

2.0 HAZARD IDENTIFICATION AND RISK ASSESSMENT

The purpose of the Hazard Identification and Risk Assessment (HIRA) is to identify the number and frequency of disasters in Mercer County and the risk to people, property, and structures that those hazards cause. This process allows officials and residents to better prepare for incidents when they occur. The HIRA is addressed in four sections. The County Profile (2.1) provides information on Mercer County and its jurisdictions. The Hazard Identification (2.2) describes hazard that poses a threat to Mercer County and provides a brief history of significant occurrences. The Vulnerability Assessment (2.3) examines the vulnerability of each jurisdiction, and the Risk Analysis (2.4) evaluates and ranks the risks Mercer County must address through its mitigation efforts.

2.1 COUNTY PROFILE

Mercer County is located in the northwest quadrant of the State of Ohio along the Ohio-Indiana border and is well known for Grand Lake St. Mary's, a man-made lake that provides water retention as well as recreational opportunity for residents and visitors alike.

The county is primarily an agricultural county with some small to mid-size industry and manufacturing companies. The county's 40,814 residents reside between one city, eight villages, and fourteen townships

Mercer County consists of 473 square miles. Of these, 462 square miles are land and 11 square miles are water. The county shares its western border with the State of Indiana. Adams County sits to the northwest, and Jay County sits to the southwest. In Ohio, Van Wert County is to the north, Auglaize County to the east, and Darke and Shelby counties to the south. Lima, the closest significant city, is northeast of Mercer County. The closest major city is Fort Wayne, Indiana, approximately one hour to the northwest. The closest major cities in Ohio are Dayton, 80 miles south, Columbus, 110 miles southeast, and Toledo, 115 miles north.

The government structure of Mercer County's elected officials provides leadership over statutory responsibilities. The Board of County Commissioners and appointed officials provide support and service to the county. Among the many elected officials are the Mercer County Engineer, the Mercer County Auditor, and the Mercer County Sheriff who were instrumental in mitigation planning activities. Appointed officials particularly involved included the GIS coordinator and floodplain manager, various employees of the Mercer County Engineer, agricultural industry leaders, conservation and natural resources employees, and many others. Ohio's 4th, 5th, and 8th Congressional districts represent Mercer County residents.

2.1.1 Demographics

The population of Mercer County is 40,814 according to 2010 U.S. Census figure. The population has remained relatively steady since 2000, a trend that is expected to continue over the next several decades.

Table 2-1: Mercer County Population Statistics

Statistic	Figure
Population Density	88 persons/sq. mile
Female Population	50%
Male Population	50%
Median Age	40.0 years
Population under 18	26.4%
Population over 65	15.4%
White	97.4%
Black or African American	0.4%
Hispanic or Latino	1.5%
Two or More Races	0.9%
Average Household Size	2.54 persons
Median Household Income	\$53,099
Persons in Poverty	7.8%

Within Mercer County, there are 17,702 housing units. The owner-occupation rate is 76.7% and the median value of owner-occupied units is \$130,200. Multi-unit housing structures such as apartment buildings account for 10.8% of all housing units. There are approximately 1,197 mobile homes across the county. The median gross rent for all types of rental properties is \$653 per month while the median cost for homes with mortgages is \$1,089 per month.

Special residential housing facilities exist across Mercer County. As of 2010, the types of facilities and statistics for each type are as follows:

Table 2-2: Special Residential Facilities

Facility	Number of Facilities	Number of Beds
Nursing Home Facilities	6	405
Residential Care Facilities	6	308

2.1.2 Historical Origins

Mercer County was originally part of the Northwest Territory and south of the Great Black Swamp. Early settlers came from the northwest section of Germany in the mid and late 1860's to farm the fertile soils of the area. They created grain and livestock farms and prospered in the agriculturally friendly region. The Miami Erie Canal was built by the federal government to create a water transportation route from Lake Erie to the Ohio River, which supported the ingress of settlers to the area, provided jobs for early residents, and ultimately allowed products to flow from Mercer County to markets a distance away.

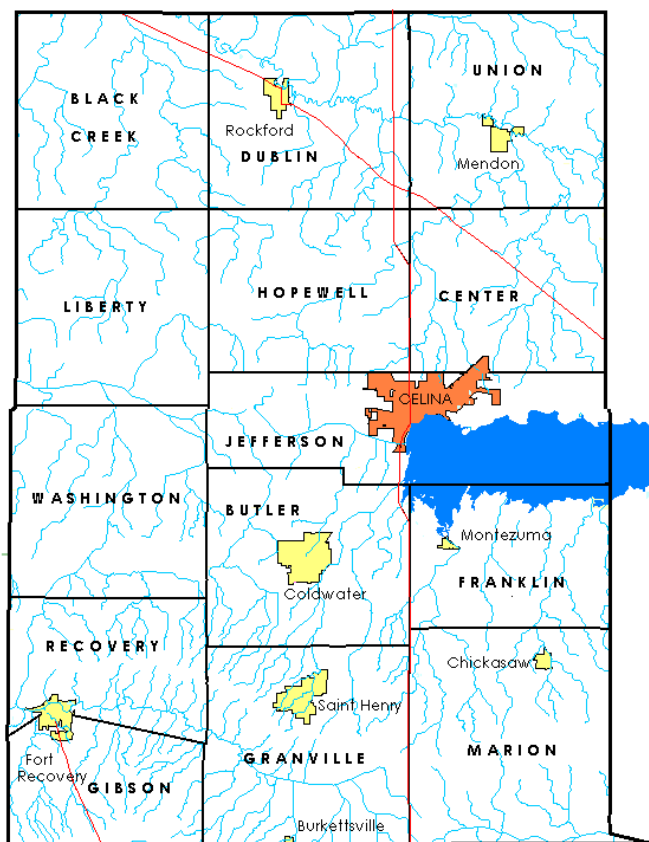
Religious practices were very important to the original settlers of Mercer County, and their faith continues to guide them today. The southern half of the county is peppered with Roman Catholic churches founded in the early 1800's and the population identifies primarily as Catholic and Lutheran. Other protestant denominations and community churches are prevalent in the

northern half of the county. Across the county, religion plays an important role in people's lives.

2.1.3 Incorporated Jurisdictions

Mercer County is comprised of one city, eight incorporated villages, fourteen townships and twenty-three unincorporated neighborhood communities. Mercer County's largest municipality and only city is Celina. The villages include Burkettsville, Chickasaw, Coldwater, Fort Recovery, Mendon, Montezuma, Rockford, and St. Henry.

Map 2-1: Mercer County Map



Burkettsville

Burkettsville, one of the smallest villages in Mercer County, sits on the border of Mercer and Darke counties. The village is located on State Route 319 and west of State Route 118 in Granville Township. A standard elected mayor-council government governs it. The village owns one building, which houses the local volunteer fire department and village hall.

Table 2-3: Burkettsville Demographics

Statistic	Figure
Land Area	0.18 sq. miles
Population, 2010	244
White	97.1%
Other	2.9%
Housing Units	107
Median Income	\$52,500
Persons below Poverty Level	1.7%
Elevation	974 feet

Celina

Celina is the only city in Mercer County. It is located on the north shore of Grand Lake St. Marys and serves as the county seat. Celina has a statutory form of government. Authority is shared between the mayor, auditor, treasurer, president of council, and the law director, all of whom are all elected by the voters of Celina.

Table 2-4: Celina Demographics

Statistics	Figure
Land Area	5.27 sq. miles
Population, 2010 US Census	10,400
White	94.9%
Black or African American	0.5%
Hispanic or Latino	2.8%
Number of Households	4,497
Persons per Household	2.29
Median Income	\$41,040
Persons in Poverty	11.9%
Elevation	876 ft.

James Watson Riley founded Celina in 1834. Before that, the area was a swampy, wooded area that had to be drained before it was habitable. Once the land was cleared and drained, the fertile soils led to a beautiful landscape and productive farms. Named after Salina, New York, the area grew slowly until oil and natural gas wells began producing petroleum products in the later 1800s. The city's growth was primarily due to development of agri-businesses and other ventures that supported the farming industry.

Celina is located on the northern edge of Grand Lake St. Marys where tourists and residents enjoy summer recreational activities, community festivals, and other fun spots. Several state highways cross the area in various directions, giving easy access to cities including Toledo, Dayton, Indianapolis, and Columbus. The county boasts of its strong work ethic, high quality educational opportunities, and its sense of community, drawing workers to the area from cities like Columbus and Indianapolis.

The city is home to Celina City Schools, Immaculate Conception School, and Wright State University Lake Campus. Celina Aluminum Precision Technology, Crown Equipment Corporation and Reynolds & Reynolds are among the many small industrial and manufacturing businesses that employ local workers and feed the local economy. Huffly Bicycle and Mersmans Furniture have closed, as have a few other large businesses, but aggressive recruitment of new business has successfully filled the holes created when doors closed.

Well-kept properties and community pride are apparent when one drives into Celina. Neatly groomed homes line the streets, and beautiful landscaping creates nice curb appeal for homes. The downtown is carefully groomed, showcasing old historic structures that have been updated and suited to contemporary uses. Streets are maintained, and sidewalks are clean and clear. The city is obviously one of long-standing care and concern for properties and businesses, and the people who live and work there take extreme pride in their surroundings.

Chickasaw

Chickasaw, named for the Chickasaw Tribe, is located in southeast Mercer County at the juncture of State Routes 274 and 716. The village was founded in 1838 by John Nutter and James Brooks and incorporated in 1890. For more than one hundred years, the village has served its population with a standard mayor-council form of government. Settlers to Chickasaw were first English and Irish and, later on, German. They engaged in hunting, trapping and timber harvest. The town was the last stop on the Underground Railroad before the Civil War; because of this, many freed slaves stayed in the county and worked for area farmers after their escape. The town was historically known for being “rough” because of its eight bars and because it was the site of the first jail in Mercer County.

Table 2-5: Chickasaw Demographics

Statistic	Figure
Land Area	0.23 sq. miles
Population, 2010	290
White	100%
Housing Units	156
Median Income	\$54,750
Persons below Poverty Level	4.4%%
Elevation	942 feet

Coldwater

The most populated village in Mercer County, Coldwater was named after Coldwater Creek. Almost two hundred years after its’ founding, the village boasts a safe and family-oriented atmosphere where progressive, controlled growth supports one of the best places in Ohio to raise a family. The village has a mixture of manufacturing, commercial, and retail businesses, some of which occupy spaces formerly used by the New Idea farm implement business that closed several years ago. The community is home to Coldwater Exempted School District, which receives high performance marks for its 1,500 students. Mercer County Community Hospital, the only hospital in the county, is also located in Coldwater.

Table 2-6: Coldwater Demographics

Statistic	Figure
Land Area	1.97 sq. miles
Population, 2010	4,427
White	95.2%
Black or African American	<1.0%
Hispanic or Latino	<1.0%
Housing Units	1,812
Median Income	\$48,792
Persons below Poverty Level	6.0%
Elevation	912 feet

Fort Recovery

The village of Fort Recovery was the site of two fierce battles during the American Indian Wars. St. Clair's Defeat in 1791 and the Attack on Fort Recovery in 1794 both took place in this small village at the headwaters of the Wabash River. The village was officially established in 1793 by order of General Anthony Wayne, who came to the area and defeated the Native American Indian tribes. The northwest corner of the Greenville Treaty Line is in Fort Recovery. In later years, the village was a stop along the railroad that connected Buffalo, NY, Chicago, IL, and St. Louis, MO.

Today, Fort Recovery is a small, progressive village with a strong agricultural influence. Many farms produce crops and livestock are in the area, as well as multiple agri-businesses in the area that work to support them with equipment, services, and supplies. They have a standard form of government with an elected mayor and village council as well as typical village departments that provide for the safety and welfare of Fort Recovery residents.

Table 2-7: Fort Recovery Demographics

Statistic	Figure
Land Area	1.97 sq. miles
Population, 2010	1,430
White	97.5%
Hispanic or Latino	0.8%
Two or More Races	<1.0%
Housing Units	590
Median Income	\$53,750
Persons below Poverty Level	9.2%
Elevation	942 feet

Mendon

The tiny village of Mendon is located in northeast Mercer County along the St. Marys River. The village was originally platted as Guilford in 1834, but the name later changed to Mendon when the US Post Office opened. The community is mostly a bedroom community for residents who work in larger nearby communities. The largest business in town, a security service, employs

less than ten people and is owner-operated. The village is one of the few in Mercer County that operates a municipal electric service.

Table 2-8: Mendon Demographics

Statistics	Figure
Land Area	0.57 sq. miles
Population, 2010	662
White	97.3%
Hispanic or Latino	<1.0%
Bi-racial	<1.0%
Housing Units	250
Median Income	\$37,083
Persons below Poverty Level	26.2%
Elevation	820 feet

Montezuma

The small village of Montezuma is located at the southwest corner of the Grand Lake St. Marys. It is home to long-time, year-round Mercer County residents as well as many seasonal residents. The village is a bedroom community for workers who serve the tourist industry in the warmer months. They have a standard form of elected village government.

Table 2-9: Montezuma Demographics

Statistics	Figure
Land Area	0.13 sq. miles
Population, 2010	165
White	100%
Housing Units	132
Median Income	\$35,714
Persons below Poverty Level	13.4%
Elevation	883 feet

Rockford

Rockford, formerly known as Shanesville and Shane's Crossing, is rich in Indian lore and history from the American Indian Wars and the War of 1812. Sitting along the high bank of the St. Marys River, the area provided campgrounds and homes to American Indians long before Christopher Columbus discovered America. Traders and trappers frequented the area, bartering with the Indians who inhabited the area. Anthony Madore, a French trader, operated a trading post at this location prior to his death about 1815. During the War of 1812, General William Henry Harrison and his troops camped in the Rockford area.

Today, Rockford is a small village located at the juncture of State Routes 33 and 118. The village experiences heavy truck traffic as thousands of semi-trucks and trailers haul hazardous materials, production supplies, and products to and from Fort Wayne, Columbus, and other cities. Fears have shifted from Indian attacks to hazardous materials spills and vehicular accidents as speeders are slowed by village police officers patrolling the highways. In recent

years, the village has been the location of several well-published crimes as perpetrators have attempted to use the rural highways as escape routes and getaway paths.

Table 2-10: Rockford Demographics

Statistics	Figure
Land Area	0.84 sq. miles
Population, 2010	1,120
White	98.7%
Black or African American	<1.0%
Housing Units	481
Median Income	\$44,643
Persons below Poverty Level	22.8%
Elevation	814 feet

St. Henry

St. Henry is a growing village in the southern part of Mercer County. With almost 2,500 residents, the village has strong development goals and a huge dose of community pride. This contemporary village plans housing and services to provide exemplary living conditions and a low crime community for its residents. Its planned neighborhoods and subdivisions give those who want a suburban feel a nice place to call home.

Table 2-11: St. Henry Demographics

Statistic	Figure
Land Area	1.65 sq. miles
Population, 2010	2,427
White	98.9%
Hispanic or Latino	<1.0%
Housing Units	859
Median Income	\$80,000
Persons below Poverty Level	2.8%
Elevation	971 feet

2.1.4 Townships and Unincorporated Communities

Mercer County is divided into 14 townships. Townships are governed by three trustees and one fiscal officer, each elected by the voters. They meet monthly at a minimum, and are responsible for the health, safety, and welfare of the township residents. Some townships have zoning officers and do their own zoning and fire code inspections for new parcels and land use improvements. Others rely upon Mercer County or another jurisdiction to do this for them. Townships are not required to adopt the mitigation plan, and Mercer County is able to act on their behalf regarding federal grant programs and official actions.

Of the municipalities, the following table shows the township in which the municipality is located; municipal government covers everything located within the municipal boundaries; township government covers everything not included in an incorporated municipality. Township population figures according to 2010 U.S. Census figures are also listed.

Table 2-12: Township Population Statistics

Township	Population	Municipality
Black Creek	631	
Butler	6,459	Coldwater
Center	1,082	Celina (partial)
Dublin	2,254	Rockford
Franklin	2,303	Montezuma
Gibson	1,860	Fort Recovery (partial)
Granville	5,662	St. Henry, Burkettsville (partial)
Hopewell	1,066	
Jefferson	12,231	Celina (partial)
Liberty	917	
Marion	2,969	Chickasaw
Recovery	1,550	Fort Recovery (partial)
Union	1,490	Mendon
Washington	1,218	

Mercer County's rural area can be divided into the "north townships" and the "south townships" based upon current characteristics and practices. This division dates back to the early 1800's when the county was settled. The Roman Catholics settled in the southern half; the Protestants settled in the northern half. As life in those times centered around church and homesteads, the culture and practices of the communities took on specific characteristics that exist yet today in a more modern sort of way. The Roman Catholics tended to raise both grain and livestock; the Protestants worked grain farms

Southern Townships

The southern townships of Gibson, Recovery, Granville, Butler, Franklin, Washington, Marion are south of State Route 219. A small portion of Washington Township extends north of SR 219. These southern townships are a mix of grain and livestock farms supported by numerous agri-businesses and service industries in and near the villages. These businesses process and sell livestock feed and supplies, sell and apply agricultural chemical, and service and sell farm equipment.

The farms in these townships raise livestock, and the grain crops provide animal feed and some commodity for market. Continual transportation ingress and egress allows for the movement of milk, feed, and livestock on a 24-hour basis every single day of the year. The ability to move people, feed, supplies, products and commodities in and out at will on a daily basis is the lifeblood of the area.

Transportation service is equally important to the many small businesses in the southern half of the county. As the small equipment manufacturers and service providers repair equipment and supply the farms with critical needs, they depend upon a network of accessible roads and highways to get to their customers. As small manufacturers try to ship products out of these townships, they need highways and railroads to carry the goods out of Mercer County into metropolitan markets.

The southern townships hold the visual and cultural key to Mercer County's religious roots through the presence of many historical buildings and facilities in the townships. St. Charles Center in Marion Township is the central facility for aged Roman Catholic priests and sisters, and provides an assisted living facility as well as a nursing home for the aged and disabled. Many old Roman Catholic churches and a few Lutheran churches pepper the countryside and provide a place of worship for local residents. These historical buildings are well preserved through a hardworking community that provides painstakingly excellent care of its properties.

The southern townships lay below the highest point in Mercer County, which is along the Mercer-Darke County line between Union City and Jenkins Road in Gibson Township. Precipitation and runoff water drains quickly. Tiled fields and few wooded areas facilitate rapid runoff, which then reaches the villages more quickly than ever before, and contributes to the rushing drainage into the villages in this area.

Watershed is split between the Wabash, Grand Lake St. Marys, and Loramie Creek watersheds in these townships. The western half drains to the Wabash and ends up in Indiana and on to the Gulf of Mexico through the Mississippi River. Most of the eastern half drains to Grand Lake St. Marys before emptying into Beaver Creek and the Wabash watershed. The extreme southeast corner of the county is part of the Loramie Creek watershed, which connects to the Upper Great Miami watershed.

In the early 1900s, Coldwater Creek was re-routed slightly to drain into Grand Lake St. Marys as a way to feed the Miami-Erie Canal. Just south of St. Anthony Road in Butler Township, the creek was artificially turned almost 90 degrees to the east to drain into the new inland lake. Today, as more water drains more quickly from points to the south of this man-made turn, Mother Nature is guiding that water to its original destination, Beaver Creek, which is part of the Wabash Watershed. Several homes in this area experience flooding when the Coldwater Creek overflows its bank and rushes north toward the creek's original destination. An earthen structure, unidentified in form by the Ohio Department of Natural Resources, sits to the south of these homes in an un-engineered attempt to keep water in the banks of the re-routed Coldwater Creek but has been insufficient to stop the forces flooding.

