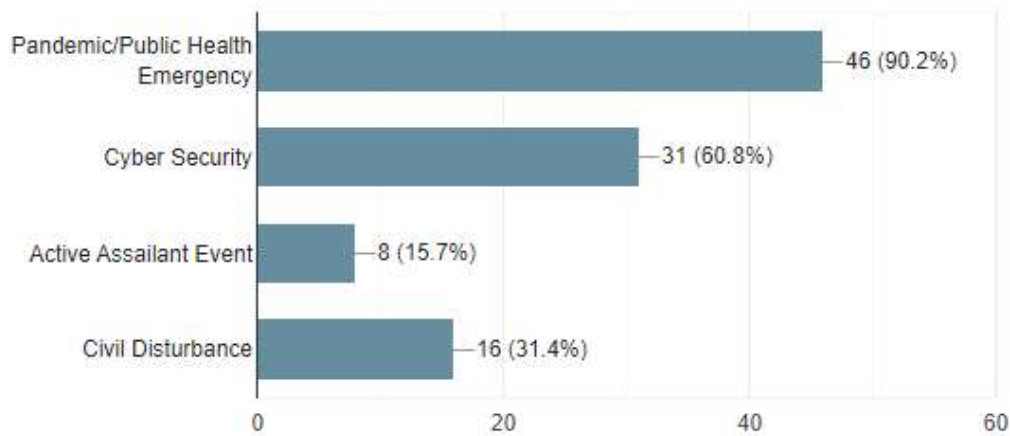


Adversarial / Human Related Hazards

Several Adversarial/Human Related hazards have also been identified that have occurred, or potentially could occur in Tuscola County in the last twenty years . Please check all of these technical hazard events that you have experienced in those 20 years.



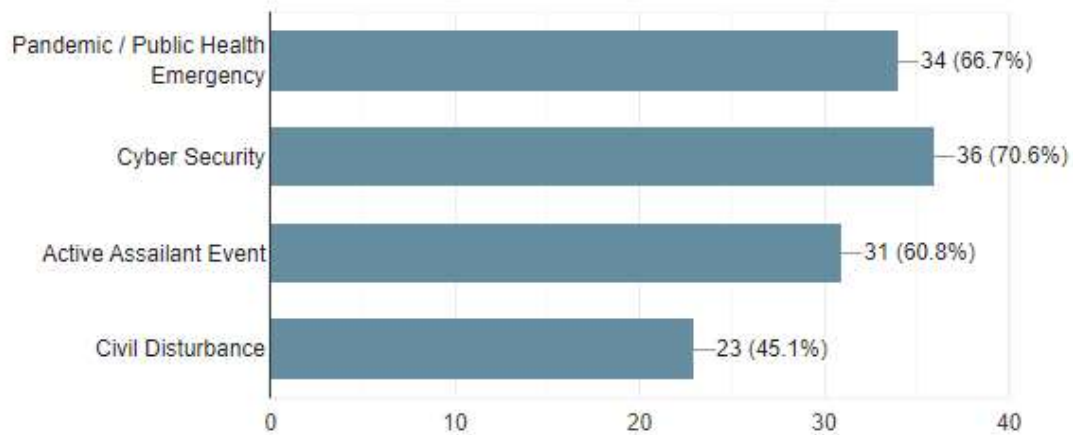
51 responses



From the list of Adversarial/Human Related hazards , which three are of the biggest concern to you?



51 responses

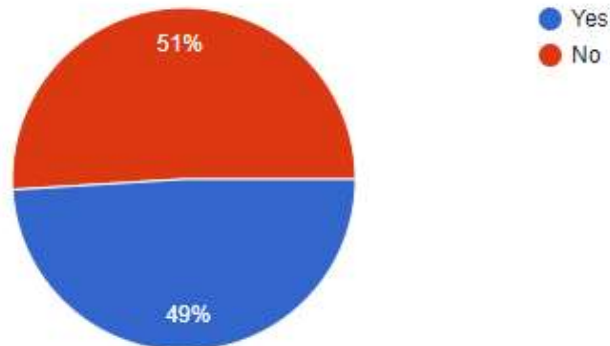


General Questions

Have you ever received information about how to make you, your home and/or business safer from any of the above hazards?

 Copy

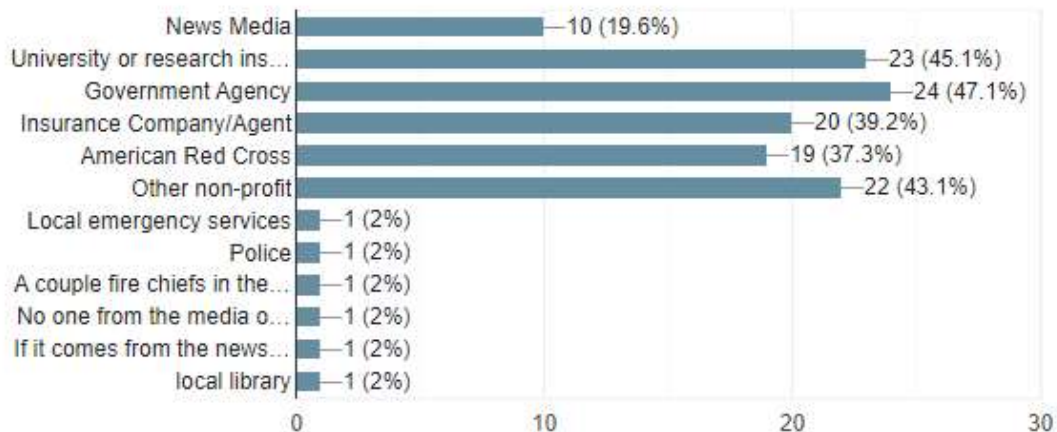
51 responses



Who would you most trust to provide you with information about how to make you, your family, and/or home safer from these hazards? (Check all that apply)