Northern Townships

The northern townships include Blackcreek, Center, Dublin, Jefferson, Hopewell, Liberty, and Union townships. Large grain farms populate many of these townships. These farm operations not only raise corn, wheat and soybeans but also have on-site drying and storage facilities to house the grain. Few farms raise livestock, and many of the farmers have full or part time jobs in local industry or businesses, supporting farm income with a part or full time job. These farms are family-owned and tend to use family members as their workforce rather than to employ non-family workers. They are less dependent upon daily ingress and egress than the livestock farms in the south, except during planting and harvest seasons when trucks and equipment travel the roads at all times of the day and night.

Because of US 33, which crosses the northern half of the county, and several heavily traveled state highways, there is significant semi-truck traffic across the northern half of the county. Services to assist the transportation industry are plentiful, as fuel stops, food service, and other small businesses line the major highways.

Several historical Indian reserves surround the Rockford area in Dublin Township. These areas are plentiful with natural beauty and riverine landscape. There are various Protestant churches in the townships, but these are more modern-day churches with newer buildings.

Many residents in the townships to the north in Mercer County work in factories and plants nearby, residing in the fairly quiet and picturesque country landscape.

While the visual of the two sections of Mercer County are very different, the basic characteristics have a lot in common. The entire county is agriculturally based, and community well being is dependent upon farming and transportation industries. The people who live in the area are very likely to be from families born and raised in Mercer County.

Unincorporated Communities and Neighborhoods

Mercer County has over twenty unincorporated communities, and many relate either to the religion of German immigrants in the early 1800s or to the white man's relationship, sometimes hostile, with the American Native Indians in the area.

The unincorporated areas in the southern half of the county are primarily evidence Roman Catholic German immigrants settling in communities that facilitated the practice of their faith. Carthagera, Cassella, Cranberry Prairie, Maria Stein, Philothea, Sebastian, Sharpsburg, St. Joseph, St. Peter, St. Rose, and Wendelin were all settled by immigrants; a Roman Catholic Church serves as the center of each community. At one point, seven different Catholic church steeples could be seen from a point near Chickasaw: The Nativity of the Blessed Virgin Church (Cassella), St Francis Catholic Church (Cranberry Prairie), St. John's Church (Maria Stein); St. Rose Catholic Church (St. Rose); St. Sebastian Catholic Church (Sebastian); St. Wendelin Catholic Church (Wendelin); and St. Aloysius Church (Carthagera).

Carthagera was founded by Charles Moore, a black man from Kentucky, in 1840. The community is near Chickasaw, which served as the second to last stop on the Underground Railroad. As slaves came through the Underground Railroad, many did not continue further for fear of capture at the final stop. Many settled in an all-black community that became known as Carthagera. The last known resident of Carthagera died in 1957 and was buried in the black-only cemetery in that community. The Missionaries of the Precious Blood purchased Carthagera from Charles Moore in 1861. They built St. Charles Seminary on the site of the Emlin Institute, a school for blacks. This became the St. Charles Seminary and is still operated by the Sisters of the Precious Blood as a senior living center, the St. Charles Center.

Other unincorporated communities include Chattanooga, Mercer, Neptune, Skeel's Crossing, Tama, and Wabash in the northern half of the county. Most of these areas are residential

clusters that used to have a post office. Most of these post offices were closed in the early 1900s.

2.1.5 Institutions and Special Facilities

Mercer County has abundant educational and healthcare resources available for residents. Access to these services improves the quality of life for residents and contributes to the successful development of Mercer County.

Education

Mercer County residents have access to many educational institutions across the county. From primary and secondary school districts to post-secondary education, there are multiple options to meet the varied need of residents.

Seven public school districts and one parochial school serve the residents of Mercer County. Six of these districts are primarily located in Mercer County while one is located in Auglaize County but serves a small population of Mercer County students.

Table 2-13: Mercer County Schools

Public School Districts	Parochial Schools
Celina City School District	Immaculate Conception School
Coldwater Exempted Village School District	
Fort Recovery Local School District	
Marion Local School District	
New Bremen Local School District	
Parkway Local School District	
St. Henry Consolidated Local School District	

Higher education opportunities abound for students in Mercer County. The Wright State University Lake Campus is located in Jefferson Township, east of Celina. This rapidly growing institution provides undergraduate and graduate programs. Within a one-hour drive of the county, students also have access to multiple community colleges and universities.

Healthcare

Mercer County Community Hospital is the only hospital in Mercer County. This full-service hospital is located in Coldwater, the geographic center of the county. The hospital offers a wide range of healthcare services, including emergency services, intensive care, and diagnostic services. Mercer Health also operates several outpatient facilities and clinics across the county.

2.1.6 Infrastructure

Mercer County's infrastructure provides residents, workers, and visitors with critical access to services. This section describes the county's transportation and utility systems.

Transportation

Many highly-traveled transportation routes traverse Mercer County. These include state highways, county roads, and local streets. Mercer County does not have any interstates in the county but the plentiful state routes provide easy access to the nation's road infrastructure.

The County Engineer is responsible for maintaining 384 miles of county roads and 382 bridges. The County Engineer also serves as the Engineer for all fourteen townships and supports roadway maintenance and repair in those jurisdictions. The Ohio Department of Transportation maintains 417 miles of roadway and 115 bridges.

Table 2-14: Mercer County Highways

Interstates	U.S. Highways	State Highways	
None	33	29	219
	127	49	274
		117	364
		118	703
		119	707
		197	716

A major factor in Mercer County's transportation development was the construction of the Miami and Erie Canal in about 1825. This canal was constructed by the federal government to create a transportation route from the Great Lakes to the Ohio River. One section was built in eastern Ohio, and the other in western Ohio and it ran through Mercer County. The canal construction provided jobs for immigrant farmers and allowed them to pay the mortgages on their land during construction by providing second jobs for them. It also provided a route for immigrants to reach Maria Stein, the hub of settling immigrant activity. It also provided a way for Mercer County farmers to ship their wares to markets. The Miami and Erie Canal exists yet today in some spots in Mercer County, but is not a functional canal system.

Utilities

The majority of homes in Mercer County, approximately 73.6%, are heated with natural gas or electricity. These services are provided by a variety of companies. The Public Utilities Commission of Ohio regulates private companies that provide public utility services. These companies, along with municipal electric utilities, are identified in Table 2-15.

Table 2-15: Mercer County Utility Service Providers

Electric Service	Natural Gas Service
Dayton Power and Light	Dominion East Ohio
Midwest Electric	
City of Celina*	
Village of Mendon*	
*Municipal Electric Utilities	

The remaining properties in the county are heated by other sources, including:

- Bottled, tank, or LP gas 18.1%
- Fuel oil, kerosene 3.4%
- Coal, coke or wood 3.2%
- Solar energy or other fuel 1.0%
- No fuel used 0.7%

2.1.7 Topography and Climate

The terrain in Mercer County is very flat. There is less than three hundred feet difference in elevation from the highest point to the lowest in the county and there are no abrupt elevation changes anywhere in the county. The highest point, 1,071 feet above sea level, lies on the southern border of Mercer County and the Darke County line on State Route 317 between Union Road and Jenkins Road. The lowest point is directly to the north, on the border between Mercer and Van Wert counties where the St. Marys River crosses the county line into Van Wert County. That elevation is 780 feet above sea level, resulting in a different of 291 feet.

Mercer County covers 284,160 acres of land that are believed to have been covered by glaciers at least three times. The northern two-thirds of the county is nearly level, with gentle slopes only along riverbanks and other ditches. The southern third is more sloping with the exception of Cranberry Prairie in Granville Township. Grand Lake St. Marys is the only significant body of water, and two-thirds of the 12,700-acre man-made lake sits in Mercer County. The lake was built in the early 1800s to create a body of water for the Miami Erie Canal; this was achieved by damming both ends of a swale to create the lake. Mercer County was part of the Great Black Swamp and parts of the county had to be drained before the land was useable and highways or buildings could be constructed.

Soil Types

The majority of Mercer County soils are either Blount Silt Loam or Pewamo Silty Loam Clay (71% totaled). These soils are both likely to retain moisture and stay wet for a long time, and neither type percolates well. The soils erode easily on sloping areas, making the banks of waterways prone to soil erosion. However, when drained and dried out for crops and pasture, the soils are highly fertile and provide the opportunity for very productive farmland. The area is suitable for woodlands, including oak, ash, maple, spruce and pine trees. Much of the land is not naturally suitable for grasses due to the erosion factor, but if drainage is facilitated, grasses grow well. The land is very poor habitat for wetland plants.

Mercer County soils are suitable for construction when drainage is facilitated. The soil's poor percolation makes drainage challenging, and sub-surface construction is dependent upon engineered wetness controls. Soils erode easily so embankments, borders, and slopes need protection. Man-made ponds are compatible with the soil types, but aquifer-fed ponds are slow to refill when necessary.

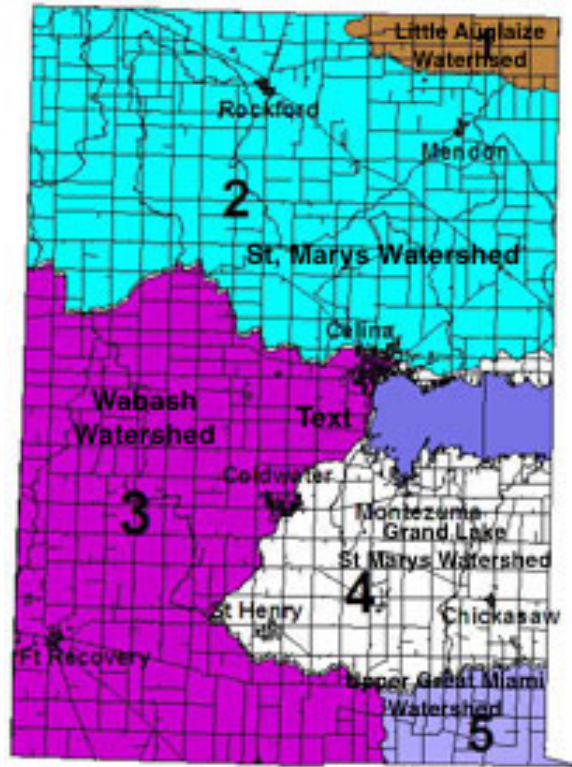
Climate

The climate of Mercer County is similar to all of northern Ohio. The humid continental climate zone features cold winters and hot summers. The average annual temperature is 51.4° F. July is the warmest month with an average high temperature of 83° F. January is the coldest month with an average low temperature of 19° F. Average annual precipitation is 68.16 inches, made up of 30 inches of snow and 38.16 inches of rain. July is typically the wettest month with average precipitation of 4.8 inches of rain. The winter months generally all have two to three inches of precipitation; whether this falls in the form of snow or rain depends on temperatures that waver slightly above and below the freezing mark.

2.1.8 Waterways and Watershed

The St. Lawrence Continental Divide splits Mercer County into two separate primary watersheds that eventually both take water to the Atlantic Ocean through very different routes. One uses the Ohio and the Mississippi Rivers to route water to the Gulf of Mexico and out into the Atlantic. The other directs water to Lake Erie and Lake Ontario, and up through the St. Lawrence Seaway into the northern Atlantic Ocean. The continental divide crosses Mercer County from the west in Liberty and Black Creek townships, and crosses southeast into the Celina area. It lies in the vicinity of Grand Lake St. Marys. At times, waterways flowing to these opposite two watersheds come within feet of one another.

The rivers and tributaries north of this divide flow into watersheds that empty into the Great Lakes, specifically into Lake Erie, through the St. Marys' River and eventually the Maumee River Watershed. Those south of the divide flow into the Wabash River and flow to the Gulf of Mexico through the Ohio River and on to Mississippi River as part of the Wabash River Watershed. A small area in the southeast flows toward the Ohio River through the Great Miami Watershed, and on to the Ohio River and the Mississippi River. This drainage takes place through five different small watersheds. These local watersheds are identified by numbers one through five on Map 2-2.

Map 2-2: Mercer County Watersheds

The Little Auglaize River Watershed, identified as 1 on Map 2-2, lies in the extreme northeast corner of Mercer County. The Auglaize River and a few tributaries – ditches and streams – flow through a corner of Union Township, supplying the Auglaize with water that then flows north into the Blanchard and on into the Maumee River, ending up in Lake Erie. The primary waterway in this watershed is Kyle Prairie Creek.

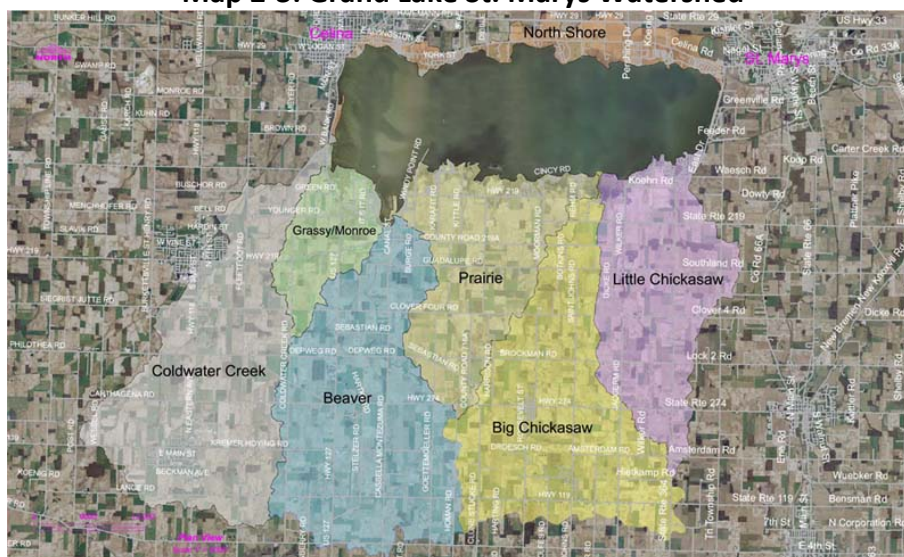
The St. Marys River Watershed, identified as 2 on Map 2-2, covers the northeast quadrant of Mercer County. This water flows into the St. Marys River through Union, Dublin and Blackcreek Townships and exits the county at the lowest elevation in Mercer County, where the St. Marys crosses into Van Wert County to the north. The river eventually flows into Fort Wayne, Indiana where it joins into the Maumee River and becomes part of the Maumee Watershed that flows to the northeast into Lake Erie through several northwest Ohio counties. The primary streams, ditches, and rivers in this watershed include Dennison Ditch, Yankee Run, Green Ditch, Eightmile Creek, Twelvemile Creek, Black Creek, Big Black Creek, Little Black Creek, Duck Creek, and Sanift Ditch.

The Grand Lake St. Marys Watershed, labeled 4 on Map 2 and shown in greater detail on Map 2-3, is comprised of the streams, ditches, and rivers that flow into Grand Lake St. Marys, a 12,700-acre man-made inland lake southeast of Celina. The water draining into this lake comes from six areas: Coldwater Creek that originates in St. Henry and moves through Butler Township (which originally flowed into Beaver Creek and on to the Wabash Watershed); the Grassy Monroe that flows through Butler and Jefferson townships into the lake; the Beaver

Creek that comes from the west through Jefferson and Washington townships as a deep and rapidly flowing waterway; the Prairie that flows from south of the Montezuma area into the lake; Big Chickasaw that flows from the Chickasaw plains and north from Marion and Franklin Townships; and the Little Chickasaw that flows into Grand Lake St. Marys from Auglaize County. These waterways all drain into Grand Lake St. Marys and then flow through the St. Marys River into the Maumee Watershed to the northeast towards Lake Erie. Waterways include Coldwater Creek, Burntwood Creek, Beaver Creek, Montezuma Creek, Dahlinghouse Ditch, Chickasaw Creek, East Fork Creek, and Prairie Creek.

This watershed was artificially modified in the late 1800s when Grand Lake St. Marys was built. The Coldwater Creek sub-watershed originally drained into Beaver Creek west of Celina, and was part of the Wabash Watershed, not the Grand Lake St. Marys Watershed. In order to assure adequate water levels in Miami-Erie Canal, Coldwater Creek was diverted into the man-made lake in Butler Township, just south of St. Anthony Road and west of Coldwater Creek. This near ninety degree artificial turn is today marked by an unclassified earthen mound on the outside turn of Coldwater Creek as it heads to Grand Lake St. Marys. While the earthen structure may keep some water from flowing across the fields in this area in search of Beaver Creek, it is insufficient to hold back the runoff from a sustained heavy rain event, and homes flood badly in this area along St. Anthony Road and in the general vicinity. Where Coldwater Creek Road meets Johnson Road, the waterway is wide and relatively deep as it carries a significant amount of water into the lake. This bridge was replaced in 2002 and the culvert was changed to accommodate the flow. It is this area where the creek has a devastating recent history of damage to area residential structures.

Map 2-3: Grand Lake St. Marys Watershed



The Loramie Creek Watershed, labeled 5 on Map 2-2, is located in extreme southeast Mercer County, south of Chickasaw and in Marion Township. This water flows south to the Auglaize River that eventually becomes part of the Great Miami Watershed and ends up in the Ohio River, flowing on to the Mississippi River and the Gulf of Mexico before it arrives in the Atlantic

Ocean. The waterways in this watershed that are located within Mercer County include Mile Creek.

The Wabash Watershed, labeled 3 on Map 2-2, includes almost the entire southwest quadrant of Mercer County. The Wabash River begins in Gibson and Granville Townships, flows north to Fort Recovery and becomes the Wabash River. Parts of Jefferson, Hopewell, and Butler Townships flow into the Wabash. The river grows in depth and width as it moves through Recovery, Washington, and a small part of Liberty Township before it exits Ohio and goes into Indiana where it collects more water, and eventually drains into the Ohio River almost five hundred miles from whence it began. Eventually it drains into the Mississippi River and the Gulf of Mexico, and then on to the Atlantic Ocean. The waterways in this watershed include Beaver Creek, Scherman Ditch, Brush Run, Little Beaver Creek, Hardin Creek, Toti Creek, Twomile Creek, Threemile Creek, Little Bear Creek, Little Beaver Creek, Crab Branch Creek, Hickory Fork Creek, Ward Ditch, Vanderbush Creek, and Limberfort Creek.

2.1.9 Land Use

Agriculture is the predominant land use in Mercer County. Cultivated crops and pastures account for 82% of all land use in Mercer County. In 2007, Mercer County was first in agriculture production sales in the State of Ohio, and 51st in the entire nation. Sales of livestock, poultry, and associated products accounted for 82.4% of those sales, placing Mercer County again first in the state in direct agriculture product sales and 35th in the nation.

Table 2-16: Mercer County Land Use

Use	Percentage
Cultivated Crops	77.48%
Developed, Lower Intensity	7.79%
Forest	4.25%
Pasture/Hay	4.21%
Open Water	3.55%
Shrub/Scrub and Grasslands	1.09%
Developed, Higher Intensity	1.01%
Wetlands	0.59%
Barren (strip mines, gravel pits, etc.)	0.01%

The forested areas, grassland, and wetlands in Mercer County provide 11,469 acres of state parks, forests, nature preserves and wildlife areas. This includes recreation and park areas such as Grand Lake St. Marys State Park, Mercer Wildlife Area, Baker Woods, and others.

Agriculture in Mercer County is quantified in the existence of 415 farms that collectively employ more than 1,400 people. However, almost 50% of the farmers have an off-the-farm supplemental job, likely for reasons of boosting personal income.

Land use for agriculture is being threatened by development in Mercer County. The sale of individual residential building lots of one to five acres is occurring at the rate of about seventy

per year. As the average age of farmers increases, the urbanization of farmland is likely to continue and perhaps even escalate as farmers retire and sell property. Oftentimes the sale of farmland that was paid for over a lifetime equates to the “retirement plan” for a farmer. These sales will likely transition more land from production agriculture to residential, which could have an impact on the county’s economy in the future.

The county’s Comprehensive Development Plan, developed in 2013, cites the need for zoning regulations that manage agricultural practices as well as residential development. The plan identifies concern about the creation of residential areas on previous farmland that results in the decrease in active farm land and exposes residential areas to confined animal production issues like manure management and air quality. The county development professionals feel that agricultural zoning regulation and additional development standards are the solution to the co-existence of these two components of land use.

Mercer County officials are concerned about industrial and manufacturing land use. Heavily subsidized, industrial wind turbines have been constructed in many adjacent communities. Officials are not only concerned about the myriad of potential negatives of large-scale industrial wind turbine developments but also the effect on local ambiance, the rural lifestyle, and the future impact when, twenty-five years from now, the turbines are decommissioned and taken out of service. The return of land to previous uses can be expensive and difficult.

Concerns about undesirable development consequences have led to the identification of specific targeted areas for certain types of development. Areas south of Grand Lake St. Marys, east of Fort Recovery, north and south of St. Henry, northwest and northeast of Coldwater, and east and west of Celina are designated residential development target areas. These areas are served by public water and sewage and transportation access does not interfere with agricultural operations.

Areas in the rural landscape that are not served by public infrastructure, have soils conducive to crop and livestock production, and are currently in agricultural use are being protected through encouraging preservation of farms, conservation districts, and agricultural districts. Farmers are encouraged to enroll in the Current Agricultural Use Valuation (CAUV) program to protect their land against unwanted development by heavy industry. Farmers are also encouraged to implement wise practices that reduce the impact agriculture can have on watersheds, such as manure management, crop covers, and other conservation practices.

2.1.10 Regulation

The Mercer County Board of Commissioners established the Mercer County Regional Planning Commission with the purpose of addressing development and land use planning issues larger than a single jurisdiction or municipality. The commission includes representation from each of the county’s fourteen townships, Celina, Coldwater, the Mercer County Engineer, Mercer County Health Department, two at-large representatives, and several non-voting members.

The commission meets monthly to address issues such zoning, floodplain regulation, subdivision regulation, development issues, and other land use topics.

Under the Mercer County Engineer, who serves as the county's floodplain administrator, floodplain regulations are currently in effect. Section 3.0 designates a Floodplain Administrator and specifies the duties of that office, which include updating regulations and enforcing such regulations under Section 6.0. Additionally, the Floodplain Administrator routinely monitors flood hazard areas to enforce regulations and provide community assistance, such as encouraging owners to maintain flood insurance policies.

Thirteen of Mercer County's fourteen townships have separate zoning regulations in place. Jefferson Township, which is divided into two districts, has partial zoning in place. The eastern half of the township is zoned while the western half is not. Each zoned township employs a part-time zoning inspector to administer their local zoning requirements. A complete list of the zoning regulation status for each township is provided below.

Table 2-17: Township Zoning Status

Township	Status
Blackcreek	Zoned
Butler	Zoned
Center	Zoned
Dublin	Zoned
Franklin	Zoned
Gibson	Zoned
Granville	Zoned
Hopewell	Zoned
Jefferson (East)	Zoned
Jefferson (West)	Unzoned
Liberty	Zoned
Marion	Zoned
Recovery	Zoned
Union	Zoned
Washington	Zoned

All incorporated jurisdictions, with the exception of Burkettsville, have zoning regulations in place. Each jurisdiction appoints a local zoning inspector, although the smaller villages sometime struggle to maintain this position.

2.1.11 Economy and Development

Mercer County's economy is dependent upon production agriculture, agri-business sales and service, small industry and manufacturing, service and government departments, and some tourism as a result of Grand Lake St. Marys and other recreational opportunities. The lakeshore areas of the county dominate the service and tourism industries; agriculture is more prevalent in the rural areas and small villages of the county. The small industries and factories are generally located in the City of Celina and the larger villages such as St. Henry, Fort Recovery,

and Coldwater. Some small businesses pepper the landscape in the rural areas as well, located along major highways that provide an excellent transportation route in and out of the county. While not densely populated in any area, the county is consistently developed from border to border. There are no remote or unsettled areas in the county.

Business and Industry

Mercer County has a generally strong, stable, and diverse economy that has benefitted from a healthy combination of agriculture, manufacturing, and service industries. Local economic development organizations such as Mercer County Community and Economic Development Corporation and the Celina-Mercer County Chamber of Commerce have worked diligently to foster innovation and new business growth in the county. In 2015, the county reported 1,136 active businesses and 47 new businesses.

Employment in Mercer County is attributed to many industrial sectors. Average employment for each sector, based on 2014 data, is listed in table 2-18.

Table 2-18: Average Employment by Sector

Employment Sector	Average Employment
Manufacturing	6,158
Trade, Transportation, and Utilities	3,652
Local Government	2,444
Education and Health Services	1,601
Leisure and Hospitality	1,247
Construction	951
Financial Services	684
Other Services	640
Professional and Business Services	581
Natural Resources and Mining	487
Information	169
State Government	146
Federal Government	95

According to the Ohio Department of Development, the major employers in Mercer County are:

Table 2-19: Mercer County Major Employers

Employer	Sector
Awardcraft	Manufacturing
Celina Aluminum Precision Technology	Manufacturing
Celina City Schools	Government
Cooper Farms Inc.	Manufacturing
Crown Equipment Corp.	Manufacturing
Fort Recovery Industries Inc.	Manufacturing
J&M Manufacturing Co.	Manufacturing
Mercer Health	Service
Pax Machine Works	Manufacturing
Reynolds & Reynolds Co.	Manufacturing
Workflow One	Manufacturing

In general, Mercer County experiences very high employment statistics. Unemployment has remained low in Mercer County when other counties in Ohio have suffered. The highest unemployment was experienced in 2011 when the unemployment rate reached 6.7%. Since then, the rate has steadily improved, reached 3.3% in 2015. As of March 2017, Mercer County has an unemployment rate of 2.5%, which represents the lowest unemployment rate of all 88 Ohio counties.

Table 2-20: Employment Statistics

	2011	2012	2013	2014	2015
Employed	20,700	21,000	21,300	21,800	22,400
Unemployed	1,500	1,100	1,200	900	800
Unemployment Rate	6.7%	5.1%	5.1%	3.8%	3.3%

While overall employment numbers have remained high, changes have been experienced within specific employment sectors. Manufacturing, education, and health services have seen significant increases in average employment. Conversely, government, information, and leisure and hospitality services have experienced slight declines.

Agriculture

The U.S. Department of Agriculture defines prime farmland as “land best suited to grow, feed, forage, fiber, and oilseed crops.” This type of land produces the highest crop yields with the least amount of energy and economic resources. According to this definition, the majority of the acreage in Mercer County is classified as prime farmland. Therefore, agriculture is a major contributor to the economy in Mercer County.

Farm statistics, according to the 2012 Agricultural Censuses, are as follows: Annual cash receipts for farms totaled more than \$596,366,000, with \$153,143,000 coming from sale of grain crops and \$443,223,000 from livestock sales. The average farm received \$493,680.00 from production sales. The county had 273,152 acres of farmland, which accounts for 91% of all land

use. There are approximately 1,208 farms in the county with an average size per farm of 226 acres. Full time farmers in the county number 544; part time farmers who hold at least a part time job off the farm number 664. Statewide, Mercer County ranks first in turkey, hog and pig production, second in layers (chickens) and third in pullets to replace later production and cattle. In 2012, Mercer County had more agricultural sales than any other county in Ohio.

Corn, soybeans, and wheat are the most prevalent grain crops. Livestock includes turkeys, chickens, hogs, dairy cattle, and beef cattle. There is almost no production of fruits, vegetables or sorghum, sunflowers, or barley.

2.1.11 Development Trends

Mercer County maintains the same reliance upon agricultural business today as it did during its founding years in the early 1800's. Grain farms and livestock production enable the county to prosper on a daily basis. Feed production and agri-businesses like equipment dealers and supply sales support production agriculture. The southern part of the county is scattered with both grain and livestock farms; the northern part of the county features grain farms and cropland. Many local residents are either farmers or are employed by farmers to work fields and production operations.

At mitigation planning meetings, county representatives both public and private indicated that they intend to continue to support, develop, and expand agricultural based businesses. This may include additional development in areas of livestock and grain production, equipment sales and service, livestock feed manufacturing, agricultural chemical sales and application, capital equipment sales and construction, and farm by-product industry. They also intend to maximize the county's ability to produce food and sell it on the commodity markets. They realize that this growth may result in additional hazards, including the increased use of farm chemicals, the enhanced need to manage runoff in the context of contemporary farm practices, and the management of farm waste such as manure management and by-product disposal. These considerations are openly discussed, and the benefit of additional agricultural development far out-weighs the cost.

The county is home to a wide variety of small and intermediate sized industries and manufacturing plants. County development professionals concentrate on attracting businesses that employ less than two hundred employees and produce innovative and contemporary products, utilizing engineering and technical professionals for research, development, and design. Their goal is to create jobs for educated young people who grew up in Mercer County or nearby counties, enticing them to return home after college for high paying jobs in a family-friendly, low-crime setting. They tout the "old German pride" people take in maintaining their properties, the Christian values, and the friendly atmosphere as incentives for a high speed and maximum production industrial community. The county expressed ongoing intent to recruit and retain modern manufacturing businesses and to continue to attract young, educated technical and engineering workers to the county. By appealing to technology-based businesses,

modern production facilities, and new and innovative industries and commercial operations, leaders feel that they can continue to grow Mercer County in a profitable and pleasant way.

Various tax incentives and advantages to doing business in Mercer County are being used to attract more business to the county. Revolving loan funds, tax abatements, and enterprise zones are being developed to enhance recruitment efforts. Actions and assurances that utilities and resources like natural gas will be available in quantities needed, and affordably, are under way.

Residential development is a major goal of local officials. All development officials want to attract more full time residents to Mercer County. While population has been on the up swing, they want to see even more young people move to the area. It is obvious when travelling to the county that residents take extremely good care of their homes and property. The neat and tidy landscape boasts quietly of a pride that is not common to all communities. Like many others, however, they intend to develop additional middle and higher income single-family homes and low and moderate multiple family homes in the coming years. In addition to the many opportunities for employment in the central part of the county, the outlying areas are close to large industries in adjacent counties. The villages of Rockford, Mendon, Burkettsville, and Fort Recovery are bedroom communities for these employees.

Interviews with the professionals involved in recruiting new businesses for the county cited many advantages to establishing a life in Mercer County. Disaster damage mitigation was among those advantages, and they cited numerous selling points. First, Mercer County is not extremely vulnerable to flooding because the county sits high in the watersheds, and storm sewer systems have been built and maintained to manage significant rainfall without damaging properties. Second, the threat of power outages has been addressed through hardening of utility services by pole replacement and transformer improvements. The fact that the community is managing vulnerability and losses, combined with a short list of past disaster incidents, aids in the recruitment and retention of business in Mercer County. Development professionals indicated that it is their intention to improve emergency management presence in development activities even further through enhancing the formality of the process through which disaster considerations are included in activities.

Tourism is important to Mercer County with Grand Lake St. Marys on the eastern edge of the county. The City of Celina sits on the northern edge of this man-made lake. Development professionals have talked of a large hotel and conference center as well as additional temporary vacation residences near and adjacent to the lake. They are working to improve and enhance public infrastructure like storm and sanitary sewer systems, water supplies, and roads to accommodate this development area. They work with emergency management to consider issues such as warning and notification, protective actions, and structural vulnerability to damages as they attempt to expand this additional area of commerce for the county.

County officials are passionate about proper land use by new ventures. While not all townships are zoned, and residential building codes do not regulate private homes, the county does strive

to guide any new construction to withstand the test of severe weather, heavy use, and occasional unanticipated problems. Commercial building codes are strictly enforced by inspectors, either locally or by contract with another county, and building permits are issued only when compliance is documented. The Mercer County Engineer monitors ditch maintenance, highway maintenance and flood plain activities, and works diligently to ensure that new development is appropriate and compatible with the area in which it is conducted. The building officials work in step with the economic development professionals to assist newcomers to Mercer County in completing wise use of the land in the county.

Because Mercer County has a plentiful water supply and several municipalities have water treatment and sewer treatment facilities, the area has few water supply or quality issues. This facilitates the development of new homes, new factories and retail facilities, and new tourism facilities. The population, even when maximized by many tourists on a hot, summer day, does not begin to burden the water resources that are available to the county. This, combined with many other local characteristics, facilitates a widespread and aggressive development program to occur.

Mercer County has been able to endure and excel in an economy that devastated many communities in Ohio. They have lost some very important businesses over the years, such as Huffy Bicycle and New Idea farm equipment, but they have worked diligently to identify other ventures to occupy space and bring new opportunities. They feel that a key to this success is in their focus on small business and industry rather than major employers. The diversity that results from many different ventures rather than a single major employer include a higher sustainability of employment statistics, greater opportunity for young and professional workers, and additional innovation and creativity in the business sector.

In Mercer County, when one door closes, they make sure that another truly does open. With its diversity, spanning from production of technical components and services for secondary automotive and small manufacturing, Mercer County has been able to grow when other counties have lost population and productivity.

2.2 HAZARD IDENTIFICATION

Mercer County has experienced many natural disasters in its history, ranging from tornadoes and blizzards to floods and droughts. The purpose this section is to identify and define each hazard that can impact Mercer County and examines historical hazard events that have occurred in the county.

In developing this assessment, the Mercer County Hazard Mitigation Planning Team analyzed the hazards and risks present throughout Mercer County. The natural hazards identified as relevant to Mercer County are:

- Dam/levee failure
- Drought and extreme heat
- Earthquake
- Flood
- Invasive Species
- Severe thunderstorm
- Tornado
- Windstorm
- Winter Storm

Some natural hazards were excluded from this plan because they pose no risk to Mercer County. Table 2-21 identifies these hazards and explains why the hazard is not relevant to Mercer County.

Table 2-21: Excluded Hazards

Excluded Hazard	Justification
Coastal Erosion	The county has no open coastline.
Land Subsidence	Not identified as a concern
Mud/landslide	Elevation not conducive to this hazard
Tsunami	Geographically impossible
Volcano	Geographically impossible
Wildfire	Insufficient forested area

Mercer County does not have a long history of federal disaster declarations and assistance. While the State of Ohio has a longer comprehensive list of incidents than displayed, Mercer County escaped damages in many of the incidents that have affected other areas of Ohio over the years. The county has only received nine federal disaster declarations in its history. Most recently, Mercer County was included in a statewide declaration in 2005 that provided support for evacuation efforts following Hurricane Katrina. The most recent declaration for a disaster directly affecting Mercer County occurred in February 2005. A comprehensive list of incidents in Mercer County that resulted in an emergency declaration in are summarized in table 2-22.

Table 2-22: Federal Disaster Declaration History

DR/EM Number	Incident Date	Incident Type(s)
DR-90-OH	January 23, 1959	Flooding, Severe Storm, Tornado
DR-191-OH	April 4, 1965	Severe Storm, Tornado
EM-3055-OH	January 26, 1978	Winter Storm
DR-831-OH	June 10, 1989	Flood, Severe Storm
DR-951-OH	August 4, 1992	Flood, Severe Storm, Tornado
DR-1065-OH	August 25, 1995	Flood, Severe Storm
DR-1478-OH	July 15, 2003	Flood, Severe Storm
DR-1580-OH	February 15, 2005	Flood, Winter Storm
EM-3250-OH	September 14, 2005	Hurricane Katrina Evacuation

To understand the risk posed by natural hazards in Mercer County, it is important to examine the characteristics of each hazard and evaluate the local history of occurrences. Historical information was obtained from the National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) and supplemented with information from local officials. This section defines each hazard and describes Mercer County's history with each.

2.2.1 Dam/Levee Failure

A dam is an artificial barrier built across flowing water. This barrier directs or slows the flow of water and often creates a lake or reservoir. A dam is considered hydrologically significant if it has a height of at least 25 feet from the natural streambed and a storage capacity of at least fifteen acre-feet or an impounding capacity of at least 50 acre-feet and is six feet or more above the natural streambed. Dams are constructed for flood control purposes or to store water for irrigation, water supply, or energy generation. They can be composed of earth, rock, concrete, masonry, timber, or a combination of materials.

Levees are embankments constructed to prevent the overflow of a river and subsequent flooding of the surrounding land. They can be built using earth, rock, or other materials. Levees constructed from concrete or masonry materials are referred to as floodwalls.

A failure of these structures is defined as the uncontrolled release of the water held back by the dam in a lake or reservoir. The majority of dams have a small enough storage volume that a breach or failure will have limited impact on the surrounding community. But failure of a large dam can cause substantial flooding downstream and lead to significant loss of life and property.

There are many causes of dam failure, including:

- Sub-standard construction
- Geological instability
- Spillway design error
- Poor maintenance
- Internal erosion
- Extreme inflow
- Earthquake

The Ohio Department of Natural Resources is responsible for determining the hazard potential for dams through their Dam Safety Program. ODNR classifies dams based on this scale:

Classification	Description
Class I	Probable loss of life, serious hazard to health, structural damage to high value property (i.e. homes, industries, major public utilities)
Class II	Flood water damage to homes, businesses, industrial structures (no loss of life envisioned), damage to state and interstate highways, railroads, only access to residential areas
Class III	Damage to low value non-residential structures, local roads, agricultural crops, and livestock
Class IV	Losses restricted mainly to the dam

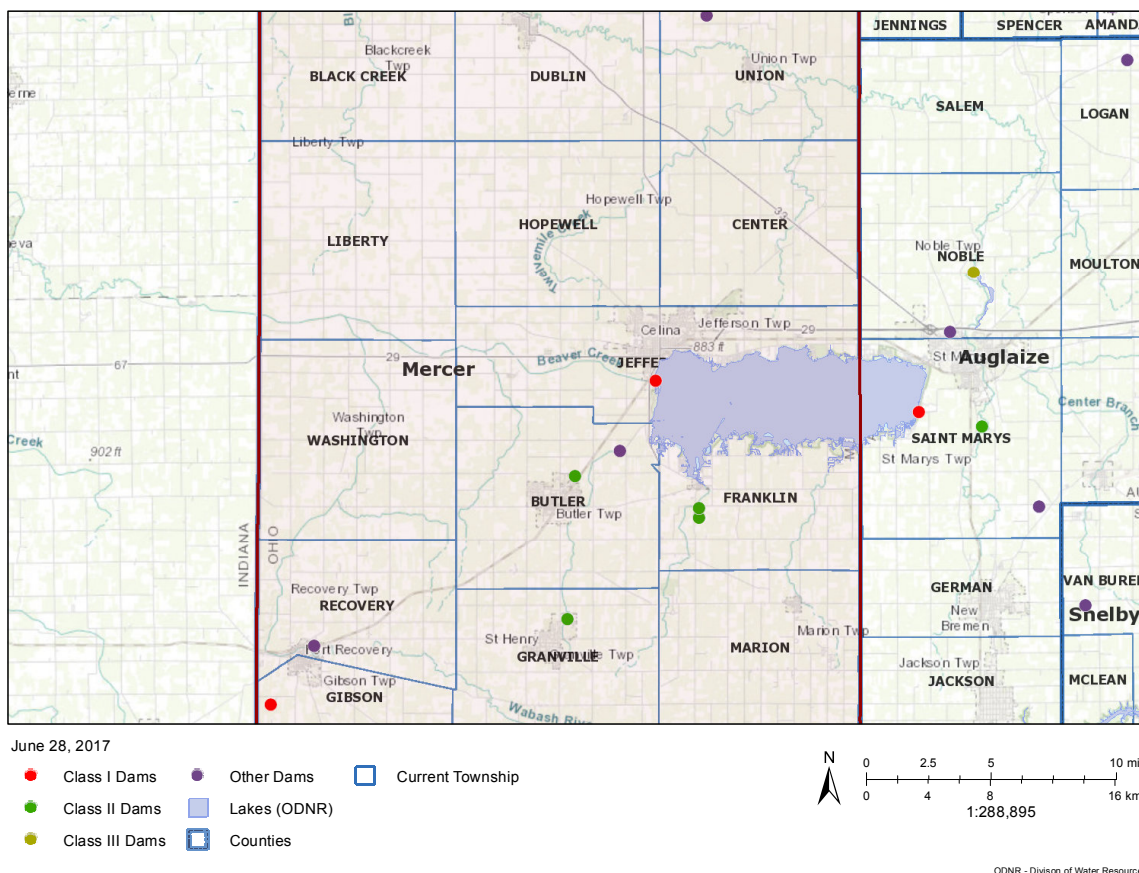
There are ten dams in Mercer County; there are no levees. These structures are water retention structures on waterways, reservoir and lagoon facilities that are part of wastewater treatment plants, and privately owned structures that affect the flow of runoff waters. Dams and classifications for Mercer County, according to the Ohio Department of Natural Resources, are identified in table 2-23.