 Copy

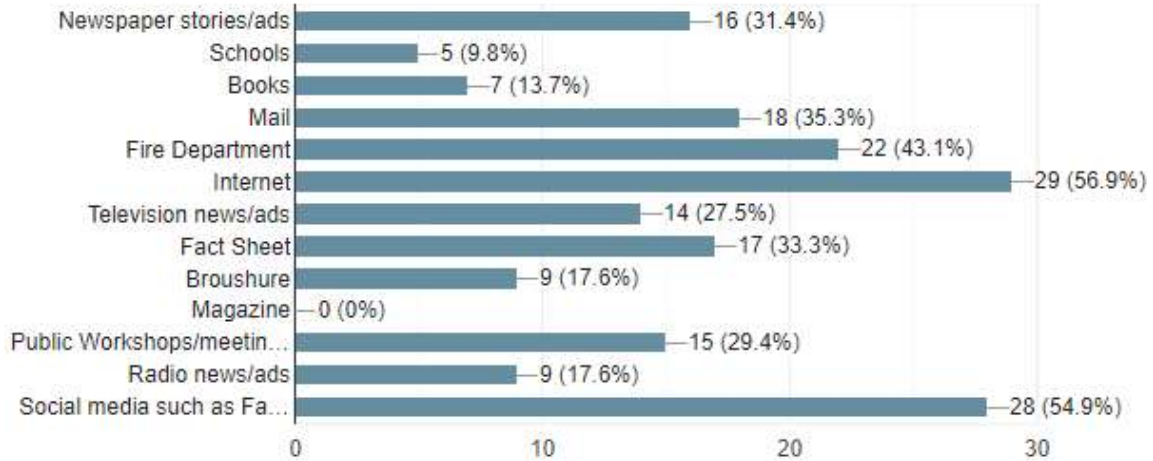
51 responses



What is the most effective way for you to receive information about how to make you, your home or business safer from these hazards? (check all that apply)



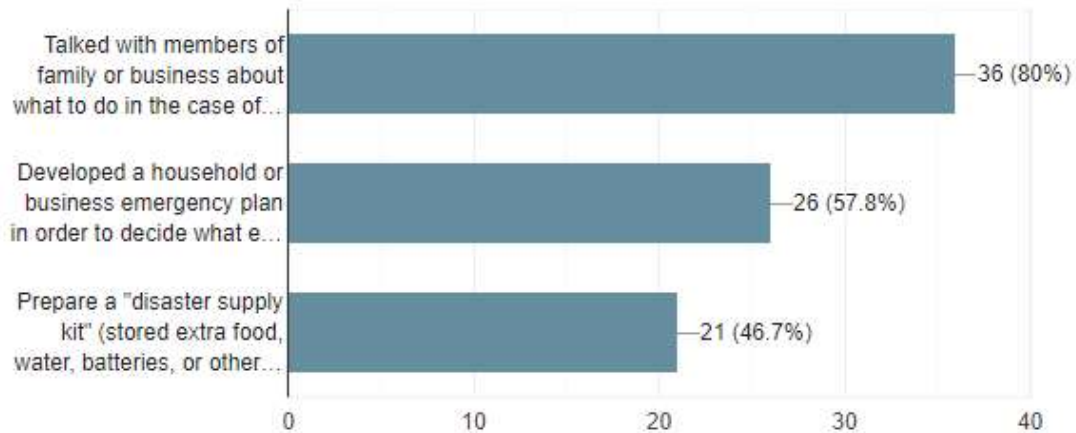
51 responses



Have you, your home or business done any of the following: (check all that apply)



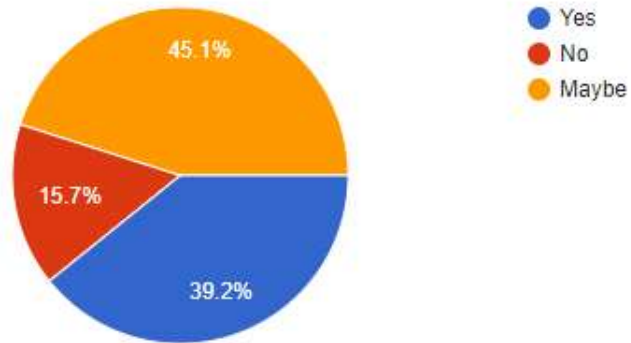
45 responses



Overall, do you feel prepared in the event one of the above hazardous events should occur

 Copy

51 responses



In your opinion, what would help Tuscola County become more resilient in the event of any of these hazards were to occur?

29 responses

Everything

For the county to actively respond to incidents and to inform the public. Also, create a survey that works, second to last question required an answer, I have not done any of those but I'm required to check one. Great example of inaccurate information. Tuscola county failed during the pandemic, road maintenance and general transparency, I'm now certain those in charge aren't skilled or knowledgeable enough to put a sufficient plan together to protect its citizens. God help us

Better emergency response info

If they would be more prepared and with a quicker response time.

People having more access to information about the events that could impact them, such as weather or a place nearby that houses explosive materials. Knowing what's going on in the area surrounding your home would be invaluable.

Offer training courses on how to deal with them

Adequate staffing of Fire Departments this would require paid positions, EMS staffing of available rigs for 911 services, this would require county/township officials not be "sold" and sugar coated by salesman from private and volunteer ambulances that are non existent. Proper staffing of road patrol deputies to patrol the entire county and each region of the county to have available road patrol 24/7. Local PD is predictable as they are not 24/7.