Table 2-23: Mercer County Dams

Dam	Classification	Owner
Upper Wabash Number 3 Pond Dam	I	Wabash River Conservancy District
Upper Wabash Structure No. 2	III	Wabash River Conservancy District
St. Henry Wastewater Treatment Lagoon	II	Village of St. Henry
Montezuma/Club Island Wastewater Treatment Lagoon	II	Mercer County
Montezuma/Club Island Wastewater Treatment Lagoon	II	Mercer County
Coldwater Wastewater Treatment Dam	II	Village of Coldwater
Grand Lake Saint Mary's West Embankment	I	ODNR, Division of Parks and Rec
Coldwater Creek Diversion Embankment	Not classified	Private
MRC Lake Dam	Not classified	Private
Guggenbiller Lake Dam	Not classified	Private

Map 2-4: Mercer County Dam Locations

Mercer County Dam Locations



ODNR - Division of Water Resources

Local Dam Failure History

According to records from Stanford University’s National Performance of Dams Program, there are no written reports of dam incidents, breaches, or failures in Mercer County. There is a less than 1% probability of a dam incident.

2.2.2 Drought and Extreme Heat

A drought is a deficiency of moisture that adversely impacts people, animals, and vegetation over an area of significant size. Because drought is a creeping phenomenon characterized by the absence of water, there is no defined beginning or end, nor is there a standard amount of time required for an extended dry period to be considered a drought. It is considered a drought when the dry period lasts long enough to impact the environment and economy of a region, typically a period of months or years.

There are four common types of drought:

Type	Description
Meteorological	Based on the degree of dryness (rainfall deficit) and length of dry period
Hydrological	Based on impact of rainfall deficits on water supply such as stream flow, reservoir and lake levels and water table decline
Agricultural	Based on impacts to agriculture by rainfall deficits, soil water deficits, reduced ground water, and reservoir levels needed for irrigation
Socioeconomic	Based on the impact of drought conditions on supply and demand of some economic goods

Drought severity is measured using the Palmer Drought Severity Index (PDSI). The PDSI measures dryness based on recent precipitation and temperature statistics. Drought classifications are identified in the chart below:

Measurement	Description
-4 or less	Extreme Drought
-4 to -3	Severe Drought
-3 to -2	Moderate Drought
-2 to -1	Mild Drought
-1 to -0.5	Incipient Dry Spell
-0.5 to 0.5	Near Normal
0.5 to 1	Incipient Wet Spell
1 to 2	Slightly Wet
2 to 3	Moderately Wet
3 to 4	Very Wet
4 or more	Extremely Wet

A heat wave is a period of abnormally hot and unusually humid weather, typically lasting for two or more days. This can be an extended period of time with higher than normal temperatures or a shorter period of time with abnormally high temperatures. Regardless of the length of time or exact temperatures, heat waves are a safety hazard to anyone exposed to the high heat. People are at risk for heat exhaustion and heat stroke, which can be fatal in the most serious cases. When heat waves are accompanied by drought conditions, the potential for a serious natural disaster increases. Between injuries, fatalities, and crop/property damage, these disasters can significantly impact the economy of a region.

Heat waves can occur in Mercer County and all of Ohio but the incidence is rare and the duration typically short. Extreme temperatures are considered anything above 90 degrees Fahrenheit. In the humid climate of northwest Ohio, these temperatures are often accompanied by high humidity. Temperatures rarely exceed the mid-90s, although the region does occasionally experience temperatures of 100 degrees or slightly higher. These brief heat

waves are not uncommon, but rarely last more than a few days. A heat wave lasting longer than a week is extremely rare.

Table 2-24: Average Temperatures and Rainfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. High	33°	38°	49°	62°	72°	80°	83°	82°	76°	64°	50°	37°
Avg. Low	19°	22°	30°	41°	51°	61°	64°	62°	55°	44°	35°	24°
Avg. Precip.	2.32"	2.17"	2.6"	3.54"	3.98"	4.06"	4.8"	3.54"	2.6"	2.64"	3.23"	2.68"

Drought is not common in Mercer County. Dry spells can last for several weeks but most months have sufficient rainfall to support crop growth and human sustenance. Drought conditions, when they do occur, have a significant impact on the agriculture industry that prevails in the county.

Drought and extreme heat are countywide hazards and can affect all areas and jurisdictions.

Local Drought/Extreme Heat History

While drought is not common, Mercer County has been impacted by several droughts in recent decades. The 1988-1989 North American Drought followed a milder drought in the Southeastern United States and California the year before. This drought spread from the Mid-Atlantic, Southeast, Midwest, Northern Great Plains, and Western United States. It was widespread, unusually intense, and accompanied by heat waves that killed 4,800 to 17,000 people nationwide and substantial numbers of livestock. One particular reason this drought became very damaging was that farmers likely farmed on land that was marginally arable. Another reason was the pumping of groundwater near the depletion mark. The Drought of 1989 destroyed crops almost nationwide. Lawns went brown and many cities and jurisdictions enacted water restrictions. This catastrophic drought continued to impact the Midwest and Northern Plains states during 1989. The drought was not declared over until 1990. According to the planning team, this drought was the most intense and damaging drought to impact Mercer County that stakeholders could recall.

The most recent drought to affect Mercer County occurred in the summer of 2012. This incident, referred to as the 2012 North American Drought, was an expansion of the 2010-2012 United States drought that began in the spring of 2012. Lack of snowfall in the United States caused very little melt water to absorb into the soil. The drought included most of the United States and all of Ohio. Along with many other counties, Mercer County was designated with moderate drought conditions by mid-June of 2012. This drought has been compared to similar droughts in the 1930s and 1950s but was not in place as long. The drought caused catastrophic economic ramifications. According to most measures, this drought exceeded the 1988-1989 North American Drought, which is the most recent comparable drought.

On July 30, 2012, the Governor of Ohio sent a memorandum to the USDA Ohio State Executive Director requesting primary county natural disaster declarations for eligible counties due to agricultural losses caused by the drought and other natural disasters during the 2012 crop year. The USDA reviewed the Loss Assessment Reports and determined that there were significant

production losses in 85 counties to warrant a Secretarial disaster designation. On September 5, 2012, Mercer County was included as one of the designated counties. While this event significantly impacted many areas of Ohio and the Midwest, community members recall the incident as more of a prolonged dry spell than a significant drought.

Table 2-25: Mercer County Drought/Extreme Heat History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Drought/Extreme Heat	2	0	0	0	0	0

2.2.3 Earthquake

An earthquake occurs when two blocks of earth, called plates, move past one another beneath earth's surface. The location where the plates meet is called a fault. The shifting of the plates causes movement along the fault line. This movement can often be felt in areas surrounding the earthquake's epicenter and can cause damage ranging from insignificant to devastating. Damage caused by an earthquake can include rattling foundations, falling debris, and, in the most severe cases, toppling buildings, bridges, and culverts. The severity of earthquake movement is measured using the Modified Mercalli Index scale as defined in this chart:

Intensity	Shaking	Description/Damage
I	Not Felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on building upper floors.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very Strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.

X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
---	---------	--

According to the Ohio Seismic Network, seismic risk in Ohio is difficult to evaluate because earthquakes are infrequent. The recurrence interval is generally very long, sometimes spanning hundreds or thousands of years. In geologic terms, this classifies Ohio's historic record as an instant. Another factor in earthquake risk is the nature of the geologic materials upon which a structure is built. ODNR states "ground motion from seismic waves tends to be magnified by unconsolidated sediments such as thick deposits of clay or sand and gravel."

Ohio has experienced more than 120 earthquakes since 1776. While only fourteen of these events have caused damage, there is a greater risk for earthquakes in Ohio than most people realize. West central Ohio is the area of Ohio at the highest risk for earthquakes; northeast Ohio is the second most active earthquake risk area.

The strongest earthquake recorded in Ohio occurred in Shelby County to the southeast of Mercer County in 1937 and was estimated to have a magnitude of 5.5 on the Richter Scale. This incident caused some damage in Anna and surrounding west central Ohio communities. The same area in Ohio previously reported earthquake activity in 1875 and 1884. The Pomeroy area, southeast of Columbus, experienced an earthquake in 1926, and residents in Anna felt minor quakes in 1930 and 1931, just a few years prior to the 1937 incident. None of these earthquakes caused widespread damage or devastation. The minor quakes caused shaking buildings, crumbling mortar, and limited property damage. Impacts were only felt locally; no statewide damages were reported.

Local Earthquake History

Mercer County has experienced four earthquakes with epicenters in the county. These earthquakes were minor and there is no documented evidence of damage in Mercer County. Other minor earthquakes have occurred in the counties surrounding Mercer and other areas of Ohio but have caused little to no local damage and no impact on Mercer County. Earthquake is a countywide hazard and can affect all areas and jurisdictions.

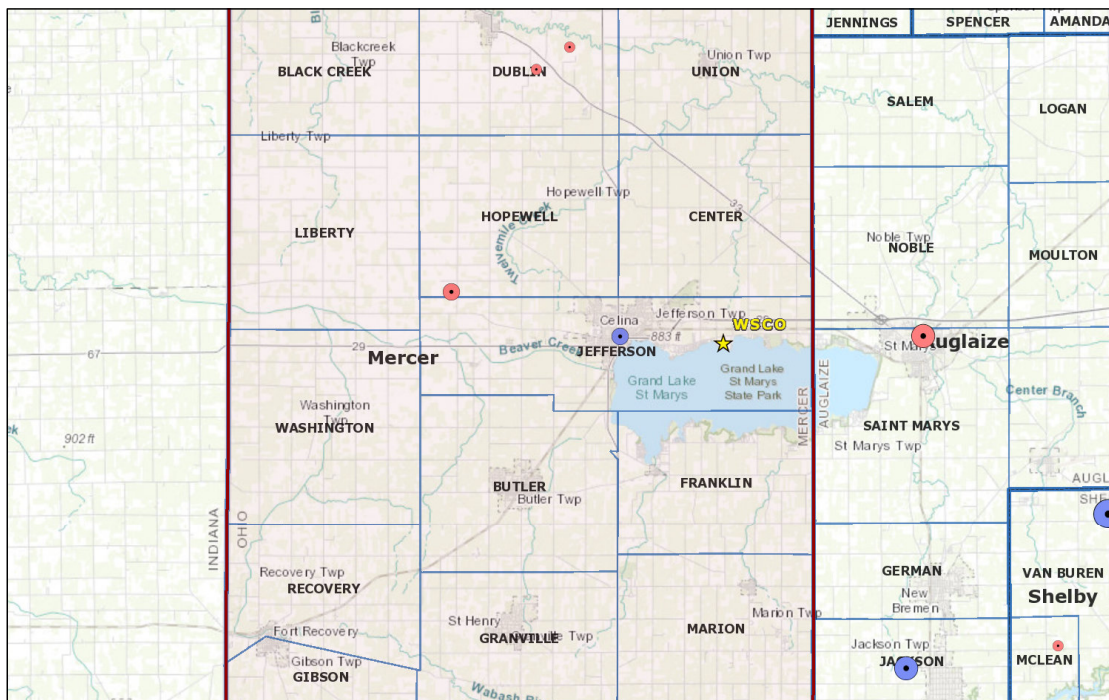
Table 2-26: Mercer County Earthquake History

Date	Location	Magnitude	Modified Mercalli
04/15/1892	Celina	3.8	IV
06/17/1977	Hopewell Township	3.3	VI
01/30/2004	Dublin Township	2.5	III
03/13/2005	Dublin Township	2.2	F

Please see the map below to locate the above incident locations.

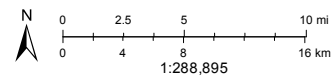
Map 2-5: Mercer County Earthquake Epicenters

Mercer County Earthquake Epicenters



June 28, 2017

★ OhioSeis Seismic Stations



ODNR - Div. of Geosurvey

2.2.4 Flood

A flood is defined as any high flow, overflow, or inundation of water over typically dry land that causes or threatens damage. Floods occur subsequent to meteorological events such as substantial precipitation, thunderstorms with heavy rainfall, rapid snowmelt, or extreme wind events along coastal waterways. In some areas, seismic activity can trigger floods.

Riverine flooding occurs when a river or stream rises to an elevation that causes the river to overflow its banks. The rising water threatens or causes damage to roadways, homes, buildings, and occupied spaces near the overflowing waterway. Lower levels of a watershed are more susceptible to this type of flooding because these waterways receive all the water from the upper levels and are responsible for carrying a much higher volume of water than the tributaries.

Flash floods are defined as the rapid and extreme flow of high water into a normally dry area; a flash flood can also occur when there is a rapid rise in the water level of a stream or creek and the water rises above a pre-determined flood level within six hours of a precipitation event. This type of flooding occurs when the ground is too saturated, impervious, or flat to drain

rainfall into waterways through storm sewers, ditches, creeks, and streams at the same rate as the precipitation falls.

Worldwide, flooding is the most common and costly disaster, resulting in significant loss of life and property every year. Floods have a substantial impact on the infrastructure. Common effects include roadway breaches, bridge washouts, roadway wash away, and water-covered roadways. As floodwater moves rapidly and forcefully, it washes away the surface and sub-surface of roads, causing holes, ruts, and other problems for vehicles. Floodwater that is one foot deep is strong enough to carry vehicles away, often with occupants inside. Rescuers are powerless against rapid, rising water because they are unable to exert enough strength to counteract the physics of moving water.

Floodwaters seek the path of least resistance as they travel to lower ground and will seep into and occupy any structure in their path. Basements and lower levels of buildings can become inundated with floodwater. Installing sandbags along the exterior of a building can only serve as a temporary stopgap measure; if floodwaters do not recede quickly, the force of the water will move through the sandbags and enter the structure.

The aftereffects of flooding can be just as damaging and dangerous as the initial incident. Cleanup is often a long, protracted activity with its own set of hazards. Sewer systems can become inundated with floodwater and cease to function properly. Standing water becomes contaminated with household and industrial chemicals, fuel, and other materials that have leaked into the water. All floodwater is considered contaminated, either from germs and disease or hazardous materials. This creates a hazard for responders and residents throughout the initial recovery phase of the disaster.

Historically, flooding has been a moderate risk for Mercer County. Data from NCEM indicates the county has experienced 78 flooding events since 1950. The majority of these, 56, were riverine flood events while 22 incidents were classified as flash floods. In total, property damage from these events has exceeded \$6,256,000. These property damage figures are significantly higher than most of the adjacent and surrounding counties, including Darke, Shelby, Auglaize, and Van Wert.

Mercer County's moderate flooding risk is largely because the county sits at the top of two major watersheds, and most of the water is able to drain naturally due to a drop in elevations. The St. Lawrence Continental Divide splits Mercer County into two halves, and crosses the county following State Routes 703 and 29. The Wabash River Watershed covers most of the southwest and south-central parts of the county, taking water to the Mississippi River via the Wabash to the Ohio Rivers along the way. The rest of the county drains into the St. Marys River Watershed, the Auglaize Watershed, the Loramie Watershed and the Grand St. Marys Lake Watersheds. This water drains to the north into the Maumee River Watershed and out to Lake Erie. Waterways in Mercer County include several significant ditches with capacity to move relatively large amounts of runoff, and include the St. Marys and Wabash Rivers, Beaver Creek, Coldwater Creek, and many others. These creeks, ditches and streams allow water to move

quickly and effectively to the rivers and on to lower lands. Much of the riverine flooding along the way is confined to agricultural land or riverbanks that are known to flood.

Flash flooding is a higher risk than riverine flooding because the land is so flat and rapid or heavy rainfall amounts have difficulty in draining as fast as precipitation falls. During heavy rainfall events, the flat terrain prevents water from draining quickly, increasing the potential for flash floods. The map below identifies the flood prone areas of Mercer County. Many of these areas have flooded streets and roads, houses have water in basements or yards, and businesses are surrounded by water-filled parking areas and spaces. Parks and other recreational areas flood, and some bridges and culverts are water-covered for a short period of time. The presence of flash flooding is totally dependent upon the amount of rainfall, whether the ground is frozen or thawed, and how well saturated the ground was prior to the rainfall. The storm that causes a flash flood in the wet, rainy spring when snow is melting is totally different than the storm that causes flash flooding on a dry, hot late August afternoon.

Data from NCEM indicates that Mercer County has been impacted by 78 flood events since 1950. Of these incidents, 56 were considered riverine flood events and 22 were categorized as flash floods. Collectively, these events have caused \$6,256,000 in property damage. Because of the number of rivers, creeks, and streams and the presence of Grand Lake St. Marys, flooding is a countywide hazard and can affect nearly all jurisdictions. Burkettsville and St. Henry do not have any identified floodplain areas.

Map 2-6: Mercer County Floodplain Areas

Local Flood History

The most significant flood in Mercer County's history occurred July 4 – 8, 2003. The incident began when a storm cell produced three to four inches of rain across west central Ohio on July 4. As the rain continued to fall, water levels on Beaver Creek, the St. Marys River, and Grand Lake St. Marys rapidly rose. In the village of Rockford, a trailer court with thirteen homes was evacuated when the St. Marys River overflowed its banks. Other homes and businesses were inundated with two to three feet of water, bridges were washed out, and State Route 127 and U.S. Route 33, major transportation routes through the county, were closed because of flooding. In Celina, Beaver Creek and the spillway for Grand Lake St. Marys overflowed, causing major flooding to multiple businesses, including a sports club and medical center. State Route 127 and many local roads were closed due to high water and multiple homes suffered major basement flood damage. In the village of Montezuma and southern areas of the county, many roads were closed and homes flooded because of the high water. This countywide flood event caused more than \$4,550,000 in property damage and is considered the worst flooding event in the county's history.

A second major flood incident affected the county February 28 – March 1, 2011. This event was caused by the combination of heavy rain from a severe storm system and snowmelt. In St. Henry, multiple roads were closed because of high water and several residences experienced basement flooding. In the Philothea neighborhood south of Celina, a trailer park was evacuated due to high water and roads were closed. Celina experienced significant residential flooding, including some evacuations, and road closures. In total, this incident caused \$470,000 in property damage.

Although NCDC records do not indicate property loss, the county experienced its most recent major flooding event in June 2015. From June 16-18, 2015, the county received more than ten inches of rainfall, causing creeks and streams, including Beaver Creek, to overflow their banks. The Grand Lake St. Marys spillway reached thirteen inches above notch level, more than twenty inches higher than the recommended level. State Route 127 and U.S. Route 33, along with other state, county, and local roads, were closed due to floodwater, making travel across the county nearly impossible. Mercer County officials issued a local emergency declaration on June 17; many businesses were forced to close temporarily because employees could not reach work due to travel restrictions. In Butler Township, six homes were directly affected by the flooding. Five homes experienced minor damage. One property was damaged severely and the residents were forced to be relocated for six months until the home was habitable again.

Table 2-27: Mercer County Flood History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Flood	78	\$6.256M	0	0	0	\$136K

2.2.5 Invasive Species

An invasive species is a plant or animal species that is not native to the local ecosystem and whose introduction is likely to cause economic or environmental harm or harm to human life. Across the United States, more than 5,000 species are recognized as invasive. Invasive species are classified as terrestrial plants, terrestrial wildlife, insects and diseases, and aquatic species.

Invasive terrestrial plants can displace native species, impact the wildlife that rely on native species as a source of food or shelter, or form monoculture plant communities that reduce biodiversity. While more than 25% of the plant species in Ohio originate from other areas, most are invasive. Fewer than 100 of these are actually considered to be invasive. Invasive terrestrial wildlife is much less common than other types of invasive species but can still cause significant damage to natural habitats. Aquatic invasive species are plants and animals that impact the quality of waterways. These can affect large bodies of water, such as Lake Erie and the Ohio River, and much smaller rivers, lakes, and streams. Invasive insects and diseases are insects, fungus, and other small organisms that can negatively impact plants, forests, and the health of wildlife. Table 2-28 identifies the invasive species across these categories that have the greatest impact in Ohio.

Table 2-28: Invasive Species in Ohio

Species	Type
Asian Carp	Aquatic
Curlyleaf Pondweed	Aquatic
Hydrilla	Aquatic
Round Goby	Aquatic
Ruffe	Aquatic
Red Swamp Crayfish	Aquatic
Sea Lamprey	Aquatic
White Perch	Aquatic
Zebra Mussel	Aquatic
Asian Longhorned Beetle	Insects & Diseases
Emerald Ash Borer	Insects & Diseases
Gypsy Moth	Insects & Diseases
Hemlock Woolly Adelgid (HWA)	Insects & Diseases
Walnut Twig Beetle	Insects & Diseases
Japanese Honeysuckle	Terrestrial Plant
Japanese Knotweed	Terrestrial Plant
Autumn-Olive	Terrestrial Plant
Buckthorns	Terrestrial Plant
Purple Loosestrife	Terrestrial Plant
Common Reed or Phragmites	Terrestrial Plant
Reed Canary Grass	Terrestrial Plant
Garlic Mustard	Terrestrial Plant
Multiflora Rose	Terrestrial Plant
Bush Honeysuckles	Terrestrial Plant
Feral Pig	Terrestrial Wildlife

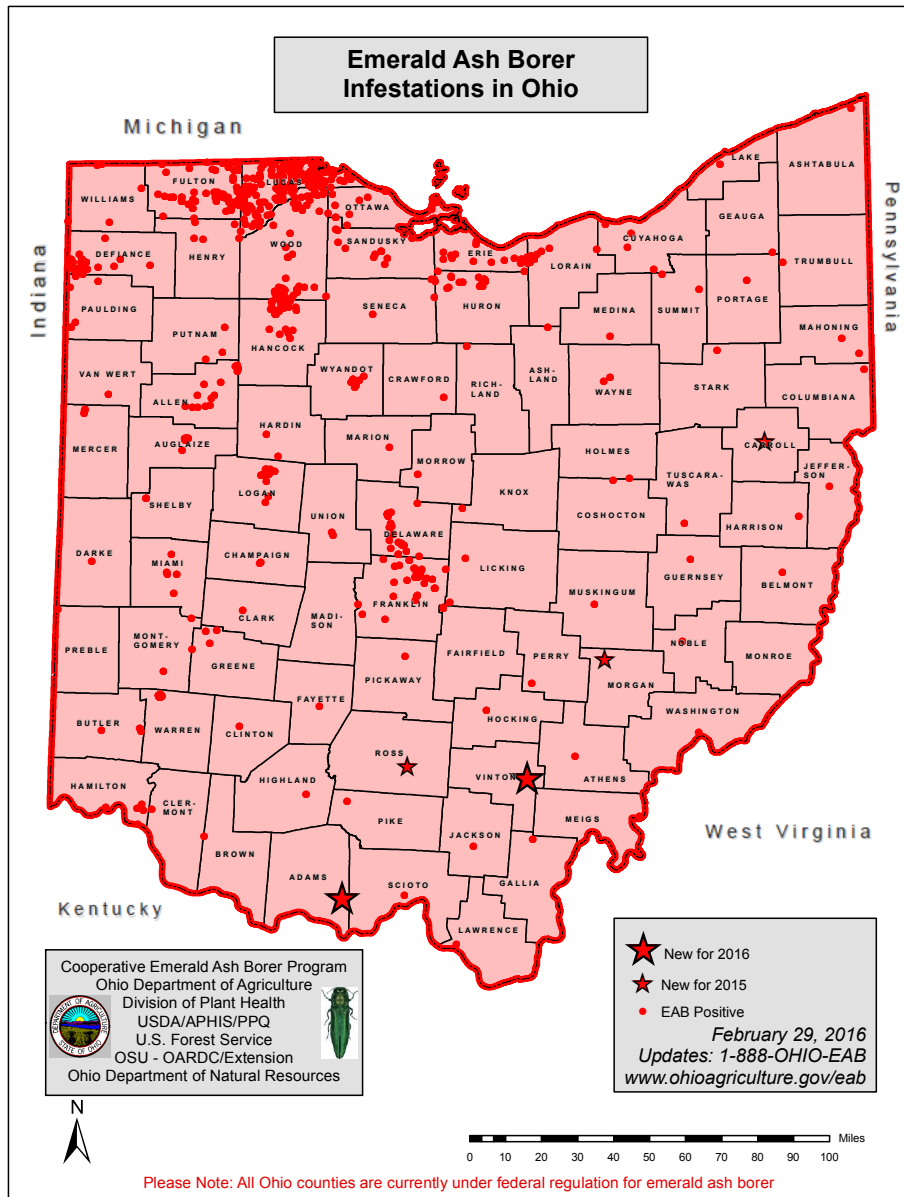
Local Invasive Species History

The most recent invasive species to impact Mercer County is the Emerald Ash Borer (EAB). EAB is an ash-tree killing insect native to Asia; it kills trees within three to five years of infestation. It was first discovered in Ohio in 2003. Since that time, the Ohio Department of Agriculture and partner agencies have worked to protect the state's 3.8 billion ash trees. The infestation was initially identified in northwest Ohio near Toledo but has since spread across the entire state. Map 2-7 identifies EAB infestation areas in Ohio. According to natural resources officials, the worst of the EAB infestation has passed. While there are many dead and diseased trees that must still be removed, a process that will take years to accomplish, significant work has been completed to remove a significant number of these hazards.

Mercer County is not the most impacted area of Ohio but it has experienced effects of the EAB infestation. As diseased trees along waterways have died, they have fallen into the waterways, impacting drainage and the flow of water. Diseased trees along the public right-of-way have also impacted infrastructure, as they are more likely to fall during a storm or high wind event. The Mercer County Engineer and jurisdiction street and road departments have aggressively removed diseased trees along the public right-of-way, which has been effective at reducing the

impact on utility lines and other infrastructure. They are not, however, able to remove trees from private property. Individual landowners are responsible for removing dead and diseased trees from their personal property.

Map 2-7: Emerald Ash Borer Infestation Map



In recent years, Grand Lake St. Marys has been affected by multiple blue-green algae blooms. The algae, which is thought to be caused by increased quantities of phosphorous and nitrogen in runoff water, can produce toxic bacteria that is harmful to plants, animals, and humans. In 2010, the lake was declared unsafe for contact, including boating and swimming, due to an algal bloom. Because of the lake’s importance to the economy of the region, this had a serious impact on businesses in the region. In October 2010, the U.S. Small Business Administration

issued a declaration of economic injury for Mercer County and the region surrounding the lake. This declaration made loans available to small businesses and non-profit organizations negatively impacted by the algal bloom on the lake. While algal blooms have occurred on the lake since 2010, none have reached the magnitude and economic impact of this incident.

2.2.6 Severe Thunderstorm

A thunderstorm is a local storm produced by a cumulonimbus cloud accompanied by thunder, lightning, and/or hail. Lightning is a brief, naturally occurring electrical discharge that occurs between a cloud and the ground. Hail is frozen rain pellets that can damage buildings, vehicles, and other structures as they fall. Hail forms in the higher clouds and accumulates size as it falls as precipitation. If temperatures close to the ground are warm, the hail can partially melt or become freezing rain. Most thunderstorms include heavy precipitation and wind. These storms can produce hail, lightning, flash floods, tornadoes, and damaging winds that pose significant risk to people and property in the area. A thunderstorm that produces a tornado, winds of 58 mph or greater, and/or hail with a diameter of at least 1", is considered a severe thunderstorm. These storms typically develop as part of a larger storm front and are preceded and followed by regular thunderstorms.

Mercer County experiences many thunderstorm events each year. The majority of these events include heavy precipitation, wind, and thunder. Hail and lightning are possible, but occur much less frequently than wind and heavy precipitation. Thunderstorms that include hail and lightning are much less frequent but are generally more severe. Thunderstorms are a countywide hazard and can affect all areas and jurisdictions. These storms range from minor to severe, although the most are minor or moderate. Thunderstorms are relatively frequent but generally result in limited property damage. According to NCDC records dating back to 1950, Mercer County has experienced 202 thunderstorm events over 161 days. Of these, 95 incidents resulted in property damage and 0 caused crop damage. Only 60 of these incidents included hail and one included lightning as reported hazards.

Local Severe Thunderstorm History

Few thunderstorms in Mercer County have caused significant property damage. According to NCDC records, only three incidents have caused more than \$50,000 in damage. The first of these occurred on June 25, 2002 in Celina. Strong thunderstorm winds toppled more than 100 trees. Several trees fell on cars and homes, causing minor damage. One individual was injured when a falling tree struck her vehicle. Total damages in the city were \$50,000.

On April 19, 2011, a severe thunderstorm impacted the Chattanooga neighborhood in the northwest quadrant of Mercer County. This storm was part of a larger storm system that spawned several tornadoes, including one in Celina, and caused nearly \$1,500,000 damage across the region. Winds of up to 60 knots caused damage to a silo, several barns, farm equipment, and several residential properties to be damaged. Multiple trees and power lines also fell. Total damage from the thunderstorm was \$90,000.

The most recent severe thunderstorm to cause serious damage in Mercer County occurred on July 10, 2013. A storm system developed in advance of an approaching cold front, leading to several severe thunderstorms with heavy rainfall, high winds, and hail. In Celina, a convenience store suffered a partial building collapse and multiple trees fell, including one onto a car. In the Philothea neighborhood south of Celina, a wooden patio was destroyed by wind. Total property damages for the incident were \$106,000.

Table 2-29: Mercer County Severe Thunderstorm History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Severe Thunderstorm*	161	\$872K	0	0	5	\$5.5K
Hail	44	\$17K	0	0	0	<\$1K
Lightning	1	0	0	0	1	0

*Includes all incidents with thunderstorm wind, hail, and/or lightning.

2.2.7 Tornado

A tornado is an intense, rotating column of air that protrudes from a cumulonimbus cloud in the shape of a funnel or rope whose circulation is present on the ground. If the column of air does not touch the ground, it is referred to as a funnel cloud. This column of air circulates around an area of intense low pressure, almost always in a counterclockwise direction. Tornadoes usually range from 300 to 2,000 feet wide and form ahead of advancing cold fronts. They tend to move from southwest to northeast because they are most often driven by southwest winds.

A tornado's life progresses through several stages: dust-whirl, organizing, mature, shrinking, and decay. Once in the mature stage, the tornado generally stays in contact with the ground for the duration of its life cycle. When a single storm system produces more than one distinct funnel clouds, it is referred to as a tornado family or outbreak.

Tornado magnitude is measured using the Enhanced Fujita scale, abbreviated as EF. The rankings range from EF-0 to EF-5 and are based on damages caused by the tornado. Prior to 2012, the Fujita scale was used to measure tornado damage and was abbreviated F-1 to F-2, depending on the level of impact.

The following table was taken from FEMA's website, and indicates the type of damages per Enhanced Fujita Scale tornado classification. The tornadoes in Mercer County have historically been limited to EF-0 and EF-1.

EF-Scale	Wind Speed	Typical Damage
0	65 – 85 mph	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over,
1	86 – 110 mph	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
2	111 – 135 mph	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground
3	136 – 165 mph	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
4	166 – 200 mph	Devastating damage. Whole frame and well-constructed houses completely leveled; cars thrown and small missiles generated.
5	>200 mph	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters; high-rise buildings have significant structural damage; incredible phenomena will occur
No rating		Inconceivable damage. Should a tornado with the maximum wind speed in excess of EF-5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. Will create serious secondary damage on structures.

Tornadoes are the most damaging of all atmospheric phenomena. While their frequency is low, the probability of significant damage is high. Because tornadoes occur as part of a storm system, they do not strike as independent incidents. Emerging out of a storm front or super cell, the tornado, especially when accompanied by heavy rain, straight-line wind, lightning, and hail, can be extremely damaging. Effects of a tornado include uprooted trees, damaged or destroyed buildings, and smashed vehicles. Twisting and flying debris turns into projectile weapons, which can cause injuries and fatalities.

Tornadoes in Mercer County are generally narrow, and do not grow to the width of the mega-tornadoes in the plain states. They are generally 25-500 yards wide and stay on the ground for a few miles. The longest recent duration for a tornado to stay on the ground was 56.2 miles in 1965, and the shortest recent one stayed on the ground for 100 yards in 2013.

Ohio ranks among the top twenty states in injuries, fatalities, and property damage from tornado events. While tornadoes do not occur frequently in the Mercer County, the severity and impact when they do is often substantial. Mercer County has experienced eighteen tornado events since 1950, according to NDPC records, and has suffered more than \$6,595,000 in property damage. The magnitude of the tornadoes has ranged from F/EF0 to F/EF4, with the highest number of incidents classified as EF-0. In Mercer County, tornadoes are a countywide hazard and can affect all areas and jurisdictions. The map below identifies the location and magnitude of tornado incidents in the county.

Map 2-8: Tornado History



Local Tornado History

Mercer County has experienced two tornado events that more than \$2,500,000 each in damage. The first of these occurred on April 11, 1965. Commonly known as the Palm Sunday Tornadoes, this tornado outbreak is one of the deadliest in U.S. history. The outbreak spawned eighteen tornado-producing systems across six states. Six of these systems reached Ohio. One of these systems crossed from Indiana into Mercer County at approximately 8:20 pm as an F-4 tornado. The storm caused widespread destruction before moving into Van Wert County. Two residents perished when their home was destroyed. Across Ohio, a total of 55 people were killed by tornadoes from this outbreak. In addition to two local fatalities, 24 people were injured and Mercer County suffered \$2,500,000 in property damage.

The second significant tornado event occurred in the early morning hours on June 1, 1980. An F1 storm impacted an area south of Montezuma and Grand Lake St. Marys. The storm injured four people and caused damage totally \$2,500,000.

The most recent tornado to cause major damage in the county occurred April 19, 2011 in Celina. This EF-2 storm travelled through the primary business district of Celina along Havemann Road. Several large commercial businesses, including a home improvement

warehouse and grocery store, suffered serious roof and HVAC damage. The grocery store was destroyed. Multiple residential structures and barns were damaged and several vehicles were moved by the strong winds. No injuries were reported but the county experienced \$340,000 in property damage.

Table 2-30: Mercer County Tornado History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Tornado	18	\$6.595M	\$30K	2	29	\$367K

2.2.8 Windstorm

A windstorm is a weather event with very strong winds but little to no precipitation. Wind speed in this type of event typically reaches at least 34 mph but can be any speed that causes light or greater damage to trees and buildings. Damage can be caused by gusts, which are short bursts of high-speed wind, or longer periods of sustained wind.

A derecho is a specific type of windstorm that is widespread and fast moving. These storms can produce damaging straight-line winds over extremely large areas, sometimes spanning hundreds of miles long and more than 100 miles wide. To be defined as a derecho, the storm must produce damage over at least 240 miles, have wind gusts of at least 58 mph across most of the storm's length, and multiple gusts of 75 mph or greater. The destruction produced by a derecho can be very similar to that from a tornado. However, the damage from this type of storm generally occurs in one direction along a straight path.

Erosion is vulnerability outcome of wind hazards in Ohio in the areas with essentially flat terrain like Mercer County. Because the soils provide fertile farmland, efforts have been sustained to use every possible acre of land for productive crops. What land was once wooded and lush with vegetation has been cleared, and windbreaks have been removed to make for more productive farm land; therefore, when winds cross the wide expanse of farm fields, the topsoil blows away. Most Mercer County farmland is vulnerable to wind-caused erosion. Because the extremely flat topography cannot be changed, and because the winds cannot be stopped, the mitigating action to save the soil is to plant windbreaks, use sod strip farming techniques, and to create vegetative buffer lines where possible.

The topography of west central Ohio can be vulnerable to damages from high winds unaccompanied by any kind of precipitation, making windstorms a countywide hazard. All areas and jurisdictions can be affected by severe wind. There is limited change in elevation or extensive wooded cover area to break up the effects of strong windstorms. Although winds in excess of 50 miles per hour can occur independently, this is uncommon. Most of the time, severe winds are part of a larger storm system. The wind occurs as precipitation and unstable air moves into the area. High winds are frequently accompanied by heavy rain, hail, ice, snow, or thunderstorms.

In Mercer County, wind-only incidents do not occur frequently. NCDC has recorded only nine wind events since 1950, resulting in \$4,953,000 in property damage. Windstorms are a countywide hazard and can affect all areas and jurisdictions.

Local Windstorm History

Although infrequent, when wind does occur as an independent hazard, the impact can be severe. The most severe windstorm in Mercer County history occurred on September 14, 2008 when the remnants of Hurricane Ike moved across Ohio. Damage across Ohio exceeded \$500,000,000. In Mercer County, sustained winds of 50 mph and gusts up to 60 mph caused many downed trees and utility lines. The winds also damaged buildings and crops. A total loss of \$4,900,000 was recorded in the county.

On March 9, 2002, the county experienced a damaging wind event, although much less damaging than the 2008 incident. Wind gusts of up to 80 mph caused significant damage to utility lines, trees, and small structures. Seven people were injured and many people lost power for several hours. Total damages in Mercer County were recorded as \$35,000.

The most recent high wind event in Mercer County occurred April 3, 2016 when a cold front moved into the region, causing significant wind to impact the area. The damage was very limited in Mercer County. According to reports, several trees and power lines were blown down causing approximately \$1,000 in damage.

Table 2-31: Mercer County Windstorm History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Windstorm	9	\$4.953M	0	0	8	\$550K

2.2.9 Winter Storm

A winter storm is a weather event that includes several winter weather hazards and can develop anytime between late fall and early spring. These storms can include any combination of extremely cold temperatures, wind, snowfall, sleet, ice, or rain with temperatures low enough to form ice.

Severe winter storms are frequent in Ohio, and the specific components of each storm is dependent upon the weather conditions at the time. Winter temperatures can be mild and relatively warm (above freezing), or they can fall below zero and stay there for several days. A season may include several fluctuations between cold and warm spells, or a winter may be relatively constant.

A blizzard is a specific type of winter storm characterized by sustained winds or frequent gusts of 35 mph or greater and falling or blowing snow that reduces visibility to less than $\frac{1}{4}$ mile; both of these conditions must be present for at least three hours to be considered a blizzard.

A non-blizzard version of a severe winter storm begins with warmer air followed by very cold temperatures and heavy precipitation. Because weather systems come up into Ohio from the south, initially warm air can cause temperatures to hover at the freezing mark, causing $\frac{1}{4}$ "to $\frac{1}{2}$ " ice (or more) to form on roads, trees, electrical lines, gutters and roofs, and vegetation as precipitation starts out as freezing rain and/or sleet. As the temperatures drop, precipitation becomes snow that adheres to the ice and forms heavy clumps of wet snow that brings power lines, trees, vegetation, and roof gutters down. As fronts move through and winds kick up, while temperatures drop, the heavy falling snow drifts across roads, ice damages trees and buildings, and travel is seriously difficult. This type storm drops 4-6 inches of heavy, wet snow of the county.