Get more community members involved in drills/exercises instead of only organization and first responders. People learn from doing.

Additional mobile response units with supplied.

More free resources to educate and workshops to help those that want to learn hands on

Have a community plan

Local news or app to be informed. Better back roads in case of an emergency and ditches cleaned out to prevent local flooding.

Hosting public forums/townhall meetings to get opinions and comments from the public.

I trust the fire department to help and serve there community. Give them the supplies and facilities to help with a huge natural disaster.

Need a place for elderly and homeless to go

Need to have a standard response for first responders. Every fire chief has their way of doing things, TCSO is going to do things different than the MSP..we all need to train together multiple times and have ONE way to do it. So when it hits the fan, every department/agency knows exactly what the other department/agency is doing. I also think that community communication is key as well...notify early and keep constant updates going to them.

Water mitigation and infrastructure updates

yes

Educating the public about where to access emergency management information in the event of an actual emergency.

Nothing

Have a prepared plan of action with trial runs, emergency list mailing to residents.

Provide preparedness information to the citizens through public workshops and brochures. Compile a list of non-profit organization and churches who would be able to assist the community in the event of an emergency and organize the organizations to be able to better serve the public if the need arises.

Setting up a plan and getting everyone on the same plan. No different than doing school fire or tornado drills

A shelter for people w/o basements

I think it's important to stress the need for individuals to have a good and water storage that can last their family In case of a supply chain issue, or much worse. That and the ability to defend and protect yourself.

Be better prepared for the coming effects of climate change

Education

Training for emergencyworkers, information to residents

not sure

Appendix 13

Local Unit of Government Hazard Mitigation Plan “Participation” Emails

****IMPORTANT-PLEASE READ** Hazard Mitigation Plan Update**

41 messages

Steve Anderson <tcemanderson@tuscolacounty.org> Tue, Mar 29, 2022 at 12:25 PM
To: Jesse Robinson <jvrobinson13@gmail.com>, Russell Speirs <ellingtonsupervisor@gmail.com>, Theresa Bauer <treasurer@denmarktp.org>, Thomas Raymond <manager@villageoffreese.us>, Carrie Petzold <cpetzold@millingtontownship.com>, Steven Schwab <trustee@denmarktp.org>, Kayla Reed <clerk@villageofmayville.org>, Chad Daniels <cdaniels@casscityschools.org>, Russell Rienas <flashtheoiler@hotmail.com>, Chris Graff <elmwoodtpw@gmail.com>, Charles Heinlein <supervisor@denmarktp.org>, Barbara Valentine <bvalentine@villageofmayville.org>, Jeff Bassett <jbassett.vbc@gmail.com>, Kathy Trischler <acwclerk@att.net>, Joe Greene <jgreene@carocity.net>, kathryn Sattelberg <ksattelberg@yahoo.com>, Shelly Hicks <clerk@tuscolatownship.org>, Ed Hunt <echunt80@gmail.com>, Sarah Donovan <treasurer@fairgrovetwp.org>, Matt Prime <unionville.prime@outlook.com>, Pamela Brinkman <elmwoodclerk@gmail.com>, Pam Shook <shookpj1@gmail.com>, Leila Rish <uvilletreas@airadvantage.net>, Chris Ranney <clerk@villageoffreese.us>, Art Graff <graffandsons@gmail.com>, Mike Damm <mdamm@cityofvassar.org>, Judy Cockerill <treasjudy@juniatatownship.org>, Matthew Blatt <supervisor@fremonttownship.org>, deana Jacoby <treasurer@akrontwp.com>, Chuck Fabbro <cfabbro@cityofvassar.org>, Nanette Walsh <occtreasurer@casscity.org>, John Stack <treasurer@vassartownship.org>, Malisa Pyles <clerk@watertowntownship.org>, Deborah Pounds <clerk@vassartownship.org>, Kristen Nelson-Young <villageoffairgrove@gmail.com>, Robin Wallace <ocvillage@casscity.org>, Deidra Zdrojewski <dazdrojewski@gmail.com>, Kaylene Long <vom_clerk@millingtonvillage.org>, Andrew Niedzinski <citymanager@cityofvassar.org>, Albert Pearsall <trustee@wellstwp.org>, Carrie Gilley <kingstontwp@airadv.net>, Amy Holbrook <clerk@fremonttownship.org>, Karen Varney <supervisor@wellstwp.org>, Rex Vroman <koylontwp.clerk@gmail.com>, Merri Lemcke <mlemcke@cityofvassar.org>, indianfieldstowship@gmail.com, Bruce Foether <supervisor@vassartownship.org>, Jim Stockmeyer <gilfordtpw@airadv.net>, Christine Kolar <ckolar@airadvantage.net>, Hazel Schlosser <treasurer@watertowntownship.org>, Cory Skinner <cskinner@kingstonk12.org>, Suzy Rockwell <ellingtonclerk@gmail.com>, Jim Mantey <jmifbi@gmail.com>, Rita Dickinson <dickinsonr@villageofakron.org>, Brenda Bigham <clerkbrenda@juniatatownship.org>, Jamie Schuette <akrontownship@yahoo.com>, Debbie Powell <ocmanager@casscity.org>, Anthony Shaver <daytowntownshipclerk@gmail.com>, Pat Witkovsky <almetreasurer@almetownshipmich.org>, Heather Severence <elklandclerk@gmail.com>, Keith Aeder <supervisor@fairgrovetwp.org>, Jackie Sabgash <clerk@millingtontownship.com>, Paul Keast <bangkeast@aol.com>, Steve Linzner <slinzner@hotmail.com>, Matthew Lane <Milane@carocity.net>, Lisa Geiger <juniatalisa@juniatatownship.org>, Renee Schiefer <clerk@denmarktp.org>, Carrie Hines <hinescarrie@yahoo.com>, Shari Hadaway <villageofakron@airadv.net>, Robert Loomis <supervisor@millingtontownship.com>, Ben Guile <bguile@cityofvassar.org>, Shari Blonde <koylontwptreasurer.mi@gmail.com>, Katie Gebhardt <clerk@fairgrovetwp.org>, Pennie Rienas <novestatownshipclerk@gmail.com>, Michele Perry <mperry@carocity.net>, Lisa Valentine <lisa@lindyssales.com>, Tod Fackler <tofackler@sboglobal.net>, Peggy Reavey <almetownshipclerk@gmail.com>, Jessica VanHove <uvilleclerk@airadvantage.net>, Allen Green <millingtontownship@millingtontownship.com>, Carmen Stevens <clerk@wellstwp.org>, Stephanie Bruce <treasurer@wellstwp.org>, Rita Papp <rpapp@carocity.net>, Christina Parmenter <treasurer@columbiatownshipmi.com>, Jody Hunt <arbelatowship@hotmail.com>, Carmell Pattullo <ellingtontreasurer@gmail.com>, Candra Franzel <treasurer@fremonttownship.org>, William Campbell <abcamp1937@gmail.com>, Kristine King <indianfieldstwp@treasurer@gmail.com>, Timmy Rumble <supervisor.wisner.twp@gmail.com>, Ed Rievert <eddo1963@yahoo.com>