The alternate version of an Ohio severe winter storm begins with extremely cold weather (below 10 degrees Fahrenheit) and heavy snowfall, high winds, and extreme cold. A severe storm of this nature would likely pack sustained winds of 15-25 miles per hour, over ten inches of snow, and temperatures below ten degrees Fahrenheit for more than 24 hours. This kind of storm can easily dump a foot or more of snow on Mercer County and disrupt daily activities for several days. Because the ice is not part of this kind of storm, damages are generally less as power lines are not destroyed and structural damage is not severe. However, the amount of snow is challenging in light of the extreme low temperatures. The snow tends to be fluffy and creates deep snowdrifts and blocks roads.

The greatest risk associated with winter storms is the loss of utilities. The elderly and young children are most at risk. When medications, health equipment, and food supplies cannot reach destinations, these populations endure the greatest hardship. Winter storms of this magnitude are relatively rare. Most winter storms are a temporary inconvenience that makes residents uncomfortable. It is extremely rare for casualties to occur, with the exception of traffic accidents that result from dangerous road conditions.

Due to the livestock operations that are prevalent in Mercer County, especially in the southern half of the county, blizzards that close county roads and make ingress and egress impossible for more than a few hours can be costly. Due to industry regulations, dairy farms are unable to store milk for extended periods of time and they are not at all able to process the milk given its very short shelf life. Other livestock, such as beef cattle, pigs, and poultry, require feed to be delivered to the farms frequently. Closed roads and inaccessible barns can cause animals to die for lack of fresh food. Utility outages stop automatic feeders and other electrical equipment on the farms, further extending the damages related to blizzards. Livestock can freeze to death, die of dehydration when water supplies are frozen, and starve when food isn't accessible. Severe winter weather is a risk across Ohio. All areas of the state are susceptible to winter storms that bring heavy snow, high winds, and/or ice. These storms range from short, mild bursts of snow and ice to cold snaps with significant snowfall that last several days. In Mercer

County, winter storms are a countywide hazard and can affect all areas and jurisdictions. The most common winter storms include a combination of hazards, such as ice and snowfall. The ice begins to accumulate as temperatures fall before turning to snow, creating a layer of ice under the snowfall. Sleet and ice make roadways slick and dangerous, increasing the potential for vehicular accidents. Road crews are challenged to clear snow and ice from roadways and maintain safe transportation routes for residents. Ice storms can occur independent of other winter weather hazards but this is not common. If temperatures hover near the freezing point, precipitation can freeze and accumulate on trees and power lines. This can lead to power outages when the branches and lines can break. Extreme cold temperatures can occur without other accompanying winter weather hazards but this is relatively rare. When it does occur, the incident is generally of a short duration and is an inconvenience to residents and businesses. Little physical damage generally occurs to buildings or infrastructure.

Mercer County experiences multiple winter weather events every year. However, these incidents are rarely severe enough to cause property damage. The county has experienced 69 events since 1950, per NCDRC records. Collectively, these incidents have caused \$550,000 in property damage. Five of these incidents have been considered ice storms and two were classified as blizzards; zero incidents were categorized as extreme cold events. Although less common, the ice storms and blizzards did not contribute to higher damage statistics than typical winter storms. None of these incidents were identified in the NCDRC statistics to have caused any documented property loss.

Local Winter Storm History

The only winter weather event recorded by NCDRC that caused significant property damage in Mercer County occurred on January 6, 1996. The “Blizzard of ‘96” began in the Gulf Coast region and moved northeast towards the east coast of the United States. In Ohio, the storm’s impact was most severe in southern Ohio where roofs collapsed due to excessive snowfall and blowing and drifting snow and extremely cold temperatures caused traffic accidents and forced businesses to close for several days. Statewide, damage from this storm was nearly \$15,000,000. In Mercer County, damages were limited to \$500,000 and there were no injuries or fatalities.

For most of Ohio, the most significant historical winter weather event is the Blizzard of 1978. Mercer County, and most of northern Ohio, was severely impacted by this storm. On January 26, 1978, two low-pressure systems combined over Ohio to produce record-breaking snowfall, winds of up to 70 mph, and extremely low temperatures. In Mercer County, approximately fifteen inches of snow fell on top of the twelve inches already on the ground from a previous snowfall. The high winds caused blowing and drifting so severe that roads were impassable and buildings were buried. Roads were impassable for almost a week and schools remained closed for six days. Most businesses were forced to close because transportation was at a standstill until roads could be cleared. As Mercer County weathered the storm, residents opened their homes to stranded motorists and neighbors helped one another dig out from the blizzard. To date, this remains the worst winter weather event in Mercer County’s history.

Since 2014, Mercer County has experienced more than twenty winter weather incidents. None of these incidents, however, led to any measurable property damage, injuries, or fatalities. These incidents have inconvenienced residents with hazardous road conditions and school closings but have had little long-term impact.

Table 2-32: Mercer County Winter Storm History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Winter Storm*	69	\$550K	0	0	0	\$8K
Extreme Cold	0	0	0	0	0	0
Ice Storm	5	0	0	0	0	0

*Includes all incidents with blizzard conditions, extreme cold, ice storm, and winter storm.

2.3 VULNERABILITY ASSESSMENT

While the committee developed a countywide prioritization that includes hazard consequences in the unincorporated areas of the county (townships and neighborhoods) as well as the municipalities in their conclusions, the municipalities took into account only their individual jurisdictional perspective on each hazard. The county mitigation strategies therefore were based upon the vulnerabilities of the entire county as well as those associated with the unincorporated areas like townships and rural neighborhoods. The municipal strategies were based upon the municipality only.

2.3.1 Floodplain Mapping and the National Flood Insurance Program

Mercer County participated in countywide floodplain modernization with ODNR in Fiscal Year 2008 as part of FEMA's Map Modernization process. A scoping meeting was held on October 10, 2010 and culminated with revised maps becoming effective on May 16, 2012. Subsequent to this process, several watersheds in Mercer County were identified for study under FEMA's Risk MAP process. The Auglaize and Upper Great Miami watersheds began this process in late 2010 with Discovery Reports finalized in June 2011. The Upper Wabash watershed Risk MAP process began in 2015; the final Discovery Report was published in December 2016.

The table below provides information on participation in the National Flood Insurance Program for communities in Mercer County according to the FEMA Community Status Book Report for Ohio.

Table 2-33: National Flood Insurance Program Participation

Community	Init FHBM Identified	Init FIRM Identified	Curr EFF Map Date	Reg-Emer Date
Mercer County	02/14/1975	09/06/1989	05/16/2012	09/06/1989
Celina	04/12/1974	03/18/1974	05/12/2012	03/18/1986
Coldwater	06/07/1974	05/16/2012	05/16/2012(M)	02/02/1984
Fort Recovery	06/07/1974	05/01/1987	05/16/2012	05/01/1987
Mendon	06/14/1974	05/16/2012	05/16/2012	11/15/1985
Montezuma	08/09/1974	04/15/2002	05/16/2012	02/01/1986
Rockford	04/12/1974	02/01/1986	05/16/2012	02/01/1986
St. Henry	In Process			

St. Henry is in the process of joining NFIP; the local resolution has been adopted and the village is currently working with FEMA to finalize their participation. Burkettsville and Chickasaw do not currently participate in NFIP because they have no identified flood hazard areas.

2.3.2 Repetitive and Severe Repetitive Loss Structures

Some structures in Mercer County are identified as repetitive loss properties that have experience multiple losses. The table below lists the structures that have been identified through repetitive loss claims. There are no severe repetitive loss structures in the county.

Table 2-34: Repetitive Loss Properties

Community	Properties	Losses	Building Payments	Contents Payments	Total Payment
Mercer County	6	19	\$224,025.53	\$23,060.58	\$247,086.11
Fort Recovery	1	2	\$5,000.00	\$17,422.12	\$22,422.12

Additional repetitive loss and/or severe repetitive loss structures may still exist in Mercer County, especially since changes occurred in floodplain mapping and unidentified structures may now fall inside the flood plain due to changes.

Six of the seven repetitive loss structures in Mercer County are believed to be single family homes. All of these residential structures experience flash flooding when sustained heavy precipitation reaches five inches or more over a couple days. They are owner-occupied and floodwaters reach the living spaces, damage is done to the homes' foundations, furnaces, and utility systems. Floodwaters move into the living spaces of the homes, sometimes reaching several feet of water. Contents of the homes have been completely destroyed in the past. Due to the rapid onset of the flooding, property outside the home such as vehicles, lawn equipment and other items have been destroyed as well because there was not sufficient time to remove it. This information was provided anecdotally by landowners; Mercer County does not have access to FEMA BureauNet or claims information.

A commercial property in the county is believed to have been closed and no longer in operation. The other commercial property in Ft. Recovery has made changes to storage and

use of specific areas. The building and property still floods, but the owner has made changes that prevent significant damage to contents as occurred before. Again, this is anecdotal information because data is not available to Mercer County.

2.3.3 Mercer County

Mercer County's primary concern is flooding, and flash flooding in particular. The type of precipitating event of most concern is an extended period of exceptionally heavy precipitation that results in a combination of riverine and flash flooding. The highest elevation in Mercer County is at its extreme southwestern boundary on the Mercer-Darke county line between Union City Road and Jenkins Road. The lowest point in Mercer County is almost directly north on the Mercer-Van Wert County line just east of Hill Road. The difference in elevation is approximately 270 feet. Therefore, runoff naturally flows from north to south through the various sub-watersheds.

There are many waterways that include streams, ditches, and rivers and these waterways carry runoff effectively away from settled areas and assets. Because the terrain is so flat, most farm fields are tiled. While this allows for rapid drainage to occur, it can overload and flood the ditches, streams and rivers as water reaches the waterways faster than the waterways can take it downstream. This can cause back up into fields and farmsteads, washing out crops and stranding or drowning livestock at pasture. Due to the limited absorption capability of the soils and the flat terrain that lacks drop in elevation to facilitate runoff, water accumulates very rapidly in streets and roadways, low-lying areas, parking lots, and in buffer zones around rivers. Storm sewers and wastewater treatment facilities can be overwhelmed by fast-falling heavy precipitation, backing water up into streets, driveways and parking lots, and homes. Because most of the county lies at the top of a watershed, the rivers and streams are generally effective in carrying the water away once it reaches the waterway; however, the flow of those rivers is dependent upon those downstream to keep the debris and settlement out of the river to facilitate flow through the entire watershed area. If others downstream are negligent or ineffective in maintaining the waterways, Mercer County could incur severe damages when runoff is not able to drain in a timely and effective manner.

Because Mercer County is flat, it is also open to the winds that come up from the southwest and across from the west, blowing hard and damaging properties, buildings, and infrastructure. Farm grain bins, elevators, and legs to the bins are especially vulnerable. If the winds come in the form of strong straight-line winds or tornadoes, the damage to property can be extensive. There is nothing to protect it. No elevation change breaks up storms; no forested areas provide a windbreak; no natural sanctuary exists to protect Mercer County farms, churches, and other facilities from strong Ohio winds.

Winter storms present a serious, but generally short-lived, threat for Mercer County. Livestock is a big part of the agricultural base of the county. Especially in the southern half of the county, farms produce cattle, pigs, and poultry. Feeding of the livestock is an automated process on many farms, and their mechanization is dependent upon feed delivery on a regular basis and a

working power system to power the process. When power goes out and roads are blocked or closed, neither of those segments of the process can occur. Shutdown can be deadly and expensive. Dairy cattle produce milk that must be hauled away on a frequent schedule to processing plants. The cattle are milked whether the product can be hauled away or not, and farmers have very limited storage for the unprocessed milk. The milk has a short shelf life when it is raw product, so lack of open roadways and accessible barns can be disastrous. When farmers cannot feed their herds and milk their cows, the agri-business partners like milk haulers, processors, and feed suppliers are affected too. The winter storm that closes roads for a few days is inconvenient for almost everyone, but it is expensive and deadly for farmers.

Severe thunderstorms can be damaging events. Storms can develop suddenly and often include heavy precipitation, strong winds, occasional rotational winds, lightning, and sometimes hail. Thunderstorm cells can sneak up quickly and with little warning. In Mercer County's primarily rural landscape, notification can be problematic because the population is not heavily concentrated in many geographic areas, making the installation and use of outdoor warning sirens a challenge. Thunderstorm damages can include toppled buildings, damaged roofs, and uprooted trees. Crop damages and livestock injuries are not uncommon when hail and high winds are involved. The solid agricultural base of Mercer County's economy makes a farm loss into everyone's loss. Lightning can strike farms, and with heavy loads of hay and straw in haymows and corn in bins, farm products can be ruined quite easily before they reach markets or feeding systems. Flattened corn, wheat, and soybeans from severe wind, destroyed stalks and stems that feed the fruit of crops delivers a severe blow to the economy in this farming community even if structural damage and fires are not a part of the destruction. Early growing season storms can flood germinating plants, drown tiny sprouts, and saturate soils and wash away fertilizers, herbicides and pesticides. Hail can strip plants of their fruit, and destroy the plant structure that allows for the maturation of the rest of the plant. Severe storms can be devastating when they strike hard and heavy at the wrong time.

The invasion of the Emerald Ash Borer has taken out many trees in Mercer County. Many more are weakened by the bug and will come down at the slightest threat. They end up as debris, blocking roads and streets, falling on houses and buildings, and requiring extensive work by the jurisdictions to clear the debris. The greatest difficulty with downed trees is when the debris damages utility poles and systems, causing power outages that affect livestock and farms as well as individuals and businesses.

Mercer County does not have significant history of drought or extreme heat incidents, and the water supply is reliable and plentiful enough to withstand the typical dry spell that strikes Ohio. These are threats and are possible, but rank low on the probability and damage assessment scale.

Earthquake is similar. While Ohio on occasion experiences some gentle rumbling, there is no significant history of earthquakes, and there is almost no recorded damage, at least not near Mercer County.

Dam failure is possible because the county does have several dams. Most are upground reservoirs maintained by municipalities as part of their water treatment systems. The other dams are maintained by the Ohio Department of Natural Resources, and are considered to be in excellent repair. There is no emergency plan on record for the Grand Lake St. Marys dam and spillway; the Ohio Department of Natural Resources is responsible for this plan and Celina city officials are working with them to complete a plan. The Class I dam in the very southwest corner of Mercer County, the Upper Wabash #3 Pond, is classified as it is because there is one seasonal home, a vacation cottage, in the nearby downstream area. This home is only occupied for a few weeks each year. There are no vulnerabilities otherwise in infrastructure, roadways, railways, or critical infrastructure. This dam is monitored by the Wabash River Conservancy District, and they are responsible for its maintenance, repair, and any warnings associated with an imminent dam failure.

There is no history of a problem with any of the dams in Mercer County, and therefore they rank low on the scale of threats. There are no levees in Mercer County.

2.3.4 Jurisdiction Vulnerability

While Mercer County has many common factors across the county, each municipality has its own unique vulnerabilities based upon the characteristics of the jurisdiction. Some villages are bedroom communities, while others are a haven of industrial and commercial productivity. Some areas receive more runoff from storms, and therefore have flash flooding when others have none. The following section describes each unique community and how the hazards were ranked, with 1 being the most disruptive and 9 being least concerning.

Burkettsville

The village of Burkettsville sits on the southern county line shared between Mercer and Darke Counties. This small community is affected most severely by power outages and debris from wind or flash flooding of the streets and highway. They are not prone to flood damages because they sit very high on the watershed with the highest point in the county just a couple miles to the west. Water drains into Ward Ditch and the Wabash River, and unless those waterways become blocked by excessive debris, the water moves out quickly. Sewer systems are linked to the St. Henry Village system. Water is supplied by individual wells, and there is no history of significant water supply problems. In a severe wind incident or winter storm, the village is remote and distant from other municipalities, and is a borderline community for both Darke and Mercer County. Therefore, it could take some time for power restoration in the most severe of incidents, but those are not frequent.

The Village of Burkettsville ranked hazards and threats as follows:

Table 2-35: Burkettsville Hazard Rank

Rank	Hazard
1	Windstorm
2	Flood
3	Severe Thunderstorm
4	Tornado
5	Severe Winter Storm (Blizzard)
6	Invasive Specie
7	Drought/Extreme Heat
8	Earthquake
9	Dam Failure

Celina

The City of Celina is centrally located on the east side of Mercer County and wraps around the northwest side of Grand Lake St. Marys. It is most affected by flash flooding and some riverine flooding; the streets will fill with water and excess will move into basements in homes, parking lots, and other low-lying areas after a heavy and rapid or an extended rainfall. Some commercial areas sit in vulnerable spots, and become inoperable until the water drains. The major roads that pass through Celina will flood and often are closed for a period of time until the water recedes. While there have been only a few severe sustained rain events in the past, flooding can persist for a couple days and severely hamper business and daily activities. It is rarely life threatening. Beaver Creek floods at times, but otherwise the flooding is all flash flooding. The city exercises extreme care in development of areas that flood, especially any area that are included in the floodplain.

Celina has significant risk of damage due to wind, be that a tornado or a straight-line wind event, or wind during a snowstorm and ice event. The land is flat across the entire county, and the wind and storms can sweep fast and furious as they move into Ohio from the southwest. Debris, damaged roofs and buildings, and commercial structures incur damage. In 2011, a tornado did significant damage to several businesses in the city, and tore through the mercantile section of the city on the east and north sides of town. Tree debris is a common nuisance, and requires a great deal of city effort to manage after any wind event. The infestation by the Emerald Ash Borer has increased the susceptibility of the trees to wind damage. Power outages are most likely to be caused by downed trees.

Winter storms pose difficulty in handling the plowed snow from streets and other properties. If ice falls before or after the snow, it adds a level of response that can become difficult for extended periods of time, or when multiple events follow one another without warming breaks between.

While it is a remote possibility, the failure of the dam at the lake could cause significant life and property threat. The dam is maintained by the Ohio Department of Natural Resources, and there are no suspected problems in spite of the fact that no emergency plan has been

completed. While the likelihood is very low of any incident, it is possible, especially if combined with a minor earthquake or deterioration of the structure for other reasons.

Celina has ranked the threats and hazards as follows:

Table 2-36: Celina Hazard Rank

Rank	Hazard
1	Windstorm
2	Tornado
3	Severe Thunderstorm
4	Severe Winter Storm (Blizzard)
5	Flood
6	Dam Failure
7	Invasive Species
8	Drought/Extreme Heat
9	Earthquake

Chickasaw

This small village is prone to wind damage because it sits at one of the highest points in the county. The wind in any kind of storm can whip trees and properties, doing extensive damage in a short time. Because the community is a distance from the center of the county, it can become isolated and cut off from resources. Therefore, anything that causes debris, blocks roadways, or separates the residents from outside sources can be a critical situation. Trees damaged by disease cause them to fall and block roads, damage homes, and impede drainage. The elevation causes flooding to be of little concern, and they are not exposed to any water control structures, high buildings that could cause damage in earthquakes, or compromised water supply. Therefore, wind poses the greatest threat in Chickasaw.

Chickasaw has ranked the threats and hazards as follows:

Table 2-37: Chickasaw Hazard Rank

Rank	Hazard
1	Windstorm
2	Severe Thunderstorm
3	Tornado
4	Severe Winter Storm (Blizzard)
5	Invasive Species
6	Flood
7	Drought/Extreme Heat
8	Earthquake
9	Dam Failure

Coldwater

The village of Coldwater is the second largest municipality in the county, and the local hospital is in Coldwater. This community is a well-developed and diverse collection of residential and

business areas, and that brings with it the need for open roads and high quality streets. The community is prone to wind damage because it is relatively high without significant windbreaks or forested land. Farm fields surround the community and wind damage includes crop fodder and animal waste in sewers, yards, and drainage. The village is well landscaped, and invasive species have destroyed many of the trees, causing a storm damage situation and a public expense when storms come through to clear streets and roads of downed trees.

Coldwater has ranked the threats and hazards as follows:

Table 2-38: Coldwater Hazard Rank

Rank	Hazard
1	Flood
2	Windstorm
3	Tornado
4	Severe Thunderstorm)
5	Severe Winter Storm (Blizzard)
6	Invasive Species
7	Dam Failure
8	Drought/Extreme Heat
9	Earthquake

Fort Recovery

Fort Recovery sits atop Mercer County at the headwaters of the Wabash River. As the river races through town and reaches the commercial and service lifeblood facilities, flooding can cause a serious problem. Fort Recovery has already demolished and moved numerous homes and critical facilities to remove them from dangerous locations. Farm suppliers and some production facilities remain close to the river's edge and that makes flooding a significant threat.

The community is prone to wind damage, having little protection from damage to roofs, buildings, and crops. Any severe storms seem to bring lots of rain and wind, and therefore rank very high on this little community's list of threats. Invasive species have destroyed many trees here, increasing the threat of debris damage and drainage blockages in rivers and streams.

A Class I dam is close to Fort Recovery, but there is no reason to believe this is a significant threat as long as it is maintained in the current condition. An emergency plan is in place.

Fort Recovery sits at the juncture of several state highways, and a significant amount of transportation services move through town each day as goods are hauled in and out of Mercer County. Open roads, free from debris and snow, are a critical part of that commercial infrastructure. Therefore, severe storms are a concern and a reason for this village to react quickly.

Fort Recovery has ranked the threats and hazards as follows:

Table 2-39: Fort Recovery Hazard Rank

Rank	Hazard
1	Flood
2	Windstorm
3	Tornado
4	Severe Thunderstorm
5	Severe Winter Storm (Blizzard)
6	Dam Failure
7	Invasive Species
8	Drought/Extreme Heat
9	Earthquake

Mendon

Mendon is a bedroom community on the northeast side of Mercer County. Many residents work out of the county in nearby factories and services, and depend upon the roadways and streets to be able to come and go, as they need to. Flash flooding is a concern as the gravity-based drainage can be overwhelmed quickly. Any severe storm, especially those that have significant wind, can be very damaging to this village and its property. Landscaped with many old trees, the Emerald Ash Borer has destroyed many trees, making debris and removal of dead trees an issue for Mendon. This village is diligent about keeping the streets and trees well maintained, and works to keep utilities in good repair. However, a severe storm of any kind could easily overwhelm them and cause a serious lack of adequate resources to respond.

Mendon has ranked the threats and hazards as follows:

Table 2-40: Mendon Hazard Rank

Rank	Hazard
1	Flood
2	Tornado
3	Severe Thunderstorm
4	Severe Winter Storm (Blizzard)
5	Invasive Species
6	Flood
7	Drought/Extreme Heat
8	Earthquake
9	Dam Failure

Montezuma

Montezuma lies on the south and southwest side of Grand Lake St. Marys, and is home to the majority of the tourist trade in Mercer County. Sharing the industry with Celina, Montezuma is populated by part-time homes, mobile homes, cottages and cabins, and other vacation rentals used while the sun shines and temperatures climb. To serve these individuals, there are numerous lakeside businesses that sell food, camping supplies, beer and wine, fishing gear, and other items used recreationally. This is all at risk when the wind kicks up, the waters begin to

rise due to heavy rainfall or a northeasterly strong wind blows the water into otherwise manageable properties. The nature of some of the structures is more vulnerable than typical homes that are occupied year-round, and the fact that they are at time vacant increases the chance of property damage.

The dam that maintains the water levels in Grand Lake St. Marys, if breached, could cause significant damage and even death in Montezuma. Residents are constantly aware of any water threats, including any kind of problem with the dam. This dam is maintained by the Ohio Department of Natural Resources, and its operation maintains adequate water levels in the lake. While there is no obvious reason to believe that a threat exists or is in any way imminent, there would be severe damage if the dam failed for any reason.

Montezuma has ranked the threats and hazards as follows:

Table 2-41: Montezuma Hazard Rank

Rank	Hazard
1	Windstorm
2	Tornado
3	Flood
4	Severe Thunderstorm
5	Severe Winter Storm (Blizzard)
6	Dam Failure
7	Drought/Extreme Heat
8	Invasive Species
9	Earthquake

Rockford

Rockford sits in the far northern part of Mercer County, amid several reserve areas that speak of Ohio’s Indian lore. Where the St. Marys River winds through town, US 33 cuts through as a route for trucks and other large haulers to carry goods into Ohio from Indiana. The landscape of trees and foliage makes the village prone to damage from wind of any kind, easily resulting in the tossing-about of limbs and branches. The Emerald Ash Borer has taken its toll on the trees that line the river, the highways, and the residential areas and they fall without much push from Mother Nature.

Any kind of severe weather event can cause Rockford difficulty. Wind downs trees and damages buildings. Severe rain can cause flash flooding and some neighborhoods will flood in the worst storms, causing residents to pack up and move temporarily while water drains away. The twists and turns in the interstate and the village streets can become congested and flooded when water comes hard and heavy.

Rockford has ranked the threats and hazards as follows:

Table 2-42: Rockford Hazard Rank

Rank	Hazard
1	Windstorm
2	Tornado
3	Invasive Species
4	Flood
5	Severe Thunderstorm
6	Severe Winter Storm (Blizzard)
7	Drought/Extreme Heat
8	Earthquake
9	Dam Failure

St. Henry

St. Henry is a neat, tidy and busy village in the south-central area of Mercer County. This community sits at the top of Coldwater Creek and just south of the Wabash River. It’s well designed and developed neighborhoods, its new and renovated businesses and small factories, and its service and retail businesses are all located on wide and well maintained streets. However, these streets are prone to flash flooding when rain comes quickly, or when rain is sustained over many days. Out in the midst of farmland, debris and fodder wash into town and block the drainage system, impeding the movement of runoff waters out of yards, neighborhoods, and parking lots or streets

The village sits out by itself without a lot of forest or wind breaks, and is therefore susceptible to wind damage from high wind, tornado, or other severe storms. Ice can be a common part of storms that come during seasonal transitions, complicating the management of roads and utilities. The village has been impacted by tree disease, making the trees more vulnerable to falling when winds kick up. Wind, water, and temperature are what threaten this village the most.

St. Henry has ranked the threats and hazards as follows:

Table 2-43: St. Henry Hazard Rank

Rank	Hazard
1	Flood
2	Windstorm
3	Tornado
4	Severe Thunderstorm
5	Severe Winter Storm (Blizzard)
6	Invasive Species
7	Drought/Extreme Heat
8	Earthquake
9	Dam Failure

The following chart is a summation of the previous rankings for ease of use.

Table 2-44: Jurisdictional Vulnerability

Hazard	Mercer County	Burkettsville	Celina	Chickasaw	Coldwater	Fort Recovery	Mendon	Montezuma	Rockford	St. Henry
Dam/Levee Failure	8	9	6	9	7	6	9	6	9	9
Drought/Extreme Heat	7	7	8	7	8	8	7	7	7	7
Earthquake	9	8	9	8	9	9	8	9	8	8
Flood	3	2	5	6	1	1	6	3	4	1
Invasive Species	6	6	7	5	6	7	5	8	3	6
Severe Thunderstorm	4	3	3	2	4	4	3	4	5	4
Tornado	2	4	2	3	3	3	2	2	2	3
Windstorm	1	1	1	1	2	2	1	1	1	2
Winter Storm	5	5	4	4	5	5	4	5	6	5

2.4 RISK ANALYSIS

To estimate disaster losses, a damage profile that considers the potential impact and loss from each hazard is developed. In this section, loss estimates from floods, earthquakes, winter storms, tornadoes, thunderstorms, windstorms, and drought are examined. While the losses from these incidents are often more of a temporary and inconvenient nature, significant disruption to business, some property damage, and loss of life is possible under extreme or unusual circumstances. This information was used to determine Mercer County's risk for each specific hazard.

2.4.1 Dam/Levee Failure Damage Profile

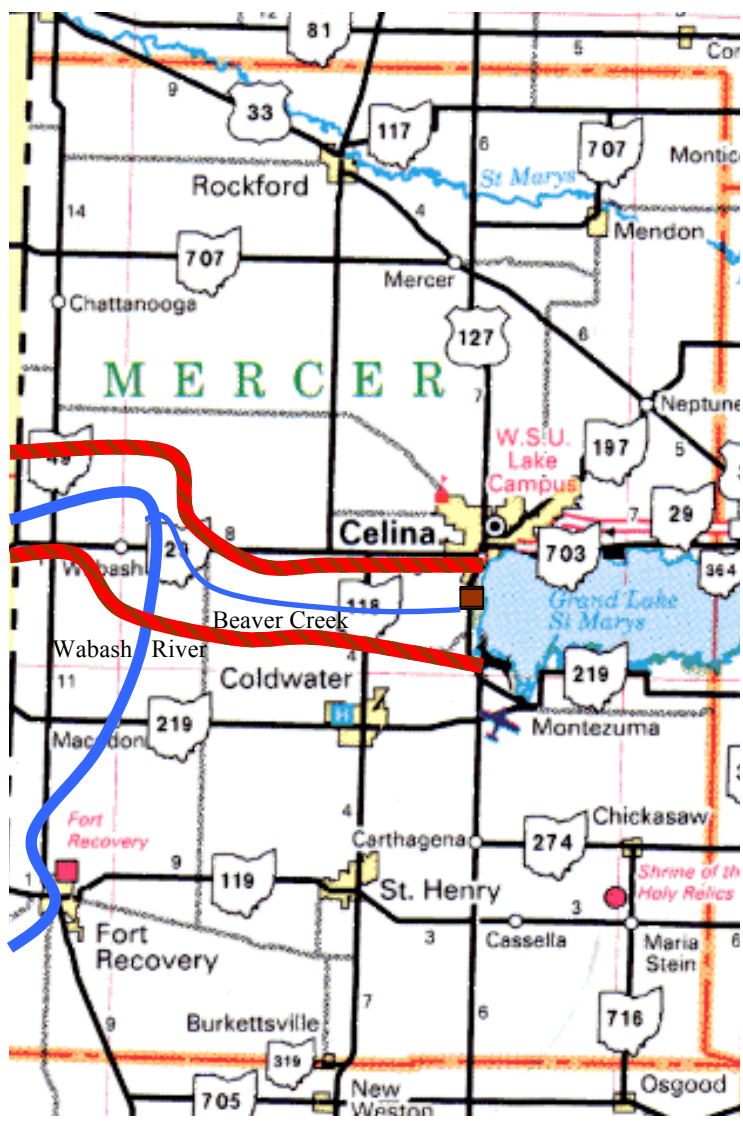
Most of the dams in Mercer County are classified as "other" structures because they are low and narrow, on private property, and do not meet criteria for otherwise classified dams. The only Class I dams in the county are the Upper Wabash Number 3 Pond near Fort Recovery, owned by the Wabash River Conservancy District, and the Grand Lake St. Marys West Embankment near the west side of Celina owned by the Ohio Department of Natural Resources, Division of Parks and Recreation. There is an emergency plan for the Upper Wabash dam but no emergency plan of record for the lake dam and spillway. The Upper Wabash #3 Pond vulnerability is described in the Mercer County

St. Henry and Montezuma have wastewater treatment lagoons and dams that are maintained by the villages, and have emergency plans in place. The Upper Wabash Number 2 Pond is also a Class III dam and is owned and maintained by the conservancy district. There are several low,

shallow structures on private property that are unclassified. There is no history of failure or compromise for any of these structures.

Failure of a class I dam as a result of a natural event is very remote. The depth and size of Grand Lake St. Marys makes major damage from a storm unlikely. The county has no history of natural events, such as earthquakes, impacting the stability of the dam structure. If a catastrophic failure did occur, major damage would occur downstream along the Beaver Creek. Agricultural land, homes, and farm buildings are prevalent in the downstream area. Several commercial and residential structures are located in the area immediately adjacent to the dam. These include an apartment building, medical center, and other commercial structures. A total loss of these facilities would be anticipated in a dam failure incident, resulting in more than \$100 million in losses.

Map 2-9: Class I Dam Failure Damage Zone



The Class I dam in the very southwest corner of Mercer County, the Upper Wabash #3 Pond, is classified as it is because there is one seasonal home, a vacation cottage, in the nearby downstream area. This home is only occupied for a few weeks each year. There are no vulnerabilities otherwise in infrastructure, roadways, railways, or critical infrastructure. This dam is monitored by the Wabash River Conservancy District, and they are responsible for its maintenance, repair, and any warnings associated with an imminent dam failure.

The Coldwater Waste Water Treatment Lagoon is a Class II dam. It is an upground earth-fill structure that retains wastewater. This structure is monitored on a weekly basis, or if a problem is discovered in between inspections for a variety of potential problems. These potential problems include earth spillway flows, embankment overtopping, seepage and sink holes, embankment integrity problems, earthquake evidence, security threats, and sabotage. The community has established a system that monitors these situations on a regular basis, watches any indications that appear threatening and issue public watch notices if necessary, and then issue warnings to evacuate property if a breach or failure is imminent. This plan is updated on a regular basis, and was most recently updated in 2015. The community's vulnerability is significant if a severe and total failure were to happen, and vulnerability would be limited. Specifically, the public water system could be impacted, three structures classified as "high value" could be impacted, and one railroad tracks and one rural building could be affected. Two adjacent properties have been determined as no significant hazard noted. The likely damages from a dam failure would be low according to this emergency action plan.

The Montezuma Waste Water Treatment Lagoons are Class II dams. Both are upground earth-fill structures that retain wastewater. These structures are monitored on a weekly basis or if a problem is discovered in between inspections for a variety of problems. These potential problems include earth spillway flows, embankment overtopping, seepage and sink holes, embankment integrity problems, earthquake evidence, security threats, and sabotage. The community has established a system that monitors these situations on a regular basis, watches any indications that appear threatening and issue public watch notices if necessary, and then issue warnings to evacuate property if a breach or failure is imminent. This plan is updated on a regular basis, and was most recently updated in 2015. The community's vulnerability is outlined in the emergency plan for the dam. Under severe failure conditions, the public water supply could be threatened by contamination, one property designated "high value" could be impacted, and two local roadways could be closed or damaged. There are two properties where no potential hazard is identified in the dam emergency plan document.

The St. Henry Waste Water Treatment Lagoon is a Class II dam. It is an upground earth-fill structure that retains wastewater. This structure is monitored on a weekly basis or if a problem is discovered in between inspections for a variety of problems. These potential problems include earth spillway flows, embankment overtopping, seepage and sink holes, embankment integrity problems, earthquake evidence, security threats, and sabotage. The community has established a system that monitors these situations on a regular basis, watches any indications that appear threatening and issue public watch notices if necessary, and then issue warnings to evacuate property if a breach or failure is imminent. This plan is updated on a regular basis,

and was most recently updated in 2015. The community’s vulnerability is somewhat limited due to the location of the dam. Under reasonably anticipated dam failure circumstances, the public water supply could be interrupted, two separate sections of roadway could be damaged, and one property designated “high-value” could be impacted. There are several structures in the dam emergency plan that are identified as having no noted hazard vulnerability.

2.4.2 Drought/Extreme Heat Damage Profile

Mercer County can experience slight drought and regularly experiences periods of decreased precipitation during the growing season for area farms. The climate is moderate and does not turn arid at any time. There is no history of an extended drought that would cause casualties or property damage more significant than a reduction in crop yields for a single growing season nor is there any history of extensive crop losses in excess of a single crop year. Precipitation patterns can cause a series of years to have higher or lower average yields due to slight dryness, late planting due to excessive rainfall, or late harvest due to rainfall.

For the purpose of loss estimates, only the major cash grain crops were considered because those crops constitute the majority of production in Mercer County and are consistently produced in the expressed acreages from year to year. Production livestock can be sold in spite of drought; other cash crops such as cucumbers, tomatoes, and vegetables are heavily insured. While many farmers purchase crop insurance for all crops, including grain, data does not exist to determine the percentage of crops that are insured in Mercer County.

Based on the U.S. Department of Agriculture’s 2012 Census of Agriculture, Mercer County’s agriculture industry has a total market value of \$596,366,000. Of this total, \$153,143,000 (26%) comes from crops and \$443,223,000 (74%) comes from livestock. In a drought, these commodities would all be exposed to loss. Table 2-46 identifies the quantities of the primary agricultural commodities in the county that would be exposed to drought-related loss.

Table 2-46: Drought Vulnerability Assessment

Commodity	Crop Acres	Livestock Counts
Soybeans	103,534	
Corn (for grain)	94,680	
Wheat	17,213	
Corn (for silage)	1,427	
Layers		7,948,740
Turkeys		1,408,779
Pullets (laying stock replacement)		878,002
Hogs/Pigs		261,390
Cattle/Calves		66,024

2.4.3 Earthquake Damage Profile

Earthquakes are geologically possible but not common in Mercer County. The county has experienced several earthquakes in that past, although these have all been very minor and have

caused no known damage. As such, there is little data to support committing extensive resources to earthquake-proofing buildings and other structures.

Because of the low risk and high cost of implementing mitigation strategies related to earthquake risk, the planning team did not identify any such actions. As they arrived at this decision, they considered historical earthquake damage data and HAZUS loss projections for a 5.4 magnitude earthquake with an epicenter in Celina. Table 2-47 is the vulnerability analysis made available to the committee.

Table 2-47: Earthquake Scenario Vulnerability Analysis

Building Type	Number of Buildings	Exposure
Residential	1,749	\$269,660,719
Non-Residential	973	\$150,139,833
Critical Facilities	38	\$5,863,632
<i>Totals</i>	2,760	\$425,664,184

2.4.4 Flood Damage Profile

Mercer County is vulnerable to minor to moderate damage from floods. The areas most likely to sustain flood damage are those adjacent or in close proximity to waterways, including some low-lying roadways and areas close to storm sewers that may be undersized or inadequate to handle runoff from heavy precipitation events. One area in Butler Township where the Coldwater Creek was artificially re-routed to supply Grand Lake St. Marys with water is exceptionally prone to serious flooding with extensive damages.

Incapacitating or damaging flooding in Mercer County is generally the result of several days of heavy precipitation, and perhaps exacerbated by sudden melting of snow and ice or over-saturation of the soils prior to the start of rainfall. As the water accumulates, it is unable to get away as fast as it comes, and flash flooding occurs in the streets, highways, some low-lying properties, and vulnerable commercial properties. Most residential damage is limited to flooded basements and access issues in general, excepting for several homes to the southwest of Celina where a creek was re-routed and water seems to seek the original watershed when precipitation is excessive.

There is some thought that tiled fields allow the runoff to reach communities at a faster pace than in years past, causing street and highway flooding to be worse than it used to be. Some residents believe this, and others feel it is falsely assigned. Some residents feel that the rainfall is more intense and more frequent than it used to be. There is also concern that field fodder and debris from fallen trees (caused by a severe infestation of Emerald Ash Borer) washes into storm drains and clogs the storm sewers in many of the villages and developed portions of townships where they have storm sewers. There is a general opinion that when culverts and bridges are replaced, the new structures should be larger and have greater capacity. Whatever the cause, flash flooding and the sewer capacity is more challenged than in the past, and this makes flash flooding more serious even though it is still a temporary condition.