Greetings,

As we slowly go through the process of getting the Hazard Mitigation Plan updated, some new information from FEMA will be of interest to you, the local units of government.

In order to eventually adopt this version of the hazard mitigation plan at the local level, FEMA is now requiring that local units of government **MUST** now "participate" with the plan. But unfortunately this is not simply filling out a survey and calling it participation as in the past.

Now each local unit of government **MUST** select an Action Plan Item from Chapter 7 of the current "draft" plan. This Action Plan Item must be an item that your local unit of government is willing to "participate in" or accomplish in the next five years. (Hazard Mitigation Plan is updated every five years)

This text is taken directly from Huron County's FEMA review (they are slightly ahead of us in the hazard mitigation plan approval process)

"The local units of government that did not participate in the current plan's planning process will not be eligible to adopt this plan during its lifespan, even if they decide to participate in hazard mitigation efforts over the next 5 years. If a jurisdiction did not participate in the planning process, and wishes to be annexed into the plan, they must complete a separate planning process and provide additional information."

The Action Plan Items are the following:

1. Test, expand, and update the current countywide warning system
2. Hardening and reinforcing of critical infrastructure such as water & sewer facilities and local units of government facilities.
3. Encourage the establishment of heating and cooling shelters for vulnerable populations.
4. Update and continue integration of Critical Infrastructure data into the County GIS System
5. Participate and encourage joining the National Flood Insurance Program
6. Increase/continue with community preparedness and other hazard mitigation projects
7. Integration of Hazard Mitigation concepts into local master plan updates or other pertinent plans
8. Identify special needs populations
9. Repetitive Flood Damage Mitigation
10. Flood Drainage Expansion

In attempts to simplify this process I made the following survey which gives examples of each "Action Plan Item". Also, I need only one response per local unit of government:
(If none of the above Action Plan Items work for your unit of government, there is a space provided in the survey to list your own Action Plan Item.)

https://docs.google.com/forms/d/e/1FAIpQLSfpVo4iSNCL_8q8PhXTHCvDjjM827rarH98Jvym2fbTyVCqIQ/viewform?usp=sf_link

For your viewing pleasure, here is a link to the current Hazard Mitigation Plan Draft (Chapter 7 is located on pages 136-140):

<https://docs.google.com/document/d/1B80e1wipoNhJwzXg7QQJZ5t1gtGCUTXmrKwSTkuFd6o/edit>

This survey will close on April 30, 2022. If I receive no response, it will be presumed that your local unit of government does not wish to participate or adopt the Hazard Mitigation Plan after FEMA's approval.

I have also provided some links to other pertinent information that maybe useful...

If you have any questions, please email me at tcemanderson@tuscolacounty.org





Steve

-

Deputy Steven Anderson
Emergency Manager
420 Court St. Suite #1
Caro, MI 48723
Office # 989-673-5181
Cell # 989-450-0147
Fax # 989-673-8164

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4 attachments

-  **Michigan_Hazard_Mitigation_Success_Stories_May_2011_Final_Edition_web_355580_7.pdf**
4015K
-  **fema_integrating-hazard-mitigation_case-studies_tools-community-officials.pdf**
9282K
-  **local-hazard-mitigation-planning-factsheet.pdf**
441K
-  **fema_summary-fema-hazard-mitigation-assistance-grant-programs_032321.pdf**

Hazard Mitigation Plan - Action Plan Item Update

7 messages

Steve Anderson <tcemanderson@tuscolacounty.org> Mon, Apr 18, 2022 at 1:24 PM
To: Jesse Robinson <jvrobinson13@gmail.com>, Russell Speirs <ellingtonsupervisor@gmail.com>, Theresa Bauer <treasurer@denmarktwp.org>, Thomas Raymond <manager@villageofreese.us>, Carrie Petzold <cpetzold@millingtontownship.com>, Steven Schwab <trustee@denmarktwp.org>, Kayla Reed <clerk@villageofmayville.org>, William Campbell <abcamp1937@gmail.com>, Chad Daniels <cdaniels@casscityschools.org>, Russell Rienas <flashtheoilier@hotmail.com>, Chris Graff <elmwoodtwp@gmail.com>, Charles Heinlein <supervisor@denmarktwp.org>, Barbara Valentine <bvalentine@villageofmayville.org>, Jeff Bassett <jbassett.vbc@gmail.com>, Kathy Trischler <acwclerk@att.net>, Joe Greene <jgreene@carocity.net>, kathryn Sattelberg <ksattelberg@yahoo.com>, Shelly Hicks <clerk@tuscolatownship.org>, Ed Hunt <echunt80@gmail.com>, Sarah Donovan <treasurer@fairgrovetwp.org>, Matt Prime <unionville.prime@outlook.com>, Annette Rieck <annettemieck@gmail.com>, Jody Hunt <arbelatownship@hotmail.com>, Pamela Brinkman <elmwoodclerk@gmail.com>, Pam Shook <shookpj1@gmail.com>, Leila Rish <treasurer@unionville.mi.us>, Chris Ranney <clerk@villageofreese.us>, Art Graff <graffandsons@gmail.com>, Mike Damm <mdamm@cityofvassar.org>, Judy Cockerill <treasurer@juniatatownship.org>, Matthew Blatt <supervisor@fremonttownship.org>, deana Jacoby <treasurer@akrontwp.com>, Kristine King <indianfieldstwpresident@gmail.com>, Chuck Fabbro <cfabbro@cityofvassar.org>, Nanette Walsh <octreasurer@casscity.org>, John Stack <treasurer@vassartownship.org>, Malisa Pyles <clerk@watertowntownship.org>, Deborah Pounds <clerk@vassartownship.org>, Kristen Nelson-Young <villageoffairgrove@gmail.com>, Robin Wallace <ocvillage@casscity.org>, Kristin Wright <clerk@wellstwp.org>, Deidra Zdrojewski <dazdrojewski@gmail.com>, Kaylene Long <vom_clerk@millingtonvillage.org>, Timmy Rumble <supervisor.wisner.twp@gmail.com>, Andrew Niedzinski <citymanager@cityofvassar.org>, Albert Pearsall <kingstonpolice48741@gmail.com>, Christina Parmenter <treasurer@oolumbiatownshipmi.com>, Carrie Gilley <kingstontwp@airadv.net>, Amy Holbrook <clerk@fremonttownship.org>, Karen Varney <supervisor@wellstwp.org>, Rex Vroman <koylontwp.clerk@gmail.com>, Merri Lemcke <mlemcke@cityofvassar.org>, indianfieldstwpresident@gmail.com, Bruce Foether <supervisor@vassartownship.org>, Jim Stockmeyer <gilfordtwp@airadv.net>, Christine Kolar <ckolar@airadvantage.net>, Camell Pattullo <ellingontreasurer@gmail.com>, Hazel Schlosser <treasurer@watertowntownship.org>, Cory Skinner <cskinner@kingstonk12.org>, Suzy Rockwell <ellingtonclerk@gmail.com>, Jim Mantey <jmifbi@gmail.com>, Rita Dickinson <dickinson@villageofakron.org>, Brenda Bigham <clerkbrenda@juniatatownship.org>, Jamie Schuette <clerk@akrontwp.com>, Debbie Powell <ocmanager@casscity.org>, Anthony Shaver <daytontownshipclerk@gmail.com>, Pat Witkovsky <almertreasurer@almertownshipmich.org>, Heather Severence <elklandclerk@gmail.com>, Keith Aeder <supervisor@fairgrovetwp.org>, Jackie Sabgash <clerk@millingtontownship.com>, Candra Franzel <treasurer@fremonttownship.org>, Paul Keast <bangkeast@aol.com>, Steve Linzner <slinzner@hotmail.com>, Matthew Lane <Milane@carocity.net>, Ed Rievert <eddo1983@yahoo.com>, Lisa Geiger <juniatalisa@juniatatownship.org>, Renee Schiefer <clerk@denmarktwp.org>, Carrie Hines <hinescarrie@yahoo.com>, Village of Akron <villageofakron@airadv.net>, Robert Loomis <supervisor@millingtontownship.com>, Ben Guile <bguile@cityofvassar.org>, Shari Blonde <koylontwpresident@gmail.com>, Katie Gebhardt <gebhardt2012@yahoo.com>, Pennie Rienas <novestatownshipclerk@gmail.com>, Michele Perry <mperry@carocity.net>, Lisa Valentine <lisa@lindyssales.com>, Tod Fackler <todfackler@sbcglobal.net>, Peggy Reavey <almertownshipclerk@gmail.com>, Jessica VanHove <uvilleclerk@airadvantage.net>, Terry Muntz <elklandsupervisortm@gmail.com>, Allen Green <millingtontownship@millingtontownship.com>, Stephanie Bruce <treasurer@wellstwp.org>, Rita Papp <rpapp@carocity.net>

Greetings,

Sending out a friendly reminder that if your local unit of government wishes to adopt the Hazard Mitigation plan you must provide me with an Action Item that your unit of government is willing to try to accomplish in the next five years. Again, those 10 Action Plan Items are:

1. Test, expand, and update the current countywide warning system
2. Hardening and reinforcing of critical infrastructure such as water & sewer facilities and local units of government facilities.
3. Encourage the establishment of heating and cooling shelters for vulnerable populations.
4. Update and continue integration of Critical Infrastructure data into the County GIS System
5. Participate and encourage joining the National Flood Insurance Program
6. Increase/continue with community preparedness and other hazard mitigation projects
7. Integration of Hazard Mitigation concepts into local master plan updates or other pertinent plans
8. Identify special needs populations
9. Repetitive Flood Damage Mitigation
10. Flood Drainage Expansion

You only need to pick one item, but multiple are fine. For example, you could easily select #1; Test, expand, and update the current countywide warning system. You could accomplish this by promoting your residents to sign up and creating a

Smart911 profile. <https://www.smart911.com/> Smart911 is already in use by Tuscola County and a couple of other units of government also use it as their notification program.