Flood damage in Mercer County could include damage to and destruction of physical buildings, infrastructure, crops, and livestock. With so much livestock in the county, pastured animals could easily be trapped away from food and shelter, causing a serious threat to their well-being. Residential structural damages could include damage to single and multi-family homes, group living facilities, and multi-family housing complexes. Commercial and industrial structural damages could include buildings used for manufacturing, product handling, transportation, warehousing, retail, business, and industrial, and the capital equipment associated with those uses. Agricultural structures would include barns used for livestock, equipment storage, and commodity storage, as well as the contents of those buildings, which constitute business assets such as production animals, equipment, and machinery. Grain bins, transfer legs, and elevator systems could be damaged very easily by the force of water. Government, nonprofit, and educational institutions include critical structures like fire stations, police stations, hospitals, offices, schools, and special facilities like garages and maintenance buildings, and the capital contents of those structures.

Actual structural damage could include flooding of basements and ground level floors, compromise of the foundations and utility systems, and destruction of the contents of those structures. People are at risk from floodwater because household and industrial chemicals substances can contaminate floodwater and result in hazardous chemical exposure for rescuers, responders, and victims. Livestock could be significantly threatened by contaminated flood water and have no way to escape or the ability to protect themselves. This damage would result in large amounts of debris to manage, including finish, structural, and foundation materials and animal carcasses and waste.

Many roads can flood for short periods of time in Mercer County, potentially closing businesses and institutions and crippling commerce for a short period of time. This period of business shutdown generally is confined to the floodplain areas and lasts for only a day or two once the rain stops.

Within municipalities, some areas exist where storm sewers are of insufficient size and capacity to handle rapid and heavy downfall. Coldwater, St. Henry, and Celina are particularly vulnerable to this; Fort Recovery and Montezuma can also experience flash flooding under these conditions. Depending on exactly where precipitation is heaviest, if the ground is frozen, saturated, or dry, and how full waterways are at the time of the event, significant flooding can occur on roads, streets, bridges, and neighborhoods. These flood-prone areas are not highly populated with residential or commercial structures but significant inconvenience can result when businesses close, access is cut off, and drainage systems are overwhelmed. In some cases, such as Fort Recovery, there are aboveground tanks of hazardous chemicals or liquid manure pits that can become inundated potentially cause these substances to be dispersed in raging floodwaters. Stored farm chemicals are at risk of being absorbed into the floodwaters, distributed over flooded areas, or damaged and depositing hazardous runoff in floodwater. In some areas, livestock in pastures may be at risk in some areas, depending on which waterways flood, and can become stranded or being injured before the floodwater recedes. Agricultural

land that is heavily tiled drains quickly, facilitating rapid and significant amounts of runoff in ditches, streams, and rivers. This contributes to downstream flooding as the waterways attempt to drain the county.

Countywide flooding in Mercer County would happen only under the most severe of circumstances. As the county sits high on the watershed, the rainfall would have to come in copious amounts to flood the entire county. That being said, a multiple-day heavy rain event of more than 10 inches is suspected to be capable of widespread flooding, especially if it comes early in the spring and is combined with snowmelt and ice melting.

Flooding would occur along the Wabash River as it flows from the southwest corner near Fort Recovery, to the northwest through the rural areas and off toward Indiana. Most of this property is rural farmland and residential areas outside municipalities. The Grand Lake St. Marys watershed area includes the villages of Burkettsville, St. Henry, and Coldwater and the residential areas in and around those communities. The various large creeks and streams and sub-watersheds in that area include the Coldwater Creek, Grassy Monroe, Prairie, Beaver, Big Chickasaw, and Little Chickasaw drainage areas. These would fill and breach their banks, flooding homes and businesses as well as street, roads and highways.

In the Coldwater Creek sub-watershed, there are numerous homes that would flood when Coldwater Creek fails to contain itself at a man-made outside turn that diverts the water into Grand Lake St. Marys. This flood water would very likely breach the earthen structure that is intended to hold it back, race across fields to get to Beaver Creek as Mother Nature intended it to do years ago, and would likely inundate these homes with floodwater. Past incidents indicate that these structures could be moved from the foundations, significant exterior and frame damage would be done, and the contents would be destroyed. Because this breach happens when the force and power of water overcomes a non-engineered earthen structure, it happens quickly and without much warning. Lives could be endangered and lost under the worst of circumstances. It would be reasonable to assume the individuals in this high-risk area could be stranded and in danger, and require rapid water special rescue services to be evacuated. Although lives would be intact, there could be severe injury without extenuating circumstances.

The St. Marys River Watershed would include major municipalities like Celina, Rockford, and Mendon. Celina would be the worst affected, and flash flooding of streets, parking lots, low-lying areas, and basements of homes would be significant. The full and part time residential areas around the lake in both Celina and Montezuma could be inundated with floodwater, displacing many tourists and guests to the county in the warmer months. These lakefront homes could be damaged because many are mobile and modular structures, old structures on concrete slabs, and only partially inhabited throughout the year. Some are rental and lease properties, and owners are remote to the properties and unlikely to take immediate protective actions. There are many businesses and service-based commercial operations in this area. They would likely employ aggressive sandbagging efforts to protect their properties. There would be road closures and bridge/culvert closures, as well as threatened water plants and

other infrastructure. As Beaver Creek would roar through Celina, the water plant and other structures would be protected by sandbags but could incur some damage.

It is unlikely that loss of life would be attributable primarily due to flooding. If a death were to occur, it would likely be the result of two or more combined threats, including lightning, tornado, or driving into standing water. Extensive evacuation of the part-time residences around the lake and the low-lying homes in Celina, Coldwater, St. Henry and Fort Recovery could occur, and would likely be rather short-lived, lasting a day or two rather than a week or more. Power would likely be affected, but again, outages would probably be short-lived and temporary due to the infrastructure improvements done since the severe damages in 2008. The lowest amount of flood damage would likely occur in the extreme northeast where the Auglaize Watershed creeps into Mercer County, and the far southeast corner at the headwaters of the Upper Great Miami is formed in the Loramie Watershed. This land is rural, involves no municipalities and few residences. It is likely damage in these areas would be minimal.

Table 2-48: 100-Year Flood Scenario Vulnerability Analysis

Building Type	Number of Buildings	Exposure
Residential	994	\$445,135,000
Non-Residential	314	\$140,786,000
Critical Facilities	33	\$14,603,000
<i>Totals</i>	1,340	\$600,524,000

2.4.5 Invasive Species Damage Profile

Mercer County is part of what was originally the Black Swamp. As such, there are many wooded areas that not only occupy some of the rural area, but also are incorporated into residential areas in communities and neighborhoods. One of the primary characteristics of the Black Swamp was that it was completely flat, thus the need to “drain the swamp” through creation of water management systems. The other component of flat terrain is that there is nothing there to break the severe winds that blow across the Midwest. This strong wind, oftentimes throughout the year measured at sustained winds of 30 to 40 miles per hour and gusts over 50 miles per hour, can easily down diseased trees. These fallen trees become storm debris, and fall onto homes, cars and trucks, businesses, and anything else in the way. They fall into rivers and streams, impede drainage, and fill waterways with excessive dead debris.

Ohio is rich with all kinds of trees in addition to the trees affected so seriously by the Emerald Ash Borer. There are maples of every sort, birch, oak, and ash trees. There is also other vegetation, along waterways, in landscaping, along roadways and highways, and in areas of natural habitat like parks and recreational areas. Any infestation, of insects or other infectious agents, will cause extreme destruction of these areas. The lakes and streams that carry fish and other aquatic life can be endangered by either plant or animal infestations such as Asian carp or zebra mussels. In the past decade, Grand Lake St. Marys was infested with algal bloom, making the lake unsuitable for swimming or any human or pet contact. This severely affected the tourism industry in Mercer County, and took several years to contain.

This damage is difficult to quantify because it does not affect structures, in general. The cost is made up of removal and disposal of contaminated trees and vegetation, repair of property where fallen trees do damage; cleaning and dredging of waterways that are filled with debris; cleaning of bodies of water; and repair of infrastructure damaged by the infestation. These are expensive tasks, and when done by government providers or large contractors who respond to emergent needs for service, the response can be extremely high, totaling hundreds of thousands of dollars for each and every jurisdiction.

2.4.6 Severe Thunderstorm Damage Profile

Thunderstorms are not uncommon in Mercer County. During summers when heat builds up in the afternoon, a muggy and hot day can easily end with thunderstorms that include hail, lightning and heavy rain and wind. Microbursts often add strong straight-line winds that destroy standing crops ready for harvest. These storms can come on quickly, give little warning, and be very destructive.

Thunderstorms that include hail are generally spotty and inconsistent. The varying temperatures in the atmosphere needed to create hail do not often exist in western Ohio. When hail falls, damage is most frequently done to vehicles, roofs, and siding on buildings. Rarely is there loss of life or significant bodily injury. The winds associated with thunderstorms can damage standing crops, and are most damaging when wheat, soybeans, and corn are ready for harvest. Wheat is harvested in July, but soybeans and corn are not harvested until early fall. Corn is frequently at the pollination stage in July, and any time after stalks are mature, hail and wind can shred and tear the leaves, flatten the stalks, and destroy the ears that are in the formative stages. This situation drops crop production to drastically low levels, causing an extreme loss to farmers for that year's crop.

Thunderstorms are a frequent but low risk hazard in Mercer County. The combination of hail, lightning, precipitation, and wind caused by thunderstorms can inflict damage in any area of the county. Thunderstorms are somewhat common but are typically minor and cause more inconvenience than actual damage. Lightning that directly strikes structures or objects is possible but infrequent. Moderate to severe damage from hail, lightning, and thunderstorm wind, including loss of life and property, is possible but statistics indicate the frequency is extremely low.

When severe thunderstorms are accompanied by tornadoes, damage from the tornadoes is likely to be more significant than that caused by the thunderstorm. Straight-line winds, the result of downbursts and microbursts, can be as destructive as tornado and cause damages similar to those described in the tornado EF scale.

Table 2-49: Thunderstorm Scenario Vulnerability Analysis

Building Type	Number of Buildings	Exposure
Residential	722	\$111,284,000
Non-Residential	228	\$25,196,000
Critical Facilities	24	\$3,651,000
Totals	974	\$150,131,000

2.4.7 Tornado Damage Profile

Mercer County is universally vulnerable to tornado damage. The county is mostly flat or slightly rolling and there is little change in elevation that would cause a tornado to slow down or break apart. Although tornado warnings are issued several times each year, tornadoes do not occur frequently in the county. They are most common in the spring although they can develop throughout the summer and fall. Historically, the magnitude of tornadoes in Mercer County is between EF-0 and EF-1. The county has experienced an EF-4 tornado event that caused significant damage but it is rare for a storm to reach that magnitude.

In Mercer County, there are several thousand mobile homes throughout the county. In the vicinity of Grand Lake St. Marys, there are numerous campgrounds, marinas, condominiums, and cottages that serve part-time seasonal residents and visitors. These structures are more vulnerable to wind damage because they are less secured to the ground than buildings with foundations, have no basement or sub-terrain level, and are lighter weight and made of less wind resistant material than traditionally constructed homes.

The majority of residential structures in the county are constructed from wood, concrete, brick, and stone. Many homes are older and were constructed using limestone and other masonry materials; these homes are built on traditional foundations with basements or crawl spaces. Some newer homes are concrete slab construction without basements or crawl spaces. These homes are most prone to superficial damage, roof damage, and falling trees during tornadoes and severe windstorms.

Commercial buildings are constructed of concrete, brick, concrete block, stone, and wood. These structures are generally built on concrete slabs with structural support trusses and pitched roof construction to facilitate snow and ice melt and runoff. Flat roof buildings, such as shopping centers and big-box type retail stores, are susceptible to heavy snow in blizzard conditions; there is no identifiable history of roof collapse incidents due to snow or ice. Property damage from tornadoes in Mercer County most frequently includes damaged roofs, gutters, downspouts, trees, and, on occasion, and entire building. Mobile homes are damaged or destroyed in the most serious incidents. Outbuildings, barns, and storage buildings can be damaged because these structures are less resistant to wind damage and are frequently built on concrete slabs or dirt foundations.

Table 2-50: Tornado Scenario Vulnerability Analysis

Building Type	Number of Buildings	Exposure
Residential	289	\$44,514,000
Non-Residential	91	\$14,079,000
Critical Facilities	10	\$1,460,000
Totals	389	\$60,053,000

2.4.8 Wind Storm Damage Profile

Wind incidents are somewhat frequent across Ohio, including Mercer County. The county has experienced several high wind events in recent years. These typically damage trees, which lead to obstructed roadways and downed power lines. Crop damage and destruction is also a concern. When high winds damage young and maturing crops, yields can be significantly reduced, which negatively impacts the county's economy.

Table 2-51: Wind Storm Scenario Vulnerability Analysis

Building Type	Number of Buildings	Exposure
Residential	577	\$89,027,000
Non-Residential	182	\$28,158,000
Critical Facilities	19	\$2,921,000
Totals	779	\$120,106,000

2.4.9 Winter Storm Damage Profile

Winter storm damages can potentially affect every home, business, or property in Mercer County. There is no area that is more or less vulnerable to snowfall because there are no hills and valleys that interrupt or redirect precipitation. The flat terrain and consistent elevations allow drifting and blowing snow to cause low visibility across the county. The areas in the southern townships can incur more loss and more disruption due to blizzards, ice, and snow than others because of the livestock operations in this section of the county. Regardless of weather conditions, the animals must be fed, cows must be milked, manure must be removed from barns, and operations must continue. This requires daily ingress and egress to these farms, bringing in food and supplies, and hauling out raw product and waste.

Power outages occur across the entire county during blizzards or snow storms that include significant ice, wind, or heavy amounts of snow. Residential electric lines are mostly above ground and vulnerable to wind and ice, although the power companies have improved the distribution systems since the 2008 and 2012 wind storms. Very few residential properties have buried electric lines; most of these are recent construction. Major supply lines are above ground as they enter Mercer County from the generation plants; therefore, power to the substations is vulnerable to wind and heavy snow and ice even if the residential lines are not. Therefore, power outages are probable, frequent, and can be widespread. The farms with livestock are again much more vulnerable to significant loss; the feeding systems, milking and collection systems, and other critical operations are all based upon an electrical supply to run mechanized equipment. Without electricity, animals are not fed, eggs are not collected, and

dairy cows are not milked. Product goes to waste, animals get sick, and farms lose a lot of income.

In 2014 and 2015, Mercer County, along with much of Ohio and the Midwest, experienced an exceptionally long and cold winter. Seasonal snowfall totals were high, and temperature averages were significantly lower than normal. In spite of the frequent and unusual snowfall and temperatures, Mercer County did not report any property damages or loss of life as a result of the winter storm conditions. The county experienced short-term inconvenience following each incident, including closed schools and business, treacherous travel conditions, extreme cold, and blowing and drifting snow but nothing that impacted the county on more than a temporary, short-term basis. It was difficult to get feed to livestock, to run critical farm operations for livestock, and to operate grain drying and storage equipment during that time. Ingress and egress challenges were an extreme nuisance, but fortunately did not last long enough to cause extensive loss.

The loss estimates for winter storms are relatively low in spite of the recent and memorable winter seasons. There is no identifiable history of property loss due to snow pack, avalanche, or other winter storm related cause. Reasonably anticipated losses from winter storms would include content loss such as food and perishables due to power interruptions. Losses in anything but an unusual, unpredictable incident would not include structures or infrastructure.

Table 2-52: Winter Storm Scenario Vulnerability Analysis

Building Type	Number of Buildings	Exposure
Residential	58	\$8,903,000
Non-Residential	18	\$2,817,000
Critical Facilities	2	\$293,000
Totals	78	\$12,013,000

2.4.10 Countywide Risk Analysis

Based on the available hazard and vulnerability information, Mercer County has risk for damage from a variety of disasters. To determine the county's overall level of risk, each hazard was evaluated and scored based on common criteria. The criteria included frequency, response duration, speed of onset, magnitude, and impact on businesses, people, and property. Table 2-53 describes the overall scale used to score each hazard. Table 2-54 provides details on scale used to measure magnitude. The composite scores for each hazard and their respective rank are identified in table 2-55.

Table 2-53 Assessment Scale

Score	Frequency	Response Duration	Speed of Onset	Magnitude	Business Impact	Human Impact	Property Impact
1	None	< ½ Day	> 24 Hours	Localized	< 24 Hours	Minimum	< 10%
2	Low	< 1 Day	12-24 Hours	Limited	1 Week	Low	10-25%
3	Medium	< 1 Week	6-12 Hours	Critical	2 Weeks	Medium	25-50%
4	High	< 1 Month	< 6 Hours	Catastrophic	> 30 Days	High	> 50%
5	Excessive	> 1 Month					

Frequency

Hazard events that occur regularly are a higher risk than those that occur infrequently.

- 1 = None/Once in 100 years
- 2 = Low/Once in 50 years
- 3 = Medium/Once in 25 years
- 4 = High/Once in 1-3 years
- 5 = Excessive/More than annual

Response Duration

Response duration is defined as the amount time the response to a particular hazard is anticipated to last.

- 1 = Less than ½ day
- 2 = Less than 1 day
- 3 = Less than 1 week
- 4 = Less than 1 month
- 5 = More than 1 month

Speed of Onset

Speed of onset addresses the amount of advance warning a community has before each hazard occurs.

- 1 = More than 24 hours
- 2 = 12-24 hours
- 3 = 6-12 hours
- 4 = Less than 6 hours

Magnitude

Magnitude is rated using standard damage scales such as the Enhanced Fujita Scale, or through development of a local comparative scale that is comparable in damages at like levels using the established damage scales. Some scales from other geographic regions, such as the North East Snow Index Scale, were used as models to develop a comparative tool in Richland County.

Table 2-54: Magnitude Scale

Score	Tornado	Windstorm	Flood	Earthquake	Drought	Winter Storm
1	EF-0/1	<65 mph	Minor	<5.9	D-0 Very Dry D-1 Moderate	<8" snow
2	EF-2	65-75 mph	Moderate	6.0-6.9	D-2 Severe	8-12" snow
3	EF-3	76-85 mph	Significant	7.0-7.9	D-3 Extreme	12-16" snow
4	EF-4/5	>86 mph	Major	>8.0	D-4 Exceptional	>16" snow

Business Impact

Business impact refers to the potential economic impact a hazard event is likely to have on a community. The definition of each score refers to the amount of time critical facilities are likely to be shut down in the impacted community.

- 1 = Less than 24 hours
- 2 = 1 week
- 3 = At least 2 weeks
- 4 = More than 30 days

Human Impact

Human impact is defined as the number of lives potentially lost for a particular hazard.

- 1 = Minimum/Minor injuries
- 2 = Low/Some injuries
- 3 = Medium/Multiple severe injuries
- 4 = High/Multiple fatalities

Property Impact

Property impact is defined as the number amount of property potentially lost during a given hazard event.

- 1 = Less than 10% damaged
- 2 = 10-25% damaged
- 3 = 25-50% damaged
- 4 = More than 50% damaged

The factors identified above were assigned values as described, and rated against anecdotal analysis based upon history and past incidents. This scoring mechanism resulted in very similar assessment of risks and vulnerabilities for the countywide vulnerability analysis.

Each community evaluated their hazards and risks the same way, and results were developed and confirmed for each municipality. Those results are shown in each municipality section; those below are for the county as a whole entity.

Table 2-55: Risk Analysis

Hazard	Frequency	Response Duration	Speed of Onset	Magnitude	Business Impact	Human Impact	Property Impact	Score	Rank
Dam/Levee Failure	1	5	1	0	1	1	2	11	8
Drought/Extreme Heat	3	2	1	1	3	1	2	13	7
Earthquake	1	1	4	1	1	1	1	10	9
Flood	3	3	3	3	1	3	2	18	3
Invasive Species	3	5	1	1	1	1	2	14	6
Severe Thunderstorm	5	3	3	3	1	1	1	17	4
Tornado	3	3	4	3	3	2	1	19	2
Windstorm	5	4	4	1	2	2	2	20	1
Winter Storm	4	3	2	3	2	1	1	16	5