If that is not an option, look at any future projects that your jurisdiction has coming up in the next several years. Generators for governmental buildings, water, sewer, and fire halls would all qualify as #2: Hardening and reinforcing of critical infrastructure such as water & sewer facilities and local units of government facilities. Updates to your Master Plans to include a small section about flood mitigation or any mitigation activities would count as #7: Integration of Hazard Mitigation concepts into local master plan updates or other pertinent plans.

Again, if you are looking for guidance, please let me know...

Here again is the link to the Hazard Mitigation Plan Draft:
<https://docs.google.com/document/d/1B80e1wip0NhJwzgx7QQJZ5t1gtGCUTXmrKwSTkuFd6o/edit>

Chapter 7, which covers the Action Plan is on pages 138-141. Those local units of government that have responded have their "Items" listed in the table below.

Here is the list as of today, April 18th:

Local Unit of Government	Planned Action Item Participation
Akron Twp	
Almer Twp	
Arbela Twp	
Columbia Twp <i>Response from Kathy Trischler-Twp Supervisor</i>	#2 Hardening of Critical Infrastructure-Building new Fire Hall
Dayton Twp	
Denmark Twp	
Elkland Twp	
Ellington Twp	
Elmwood Twp	
Fairgrove Twp	
Fremont Twp	
Gilford Twp	
Indianfields Twp	
Juniata Twp	
Kingston Twp	
Koylton Twp	
Millington Twp	
Novesta Twp <i>Response from Pennie Rlenas-Twp Clerk</i>	#2 Hardening of Critical Infrastructure-Considering Installation of security cameras #4 Critical Infrastructure Into GIS-Believe that tax assessor is doing this #6 Increase/Continue Community Preparedness-Future Narcan Training
Tuscola Twp	
	#1 Test Expand and update countywide warning system-Addition of warning system In

Vassar Twp <i>Response from John Stack- Twp Supervisor</i>	the township park. #3 Heating and Cooling Centers-Open township hall at times of need
Watertown Twp	
Wells Twp	
Wisner Twp	
City of Caro	
City of Vassar <i>Response from Andrew Niedziński- City Manager</i>	#1 Test Expand and update countywide warning system-Promote Smart911 #2 Hardening of Critical Infrastructure-generators for water tower, lift stations, & wells #3 Heating and Cooling Centers-City Hall and VAAS Base are both being used as such #4 Critical Infrastructure into GIS-Continue entering data in own GIS system #5 Participate & encourage joining NFIP-Already members but continue to encourage participation #6 Increase/Continue Community Preparedness-Heart Smart Community, continue education of the public #7 Integration of Haz Mit concepts into local plans-Update local Emergency Response Plans #8 Identify Special Needs populations-Smart911 promotion #9 Repetitive Flood Damage Mitigation-Encouraging EDC not to restore Caro Dam #10 Flood Drainage Expansion-Continual inspection & maintenance of flood control devices and improvements as needed or as funding becomes available.
Village of Akron <i>Response from Marv Hasso-Fire Chief/DPW</i>	#2 Hardening of Critical Infrastructure-Upcoming water project
Village of Cass City <i>Response from Debbie Powell-City Manager</i>	#1 Test, expand, and update countywide warning system- Promote Smart911 #3 Heating and Cooling Centers-Generator at Municipal Building to become shelter #5 Participate & encourage joining NFIP-WWTP renovation requirement
Village of Fairgrove	#3 Heating and Cooling Centers-Seek replacement of antiquated generator and develop a plan for opening and running a shelter.
Village of Gagetown	
Village of Kingston	
Village of Mayville	
Village of Millington <i>Response from Kaylene Long- Village Clerk</i>	#3 Heating and Cooling Centers-Looking for a location to open this type of Center #4 Critical Infrastructure into GIS-mapping water and sewer lines with recent SAW grant #5 Participate & encourage joining NFIP-Potential of joining this program with additional information #6 Increase/Continue Community Preparedness-Outreach in collaboration with local emergency services #7 Integration of Haz Mit concepts into local plans-Willing to work into Master Plan and local economic plan #10 Flood Drainage Expansion-With mapping occurring, future drain work might become apparent.
Village of Reese	
Village of Unionville <i>Response from Jessica VanHove- Village Clerk</i>	#2 Hardening of Critical Infrastructure- #5 Participate & encourage joining NFIP-Potential of joining this program with additional information #9 Repetitive Flood Damage Mitigation-Working on updating storm sewers #10 Flood Drainage Expansion-Working on updating storm sewers

Once you have selected an "Action Item(s)", please either complete this survey: https://docs.google.com/forms/d/e/1FAIpQLSfpVo4ISNCL_8q8PhXTHCvDjjM827rarH98Jvym2fbTyVCqIQ/viewform?usp=sf_link or email me back directly at toemanderson@tuscolacounty.org

If you have any questions, please let me know.



Hazard Mitigation Plan Update - **Third and Final Notice -**

2 messages

Steve Anderson <toemanderson@tuscolacounty.org> Wed, Apr 27, 2022 at 10:16 AM

To: Jamie Schuette <clerk@akrontwp.com>, Steve Linzner <supervisor@akrontwp.com>, Jamie Schuette <akrontownship@yahoo.com>, Ed Hunt <echunt60@gmail.com>, Jody Hunt <arbelatownship@hotmail.com>, Anthony Shaver <dayontownshipclerk@gmail.com>, Renee Schiefer <clerk@denmarktp.org>, Charles Heinlein <supervisor@denmarktp.org>, Theresa Bauer <treasurer@denmarktp.org>, Heather Severence <elklandclerk@gmail.com>, Terry Muntz <elklandsupervisortm@gmail.com>, Suzy Rockwell <ellingtonclerk@gmail.com>, Russell Speirs <ellingtonsupervisor@gmail.com>, Carmell Pattullo <ellingontreasurer@gmail.com>, Pamela Brinkman <elmwoodclerk@gmail.com>, cbbograff@gmail.com, ckilbourn@mail.tband.net, Amy Holbrook <clerk@fremonttownship.org>, Matthew Blatt <supervisor@fremonttownship.org>, Candra Franzel <treasurer@fremonttownship.org>, Jim Stockmeyer <gilfordtwp@airadv.net>, indianfieldstowship@gmail.com, William Campbell <abcamp1937@gmail.com>, Kristine King <indianfieldstwp@treasurer@gmail.com>, Carrie Gilley <kingstontwp@airadv.net>, Jackie Sabgash <clerk@millingtontownship.com>, Robert Loomis <supervisor@millingtontownship.com>, Allen Green <millingtontownship@millingtontownship.com>, Carrie Petzold <cpetzold@millingtontownship.com>, Shelly Hicks <clerk@tuscolatownship.org>, Tod Fackler <tofackler@sboglobal.net>, Malisa Pyles <clerk@watertowntownship.org>, Hazel Schlosser <treasurer@watertowntownship.org>, Cory Skinner <cskinner@kingston12.org>, Stephanie Bruce <kingstonclerk@airadv.net>, DeeDee Vanditteli <clerk@villageofmayville.org>, Barbara Valentine <bvalentine@villageofmayville.org>, Ed Rievert <eddo1963@yahoo.com>

Greetings,

This is the final reminder that your local unit of government must select, at a minimum, one of the "Action Items" below to complete or attempt to complete in the next five years. Failure to select or respond to an "Action Item" will mean that your local unit of government will not be able to adopt the Hazard Mitigation Plan and you will not be able to apply for any Pre- or Post- Disaster Mitigation Grants.

The 10 Action Plan Items are the following:

1. Test, expand, and update the current countywide warning system
2. Hardening and reinforcing of critical infrastructure such as water & sewer facilities and local units of government facilities.
3. Encourage the establishment of heating and cooling shelters for vulnerable populations.
4. Update and continue integration of Critical Infrastructure data into the County GIS System
5. Participate and encourage joining the National Flood Insurance Program
6. Increase/continue with community preparedness and other hazard mitigation projects
7. Integration of Hazard Mitigation concepts into local master plan updates or other pertinent plans
8. Identify special needs populations
9. Repetitive Flood Damage Mitigation
10. Flood Drainage Expansion

You only need to pick one item, but multiple are fine. For example, you could easily select #1; Test, expand, and update the current countywide warning system. You could accomplish this by using promotional materials in an attempt to get your residents to sign up and creating a Smart911 profile. <https://www.smart911.com/> Smart911 is already in use by Tuscola County and a couple of other units of government also use it as their notification program. I have also attached promotional flyers that can easily be printed and used as handouts at your governmental offices. Additional promotional items for Smart911 can be found here: <https://www.ravemobilesafety.com/customer-center/customer-marketing-portal/government-public-safety/?category=all-resources&type=all-types&product=smart911>

If that is not an option, look at any future projects that your jurisdiction has coming up in the next several years. Generators for governmental buildings, water, sewer, and fire halls would all qualify as #2: Hardening and reinforcing of critical infrastructure such as water & sewer facilities and local units of government facilities. The project doesn't necessarily have to be completed as long as an effort is made to attempt to secure funding (grant or otherwise) towards the project.

Updates to your Master Plans to include a small section about flood mitigation or any mitigation activities would count as #7: Integration of Hazard Mitigation concepts into local master plan updates or other pertinent plans.

Simply email me back your selection or if you are looking for guidance, please let me know...

Here is a link to the current "Draft" of the Hazard Mitigation Plan:

<https://www.tuscolacounty.org/emergency/doc/2021%20Tuscola%20County%20Hazard%20Mitigation%20Plan%2041822.pdf>


Steve


—

Deputy Steven Anderson
Emergency Manager
420 Court St. Suite #1
Caro, MI 48723
Office # 989-673-5181
Cell # 989-450-0147
Fax # 989-673-8164

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2 attachments

 Smart911 brochure MMR.docx
881K

 Smart911_trifold_brochure_v2_2015.pdf
2757K

Note: In addition to the email, an attempt to fax the information to the following local units of government was also made on 04/27/22:

- *Akron Twp*
- *Arbela Twp*
- *Denmark Twp*
- *Elmwood Twp*
- *Fremont Twp*
- *Gilford Twp*
- *Indianfields Twp*
- *Watertown Twp*
- *Village of Gagetown*
- *Village of Mayville*

Appendix 14

Partner Agency, Business and surrounding County draft plan email seeking comments



Tuscola County Hazard Mitigation Plan Update

4 messages

Steve Anderson <tcemanderson@tuscolacounty.org> Thu, Apr 7, 2022 at 2:10 PM
 To: George Rierson <grierson@carok12.org>, Matt Drake <mdrake@kingstonk12.org>, Allison Zimba <azimba@casscityschools.org>, Diane Foster <dfoster@a-f.k12.mi.us>, Lawrence Kroswek <lawrence.kroswek@mcsdistrict.net>, Keith Wetters <kwetters@reese.k12.mi.us>, Tracey Henry <thentry@tuscolaisd.org>, Eric Kunisch <ekunisch@tuscolaisd.org>, Josh Hahn <hahnj@think-usa.org>, Gene Pierce <gpierce@tuscolaisd.org>, Barry Markwart <barry.markwart@mayvilleschools.org>, Dorothy Blackwell <dblackwell@vassar.k12.mi.us>, Randy Miller <millerr@co.huron.mi.us>, Ryan Manz <ManzR@baycounty.net>, Todd Hillman <thillman@sanilacounty.net>, "Mary Piorunek (mpiorunek@lapeercounty.org)" <mpiorunek@lapeercounty.org>, Mark Przybylski <mprzybylski@saginawcounty.com>, Jeff Wilson <jwilson@co.genesee.mi.us>, Emily Boynton <emily.boynton@poet.com>, Patrick Nellenbach <patrick.nellenbach@starofthewest.com>, Burt Eichler <burt.eichler@coopelev.com>, Katie Tennant <ktennant@walbro.com>, Kaylee Briolat <kbriolat@hillsanddales.com>, Annette Swain <ann.swain@redcross.org>, Loren Curtis <curtisl@michigan.gov>, Donald Derryberry <dderryberry@tchd.us>, Jason Root <jroot@tuscolaroad.org>, Rob Wamemuende <rob.wamemuende@cmich.edu>, Rob Kelly <rob.kelly@cmich.edu>, Eric Snidersich <esnidersich@mobilemedical.org>, Phil Petzold <ppetzold@mobilemedical.org>, Jimmy McDaniel <jmcdaniel@tcmcf.org>, Larry Zapfe <lzapfe@tuscolacounty.org>, Lonnie Kester <lonniekester@gmail.com>, Sharon Beals <sebeals@tbhs.net>, Michael Sage <michael.sage@dteenergy.com>, Brian Buck <brian.buck@enbridge.com>, Richard Ahrens <AhrensR1@michigan.gov>, adam.sneed@nexteraenergy.com

Greetings,

Tuscola County is in the long and tedious process of completing our FEMA required five year update of our Hazard Mitigation Plan. The Hazard Mitigation Plan's goal is to reduce loss of life and property by minimizing the impact of disasters by implementing mitigation activities.

This process begins with state, tribal and local governments, and in this case Tuscola County, identifying natural disasters and other hazards and then determining what vulnerabilities are common in the county. After identifying these risks, we develop long-term strategies for protecting people and property from similar events. Mitigation plans are key to breaking the cycle of disaster damage and reconstruction.

As part of the public input process, a digital copy of the "Draft" is being provided to your organization which has a vested interest in our Plan. A copy of this "Draft" can be found here: (FYI, it is 375 pages long)

[2021 Tuscola County Hazard Mitigation Plan - Draft - 3 16 22 - Google Docs.pdf](#)

Any comments or concerns about the plan can be sent to the following email: tuscolahazardmitigation@gmail.com

If you have any questions or need further details, please let me know...

Steve

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Deputy Steven Anderson
 Emergency Manager
 420 Court St. Suite #1
 Caro, MI 48723
 Office # 989-673-5181
 Cell # 989-450-0147
 Fax # 989-673-8164

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Appendix 15
Adoption Resolutions by County and Local Units of Government

**TUSCOLA COUNTY
BOARD OF COMMISSIONERS**

125 W. Lincoln Street
Suite 500
Caro, MI 48723

Telephone: 989-672-3700
Fax: 989-672-4011

At a regular meeting of the Board of Commissioners for the County of Tuscola, State of Michigan, on the 15th day of September, 2022 with the meeting called to order at 8:00 a.m.

Commissioners Present: *Thomas Young, Thomas Beaudry, Kim Vaughan,
Doug DeRusiel*

Commissioners Absent: *Dan Shinnshaw*

The following resolution was offered by Commissioner *Young*,
seconded by Commissioner *Vaughan*.

**TUSCOLA COUNTY BOARD OF COMMISSIONERS
RESOLUTION 2022-16**

A Resolution for the Adoption of the Tuscola County Hazard Mitigation Plan

Whereas, Tuscola County, Michigan is vulnerable to a wide range of natural, technical, and human-related hazards, and has experienced repetitive disasters that have caused loss of life, damage to commercial, residential and public properties, displaced citizens and businesses, closed streets and presented general public health and safety concerns; and

Whereas, Tuscola County has prepared a Tuscola County Hazard Mitigation Plan that provides an understanding of those threats, identifies the hazards affecting the area, discusses the county's vulnerability to the identified hazards, and outlines the community's options and strategies to reduce overall damage and impact from natural and technological hazards; and

Whereas, the Tuscola County Hazard Mitigation Plan represents the interests and needs of Tuscola County;

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Resolution 2022-16

Now, therefore, be it resolved that:

The Tuscola County Hazard Mitigation Plan is hereby adopted as an official plan of Tuscola County.

Ayes: *Young, Vaughan, Dukussel, Kardurel*

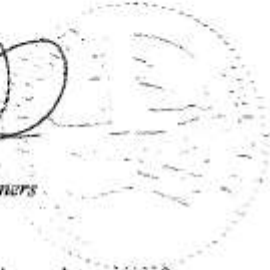
Nays: *None*

Absent: *Hemshaw*

Resolution declared approved dated this 15th day of September, 2022.

Date 9-15-22


Thomas Bardwell, Chairperson
Tuscola County Board of Commissioners



I, Jodi Fetting, Tuscola County Clerk, do hereby certify that the foregoing is a true and complete copy of an agreement approved by the Board of Commissioners at a regular meeting on September 15, 2022.

Date 9/15/22


Jodi Fetting
Tuscola County Clerk

